
THE
University of Vermont
MEDICAL CENTER

South Burlington, VT 05403

Outpatient Surgery Center

PROJECT MANUAL

Volume 1 (Divisions 0 – 12 & Appendices)

100% Construction Documents

Project No. 2021073

1/27/2023

PREPARED BY:



E4H ENVIRONMENTS FOR HEALTH ARCHITECTURE
185 TALCOTT ROAD / WILLISTON, VT 05495 / 802.878.8841

SECTION 000102
PROJECT INFORMATION

PART 1 - GENERAL

1.1 PROJECT IDENTIFICATION

- A. Project Name: University of Vermont Medical Center - Outpatient Surgery Center
- B. Project Number: 2021073
- C. The Owner, hereinafter referred to as Owner:
 - 1. University of Vermont Medical Center
 - 2. 199 Main Street
 - 3. Burlington, VT 05410
 - 4. Telephone: (802) 728-7000
- D. Project Description:
 - 1. The UVM Medical Center is planning to construct a new Outpatient Surgery Center to replace the surgical capacity formerly available at the Fanny Allen Campus and handle a wider and more sophisticated variety of surgical procedures and increased projected future surgical volume anticipated over the next 10 years.
 - 2. The design and program for the proposed +/- 84,100 GSF building will include 8 operating rooms and shell space for 4 additional future operating rooms as well as adjacent pre-surgery and post-operative recovery spaces to be located on the ground level floor.
 - 3. Convenient patient access features include a covered drop-off area with a separation of ingress and egress paths for arriving and departing patients. A registration area with an adjoining waiting room will be provided immediately inside the building entrance. Discharged patients will leave through a discrete exit. The facility will have a partial basement level that will host a Sterile Reprocessing area to support the onsite sterilization of instruments and space for sterile storage. A material handling area with a loading dock will be provided to support the delivery of clean linen and surgery supplies and the pick-up of solid waste and recycled materials. The building will be designed to accommodate the logical internal expansion of four additional operating rooms.

1.2 PROJECT CONSULTANTS

- A. Refer to Section 000103 - PROJECT DIRECTORY.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 000103
PROJECT DIRECTORY

PART 1 - GENERAL

PROJECT TITLE

University of Vermont Medical Center - Outpatient Surgery Center

TEAM DIRECTORY

Owner:

University of Vermont Medical Center
111 Colchester Avenue
Burlington, VT 05401

Architect:

E4H Environments for Health Architecture
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Landscape Architect:

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Sustainability Consultant:

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MEP/FP Engineer:

Consulting Engineering Services

UNIVERSITY OF VERMONT MEDICAL CENTER
Outpatient Surgery Center
South Burlington, VT 05403

E4H Environments for Health Architecture
Project No. 2021073
January 27, 2023

811 Middle Street
Middletown, CT 06457
Contact: Michael Bouchard, PE
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PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

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SECTION 011000
SUMMARY

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Project information.
 2. Project team.
 3. Definitions.
 4. Work covered by Contract Documents.
 5. Existing conditions and measurements.
 6. Verification of existing conditions
 7. Contractors use of site and premises.
 8. Work sequence
 9. Project Manual formats and conventions.

1.2 PROJECT INFORMATION

- A. Project Identification: University of Vermont Medical Center - Outpatient Surgery Center - 20221103, Project No. 2021073.
1. Project Location:
199 Main Street
Burlington, VT 05410
 2. Project Description: Refer to Section 000102 - PROJECT INFORMATION.

1.3 PROJECT TEAM - REFER TO SECTION 000103 - PROJECT DIRECTORY.

1.4 DEFINITIONS

- A. **Approved:** The term approved, when used in conjunction with the Architect's action on contractor's submittals, applications, and requests, is limited to the Architect's duties and responsibilities as stated in the Conditions of the Contract.
- B. **Directed:** Terms such as directed, requested, authorized, selected, approved, required, and permitted mean directed by the Architect, requested by the Architect, and similar phrases.
- C. **Furnish:** The term furnish means supply and deliver to the Project site, unloaded, unpacked, inspected for damage, and ready for assembly, installation, and similar operations.
- D. **Indicated:** The term indicated refers to graphic representations, notes, or schedules on the Drawings, or other Paragraphs or Schedules in the Specifications, and similar requirements in the Contract Documents. Terms such as shown, noted, scheduled, and specified are used to help the reader locate the reference. There is no limitation on location.
- E. **Install:** The term install describes operations at the Project site including the actual assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.
- F. **Installer:** An Installer is the Construction Manager or another entity engaged by the Construction Manager, either as an employee, subcontractor, or contractor of lower tier, to perform a particular construction activity, including installation, erection, application, and similar operations. Installers are required to be experienced in the operations they are engaged to perform, having a minimum of five previous projects similar in size and scope to this Project, being familiar with the special requirements indicated, and having complied with requirements of the authority having jurisdiction.
- G. **Products:** Means new material, machinery, components, equipment, fixtures, and systems forming the Work, but does not include machinery and equipment used for preparation, fabrication, conveying, and erection of the Work. Products may also include existing materials or components required for reuse.

- H. **Project site:** Is the space available to the contractors for performing construction activities either exclusively or in conjunction with others performing other work as part of the Project. The extent of the Project site is as defined by the Owner and Project Coordinator.
- I. **Provide:** The term provide means to furnish and install, complete and ready for the intended use.
- J. **Testing Agencies:** A testing agency is an independent entity engaged to perform specific inspections or tests, either at the Project site or elsewhere, and to report on and, if required, to interpret results of those inspections or tests.

1.5 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Work of Project is defined by the Contract Documents.
- B. Type of Contract: Project will be constructed under a single prime contract.

1.6 EXISTING CONDITIONS & MEASUREMENTS

- A. Information pertaining to the project site has been obtained through casual field observations and existing record documents and is indicated on the Drawings and in the Project Manual. This information has been gathered with reasonable care but is of a schematic nature and is not warranted. Verify all dimensions in the field prior to ordering materials or construction.
- B. Be alert to any indication or evidence of existing building conditions not indicated in the Contract Documents. Measurements shall be verified from actual observation at the project site. If unexpected existing conditions are encountered, cease operations immediately and notify the Architect.
- C. Cost of unavoidable initial damage and such supplemental and remedial work that is ordered by the Architect shall be borne by the Owner in accord with the General Conditions.
- D. Contractors shall bear the cost of damage resulting from their failure to exercise reasonable care in their work or from continuing operations without notifying the Architect.

1.7 VERIFICATION OF EXISTING CONDITIONS

- A. All dimensions, elevations, and conditions of all existing construction shall be verified in the field by contractors prior to submitting shop drawings. Upon receipt of shop drawings, the Architect has the right to assume that all field dimensions, elevations, and conditions have been verified by the contractor submitting the drawings and that the shop drawings accurately reflect such verifications unless stated otherwise on the shop drawings.

1.8 CONTRACTORS USE OF SITE AND PREMISES

- A. Construction Operations: Limited to areas as defined by Owner's Representative.
- B. Arrange use of site and premises to allow:
 - 1. Owner occupancy.
 - 2. Work by others.
 - 3. Work by Owner.
 - 4. Use of adjacent portions of the site and premises by the public.
- C. Provide access to and from site as required by law and by Owner:
 - 1. Emergency Building Exits During Construction: Keep all exits required by code open during construction period; provide temporary exit signs if exit routes are temporarily altered.
 - 2. Do not obstruct roadways, sidewalks, or other public ways without permit.
- D. Use of the Existing Building:
 - 1. Maintain the existing building in a weather tight condition throughout the construction period. Repair damage caused by construction operations. Take all precautions necessary to protect the building and its occupants during the construction period.
 - 2. Existing building spaces (outside of the construction limits) may not be used for storage.
- E. Time Restrictions:

1. Limit conduct of especially noisy, malodorous, and dusty exterior and interior work to the hours of 8:00 a.m. to 5:00 p.m.
 2. Contractors may be required to stop or limit work at certain times based on Owner operations.
 - a. Limit conduct of especially noisy interior work to the times of day acceptable to the Owner.
 - b. Contact Owner prior to beginning especially noisy work.
 3. Contractors shall perform certain work at times as necessary to minimize disruptions of the Owner's facility, including evenings, nights and weekends.
 - a. For additional work required to keep disruptions of the Owner's existing facility to a minimum as requested by the Owner, the Owner will pay only for the additional cost above the normal rates for premium time required to complete the work.
 4. Perform additional work required to meet established Contract time limits after regular working hours (7:00 AM to 5:00 PM) or, after notification of the Owner, on Sundays or on legal holidays as necessary. Deviations from this restriction require approval in writing from the Owner.
- F. Utility Outages and Shutdown:
1. Do not disrupt or shut down life safety systems, including but not limited to fire sprinklers and fire alarm system, without 7 days notice to Owner and authorities having jurisdiction.
 2. Limit shutdown of utility services to 4 hours at a time, arranged at least 96 hours in advance with Owner.
 3. Prevent accidental disruption of utility services to other portions of the facility.
- G. Smoking Policy:
1. All construction personnel and employees of the contractors shall strictly observe the Owner's smoking policy. Smoking shall be prohibited on or adjacent to the Owner's property by all personnel.
- 1.9 WORK SEQUENCE
- A. Coordinate construction schedule and operations with Owner's Representative.
- 1.10 DIVISION 1 SPECIFICATION SECTIONS APPLICABLE TO ALL CONTRACTS
- A. Unless otherwise noted, all provisions of the Division 1 sections, that are part of this Project Manual and as listed on the Table of Contents, apply to all contracts. Specific items of work listed under individual contract descriptions constitute exceptions.
- 1.11 DRAWING CONVENTIONS
- A. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:
1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
 2. Abbreviations: Materials and products are identified by abbreviations as scheduled on Drawings.
 3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.
- 1.12 PROJECT MANUAL FORMATS AND CONVENTIONS
- A. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.
- B. Project Manual Format: The Project Manual is organized into Divisions and subdivided into Sections using the Construction Specification Institute (CSI) publication "MasterFormat, 2004 Edition" numbering system.
1. Section Identification: Six/Eight digit Section numbers are utilized and cross-referenced throughout the Contract Documents. Sections in the Project Manual are in numeric

- sequence; however, the sequence is incomplete because only those Section numbers which are applicable to this Project are used.
2. Division One of the Project Manual governs procedural and administrative requirements of the Work. Division One requirements are applicable to all Sections and Documents in the Project Manual.
- C. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
1. Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be inferred as the sense requires. Singular words shall be interpreted as plural, and plural words shall be interpreted as singular as applicable to the context of the Contract Documents.
 2. Imperative mood and streamlined language is generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by the contractors. Occasionally, the indicative or subjunctive mood may be used in the Section Text for clarity to describe responsibilities that must be fulfilled indirectly by the contractors or by others when so noted.
 3. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

**SECTION 012000
PRICE AND PAYMENT PROCEDURES**

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Procedures for preparation and submittal of applications for progress payments.
- B. Documentation of changes in Contract Price and Contract Time.
- C. Change procedures.
- D. Correlation of Construction Manager submittals based on changes.
- E. Procedures for preparation and submittal of application for final payment.

1.2 SCHEDULE OF VALUES

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

1.3 APPLICATIONS FOR PROGRESS PAYMENTS

- A. Payment Period: Submit at intervals stipulated in the Agreement.
- B. Form to be used: AIA G702 and G703.
- C. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit sample to Architect for approval.
- D. Forms filled out by hand will not be accepted.
- E. For each item, provide a column for listing each of the following:
 - 1. Item Number.
 - 2. Description of Work.
 - 3. Scheduled Values.
 - 4. Previous Applications.
 - 5. Work in Place and Stored Materials under this Application.
 - 6. Authorized Change Orders.
 - 7. Total Completed and Stored to Date of Application.
 - 8. Percentage of Completion.
 - 9. Balance to Finish.
 - 10. Retainage.
- F. Execute certification by signature of authorized officer.
- G. 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.
- H. List each authorized Change Order as a separate line item, listing Change Order number and dollar amount as for an original item of work.
- I. Submit electronic copies of each Application for Payment.
 - 1. Submit documents using the Adobe Acrobat Portable Document Format (PDF).
- J. Include the following with the application:

1. Waivers of Mechanics Lien: With each Application for Payment submit waivers of mechanics liens from sub-contractors or sub- sub-contractors and suppliers for the construction period covered by the previous application.
 - a. Submit partial waivers on each item for the amount requested, prior to deduction for retainage, on each item.
 - b. When an application shows completion of an item, submit final or full waivers.
 - c. The Owner reserves the right to designate which entities involved in the Work must submit waivers.
 - d. Waiver Forms: Submit waivers of lien on forms, and executed in a manner, acceptable to Owner.
 2. Transmittal letter as specified for submittals in Section 013000.
- K. When Architect requires substantiating information, submit data justifying dollar amounts in question. Provide one copy of data with cover letter for each copy of submittal. Show application number and date, and line item by number and description.
- 1.4 INITIAL APPLICATION FOR PAYMENT
- A. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of the first Application for Payment include the following:
1. List of sub-contractors.
 2. List of principal suppliers and fabricators.
 3. Schedule of Values.
 4. Construction Schedule (preliminary, if not final).
 5. Schedule of principal products.
 6. Schedule of unit prices.
 7. List of Construction Manager's staff assignments.
 8. Certificates of insurance and insurance policies.
- 1.5 MODIFICATION PROCEDURES
- A. Submit name of the individual authorized to receive change documents and who will be responsible for informing others in Construction Manager's employ or subcontractors of changes to Contract Documents.
- B. Architect will advise of minor changes in the Work not involving an adjustment to Contract Sum or Contract Time as authorized by the Conditions of the Contract by issuing supplemental instructions on AIA Form G710.
- C. For other required changes, Architect will issue a document signed by Owner instructing Construction Manager to proceed with the change, for subsequent inclusion in a Change Order.
1. The document will describe the required changes and will designate method of determining any change in Contract Sum or Contract Time.
 2. Promptly execute the change.
- D. For changes for which advance pricing is desired, Architect will issue a document that includes 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. Construction Manager shall prepare and submit a fixed price quotation within 10 days.
1. Such request is for information only, and is not an instruction to execute the changes, or to stop work in progress.
- E. Construction Manager may propose a change by submitting a request for change to Architect, describing the proposed change and its full effect on the Work, with a statement describing the reason for the change, and the effect on the Contract Price and Contract Time with full documentation and a statement describing the effect on Work by separate or other contractors. Document any requested substitutions in accordance with Section 016000.

- F. 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 Construction Manager's price quotation.
 - 2. For change requested by Construction Manager, the amount will be based on the Construction Manager's request for a Change Order as approved by Architect.
 - 3. For pre-determined unit prices and quantities, the amount will be based on the fixed unit prices.
 - 4. For change ordered by Architect without a quotation from Construction Manager, the amount will be determined by Architect based on the Construction Manager's substantiation of costs as specified for Time and Material work.
 - G. Substantiation of Costs: Provide full information required for evaluation.
 - 1. On request, provide the following data:
 - a. Quantities of products, labor, and equipment.
 - b. Taxes, insurance, and bonds.
 - c. Overhead and profit.
 - d. Justification for any change in Contract Time.
 - e. Credit for deletions from Contract, similarly documented.
 - 2. Support each claim for additional costs with additional information:
 - a. Origin and date of claim.
 - b. Dates and times work was performed, and by whom.
 - c. Time records and wage rates paid.
 - d. Invoices and receipts for products, equipment, and subcontracts, similarly documented.
 - 3. For Time and Material work, submit itemized account and supporting data after completion of change, within time limits indicated in the Conditions of the Contract.
 - H. Execution of Change Orders: Architect will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.
 - I. 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.
 - J. 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.
 - K. Promptly enter changes in Project Record Documents.
- 1.6 APPLICATION FOR PAYMENT AT SUBSTANTIAL COMPLETION
- A. Following issuance of the Certificate of Substantial Completion, submit an Application for Payment; this application shall reflect any Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work. Administrative actions and submittals that shall proceed or coincide with this application include:
 - 1. Occupancy permits and similar approvals.
 - 2. Changeover information related to Owner's occupancy, use, operation and maintenance.
 - 3. Application for reduction of retainage, and consent of surety.
 - 4. Advice on shifting insurance coverages.
 - 5. List of incomplete Work, recognized as exceptions to Architect's Certificate of Substantial Completion.
- 1.7 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 017000 - Execution and Closeout Requirements.
2. All closeout submittals specified in Section 017800 - Closeout Submittals have been received and approved.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 013000
ADMINISTRATIVE REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Preconstruction meeting.
- B. Progress meetings.
- C. Construction progress schedule.
- D. Progress photographs.
- E. Coordination drawings.
- F. Submittals for review, information, and project closeout.
- G. Submittal procedures.
 - 1. Submittal coordination.
 - 2. Schedule of submissions.
 - 3. Submittal procedures and grading.
 - 4. Submission requirements and quantities.
 - 5. Shop drawings, product data and samples.
 - 6. Manufacturer's instructions and certificates.
 - 7. Emergency addresses.

1.2 RELATED REQUIREMENTS

- A. Section 017000 - Execution and Closeout Requirements: Additional coordination requirements.
- B. Section 017800 - Closeout Submittals: Project record documents; operation and maintenance data; warranties and bonds.

1.3 PROJECT COORDINATOR

- A. Cooperate with the Owner's Representative in allocation of mobilization areas of site; for field offices and sheds, for material access, traffic, and parking facilities.
- B. During construction, coordinate use of site and facilities through the Owner's Representative.
- C. Comply with Construction Manager's procedures for intra-project communications; submittals, reports and records, schedules, coordination drawings, and recommendations; and resolution of ambiguities and conflicts.
- D. Comply with instructions of the Construction Manager and Owner's Representative for use of temporary utilities and construction facilities.
- E. Coordinate field engineering and layout work under instructions of the Construction Manager.
- F. Make the following types of submittals to Architect through the Construction Manager:
 - 1. Requests for Interpretation.
 - 2. Requests for substitution.
 - 3. Shop drawings, product data, and samples.
 - 4. Test and inspection reports.
 - 5. Design data.
 - 6. Manufacturer's instructions and field reports.
 - 7. Applications for payment and change order requests.
 - 8. Progress schedules.
 - 9. Coordination drawings.
 - 10. Closeout submittals.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 PRECONSTRUCTION MEETING

- A. Construction Manager shall schedule meeting after Notice of Award.
- B. Attendance Required:
 - 1. Owner.
 - 2. Architect/Engineer.
 - 3. Construction Manager.
 - 4. Subcontractors and major suppliers.
 - a. Representatives of Subcontractors and suppliers attending meeting shall be qualified and authorized to act on behalf of the entity each represents.
 - 5. Others as appropriate.
- C. Agenda:
 - 1. Submission of executed bonds and insurance certificates.
 - 2. Distribution of Contract Documents.
 - 3. Submission of list of subcontractors, list of products, schedule of values, and progress schedule.
 - 4. Designation of personnel representing the parties to Contract, Owner and Architect.
 - 5. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
 - 6. Scheduling.
 - a. Tentative construction schedule.
 - b. Critical work sequencing.
 - c. Equipment deliveries and priorities.
 - 7. Use of premises.
 - a. Working hours.
 - b. Work, office, and storage areas.
 - c. Construction facilities, controls, and construction aids.
 - d. Temporary utilities.
 - e. Security procedures.
 - 8. Safety and first-aid procedures.
 - 9. Housekeeping procedures.
 - 10. Procedures for maintaining Record Documents.
- D. Construction Manager to record minutes and distribute copies within two days after meeting to participants, with copies to Architect, Owner, participants, and those affected by decisions made.

3.2 PROGRESS MEETINGS

- A. Construction Manager to schedule and administer meetings throughout progress of the Work at maximum bi-weekly intervals.
- B. Construction Manager to make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.
- C. Attendance Required: Job superintendent, major Subcontractors and suppliers, Owner, Architect, as appropriate to agenda topics for each meeting.
 - 1. Representatives of Subcontractors and suppliers attending meetings shall be qualified and authorized to act on behalf of the entity each represents.
 - 2. The Architect and the Owner's Representative may attend meetings to ascertain that Work is expedited consistent with Contract Documents and construction schedules.
- D. Agenda:
 - 1. Review minutes of previous meetings.

2. Review of Work progress.
 3. Field observations, problems, and decisions.
 4. Identification of problems that impede, or will impede, planned progress.
 5. Review of submittals schedule and status of submittals.
 6. Maintenance of progress schedule.
 7. Corrective measures to regain projected schedules.
 8. Planned progress during succeeding work period.
 9. Coordination of projected progress.
 10. Maintenance of quality and work standards.
 11. Effect of proposed changes on progress schedule and coordination.
 12. Review of Building Enclosure Work progress with Commissioning Agent and appropriate team members.
 13. Other business relating to Work.
- E. Construction Manager shall record minutes and distribute copies within two days after meeting to participants, with copies to Architect, Owner, participants, and those affected by decisions made.
- F. Pre-Installation Conferences: Conduct a pre-installation conference at the site before each construction activity that requires coordination with other construction. The Installer and representatives of manufacturers and fabricators involved in or affected by the installation, and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise the Architect/Engineer of scheduled meeting dates.

3.3 CONSTRUCTION PROGRESS SCHEDULE

- A. If preliminary schedule requires revision after review, submit revised schedule within 10 days.
- B. Within 20 days after review of preliminary schedule, submit draft of proposed complete schedule for review.
 1. Include written certification that major contractors have reviewed and accepted proposed schedule.
- C. Within 10 days after joint review, submit complete schedule.
- D. Submit updated schedule with each Application for Payment.

3.4 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. Provide photographs of site and construction throughout progress of Work produced by an experienced photographer, acceptable to Architect.
- D. In addition to periodic, recurring views, take photographs of each of the following events:
 1. Completion of site clearing.
 2. Excavations in progress.
 3. Foundations in progress and upon completion.
 4. Structural framing in progress and upon completion.
 5. Enclosure of building, upon completion.
 6. Building insulation and air/vapor barrier installation in progress.
 7. Final completion, minimum of ten (10) photos.
- E. Take photographs as evidence of existing project conditions.
- F. Digital Photographs: 24 bit color, minimum resolution of 1024 by 768, in JPG format; provide files unaltered by photo editing software.
 1. Delivery Medium: Submit with applications for payment.
 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.

3.5 COORDINATION DRAWINGS

- A. Provide information required by Project Coordinator for preparation of coordination drawings.
- B. Review drawings prior to submission to Architect.

3.6 SUBMITTAL COORDINATION

- A. General: The Construction Manager is fully responsible for delay in the delivery of materials, progress of the Work, and damages incurred due to contractor's failure to submit, revise and resubmit submissions in accordance with the requirements herein, and in a coordinated and timely manner to allow the Architect proper time for checking and processing of each submission or resubmission.
- B. Make submittals in a proper and timely fashion, allowing for administrative procedures, Architect's review, corrections to submissions and resubmittal, if necessary, and fabrication of products without delaying the project. Minimum processing times required by the Architect are as follows:
 1. Review for Architect's Office Only: Allow a minimum of 10 working days for review and processing. Some submittals may require additional time.
 - a. Simultaneous submission of a large number of shop drawings and product data may require longer than 10 working days for review.
 - b. Complex Systems (structural, mechanical, electrical) may require longer than 10 working days for review each time shop drawings, layout drawings, and product data are submitted or resubmitted.
 2. Review by Architect and its Consultant(s): Allow 10 working days for review and processing of submittals by Architect plus an additional 5 working days for review by each consultant as applicable.
 3. Reprocessing of Submittals: For submittals requiring resubmittal, re-processing time required shall be the same as first submittal.
 4. No extension of Contract Time will be authorized due to failure to transmit submittals sufficiently in advance of scheduled performance of Work.
- C. Make submittals of similar items, systems, or those specified in a single specification section together.
- D. Make submittals for products which other products are contingent upon, first.

3.7 SCHEDULE OF SUBMISSIONS

- A. Schedule Procedure: Immediately after being awarded the Contract, meet with the Architect to discuss the schedule of submissions and then prepare and submit within 14 calendar days for approval a schedule of submissions for the Work. The schedule of submissions shall be related to the entire Project, and shall contain the following:
 1. Shop Drawing schedule (for shop and setting drawings to be provided by the contractors).
 2. Sample schedule (for samples to be provided by the contractors).
 3. With respect to portions of the Work to be performed by subcontractors, such schedule of submissions for the work of each subcontractor shall be submitted for approval within 30 calendar days after execution of a contract with such subcontractor.
- B. List all submissions required of each trade.
 1. Include the Specification Section number, name of contractor or vendor, submittal type, item, description, type, quantity and size (where applicable) of each submission.
 2. For each submission, provide the following dates, as estimated:
 - a. Scheduled date of submission.
 - b. Required date of approval (permit time for appropriate review and resubmissions as may be required).
 - c. Estimated date of beginning fabrication or manufacture of product (where applicable).

- d. Required date of submission of product to testing laboratory.
 - e. Required date of testing laboratory approval.
 - f. Required date for delivery of product to site.
 - g. Required date for beginning of installation of product.
 - h. Required date for completion of installation (and in-place testing).
- C. For each submittal, schedule to allow adequate time for review by the Architect and its consultants. The Architect will not be responsible for Work performed in shop or field prior to approval. Long-lead items requiring expedited action must be clearly indicated.
- 1. The schedule shall be reviewed and resubmitted as necessary to conform to approved modifications to the construction Project Schedule, and shall be updated as may be required by the Architect.
- D. Posting of Submittal Schedule: Print and distribute the submittal schedule to Architect, Owner, contractors and other parties affected. Post copies in field.
- E. Update schedule throughout progress of the Project, coordinated with scheduling changes in the Work, and redistribute monthly in conjunction with submittal of Application for Payment.

3.8 SUBMITTAL PROCEDURES AND GRADING

- A. Prepare and submit to the Architect the following:
- 1. Construction Schedule.
 - 2. Schedule of Values.
 - 3. Schedule of shop drawings, product data, and samples.
- B. Provide space for Construction Manager, Architect and engineering consultant review stamps, on the front page of each item's submittal copy. Apply Construction Manager's stamp, signed or initialed certifying that review, verification of products required, field dimensions, adjacent construction Work, and coordination of information, is in accordance with the requirements of the Work and the Contract Documents. The Architect's stamp shall contain the following data (Engineering consultant review stamps may vary in language, but intent of language is similar):
- _____ REVIEWED
 - _____ FURNISH AS CORRECTED
 - _____ REVISE AND RESUBMIT
 - _____ SUBMIT SPECIFIED ITEM
 - _____ REJECTED
- 1. The Architect will insert the date of action taken and an identification of the person taking the action.
 - 2. Submittal grading:
 - a. REVIEWED - No corrections, no marks.
 - b. FURNISH AS CORRECTED - Minor corrections required are as noted; all items can be fabricated as noted, without further correction and resubmission of original submission; checking is complete and all corrections are deemed obvious without ambiguity.
 - c. REVISE AND RESUBMIT - Resubmission is required; checking may be incomplete; details of items noted by checker are to be clarified further before full review can be given. Correct and resubmit, do not fabricate noted items requiring correction.
 - d. SUBMIT SPECIFIED ITEM - Submission has been rejected by Architect previously, and the currently submitted product is rejected as not being in accord with the Contract Documents, or other justifiable reasons. Submission using specified product is required.
 - e. REJECTED - Submittal is rejected as not in accord with the Contract Documents, too many corrections, or other justifiable reasons. When returning submission, Architect will state reasons for rejection. Correct and resubmit, do not fabricate.
 - 3. Review/approval neither extends nor alters any contractual obligations of the Architect, Engineer or Construction Manager.

- C. Identify all variations from Contract Documents, and product or system limitations which may be detrimental to successful performance of the completed work.
- D. Construction Manager's Review: Review all shop drawings, product data and samples. Include, without limitation, verification of the following:
 - 1. Proper title, original date, drawing number (which shall be changed if resubmitted), revision numbers and dates, designation of project Construction Manager, contractor and/or supplier.
 - 2. Identification of Shop Drawings, Product Data or Samples by Specification Section and subsection or paragraph where appropriate and identification of Contract Drawings by number and detail.
 - 3. On each submittal, as a minimum, Construction Manager shall identify the following:
 - a. Errors, inconsistencies, and omissions discovered in the contract documents and field conditions must be reported at once to the Architect.
 - b. Any variations from code requirements contained in the contract documents must be reported promptly in writing to both the Architect and Owner.
 - c. Promptly report to the Architect information that any design, process, or product infringes on a patent.
 - d. Names of contractor(s) and supplier(s). Include name(s) of contact person(s), address, telephone and fax number(s).
- E. Revise and resubmit submittals as required, identify all changes made since previous submittal. Distribute copies of reviewed submittals to concerned parties; instruct parties to promptly report any inability to comply with provisions.

3.9 SUBMISSION REQUIREMENTS AND QUANTITIES

- A. General: The Architect has adopted the use of Procore for the exchange and storage of files related to this Project. All submissions (except physical samples) shall be processed through the Procore project management system.
- B. Furnish Architect with electronic files using the Adobe Acrobat Portable Document Format (PDF) for each of the following submittal types:
 - 1. Schedules
 - 2. Shop drawings.
 - 3. Product data, manufacturer's instructions and certificates and similar submissions.
 - 4. Emergency addresses: 1 file to Architect, and 1 file direct to Owner.
- C. Electronic Documents: Submit one electronic copy in PDF format; an electronically-marked up file will be returned. Create PDFs at native size and right-side up; illegible files will be rejected.
- D. Transmittal of submittals to Architect shall provide the following:
 - 1. Transmittal shall Identify Project, Construction Manager, contractor, installer, or supplier, pertinent Drawing sheet and detail number(s), and specification Section number, as appropriate. Transmittals received by the Architect from sources other than the Construction Manager will be returned without any action taken.
 - 2. Construction Manager shall number submittals sequentially by Specifications Section prior to submittal. Resubmitted items shall retain number and be noted as resubmitted (example 260000-1 R1).
- E. Furnish Architect with 3 identical samples for each physical sample submittal.
- F. General Submission of Physical Submittals: Deliver to Architect at the following address:

E4H Environments for Health Architecture
185 Talcott Road
Williston, VT 05495
Contact: Dan Schneider, Associate Partner

3.10 SHOP DRAWINGS

- A. General: Provide accurately prepared, large scale and detailed shop drawings prepared specifically for this Project. Shop drawings shall include fabrication and installation drawings, setting diagrams, schedules, patterns, templates and similar drawings. Standard information prepared without specific reference to this Project is not considered to be shop drawings.
1. Show adjacent conditions and related work. Show accurate field dimensions where appropriate.
 2. Identify materials and products shown. Note all conditions where require coordination with other trades and special installation procedures.
 3. Show gage and thickness of materials.
 4. Indicate welding details and joint types.
 5. Show every component of fabricated items, notes regarding manufacturing process coatings and finishes, identifying numbers conforming to the Contract Documents (i.e. stair numbers, door numbers and similar items), dimensions, and appropriate trade names.
 6. Show anchorage and fastening details, including type, size and spacing.
 7. Review each submittal for conformity with the Contract requirements prior to submittal, certify such review on each shop drawing with Construction Manager's stamp, signature and date. Reference on shop drawings to other sections, installers, suppliers, or trade(s) shall designate the appropriate specification sections, and the term "by others" shall not be used.
- B. Size of Format: Not less than 8-1/2 by 11 inches, and no larger than 30 by 42 inches, except for templates, patterns and similar full-size drawings.
- C. The Architect's comments and corrections will be made on the submittal and returned to the Construction Manager. If necessary, the Construction Manager then shall make the necessary corrections on the original documents and resubmit the corrected drawings in the manner specified. The Construction Manager is responsible to furnish (at no additional cost to Owner) all prints needed for use by the Construction Manager, contractors, installers, vendors and suppliers.
- D. Drawing submittals returned "REVIEWED" or "FURNISH AS CORRECTED": Distribute adequate copies for construction, including one copy of each for designated Owner's and Architect's Project Representative(s), and then return the originals to the contractor or supplier from whom they originated.
- E. Drawing submittals returned "REJECTED" or "REVISE AND RESUBMIT": Retain a record copy, and then forward originals to source for correction; resubmit new documents as specified herein above.
- F. Shop Drawings returned "NOT REVIEWED": Retain a record copy, and return originals to source; do not resubmit.
- G. Each drawing shall have a title block on the right hand side containing the following data:
Name of project - **University of Vermont Medical Center - Outpatient Surgery Center**
Architect - E4H Environments for Health Architecture
Construction Manager - TBD
Contractor/supplier - TBD
Date of submission - TBD
- H. Each drawing shall have a clear space on the right hand side for review stamps of both the Architect and Construction Manager.
1. The Construction Manager's Review and Action Stamp: Provide suitable space on label or title block for Construction Manager's review and action stamp. Stamp and sign each submittal to show Construction Manager's review and approval prior to transmittal Architect. Submittals not signed and stamped by Construction Manager will be returned without action.

- a. Only submittals received from the Construction Manager will be considered for review by the Architect. Construction Manager shall review each submittal for accuracy and conformance with the requirements of the Contract Documents, and particularly for field measurements and proper fit with adjoining work. Modify submittals as required to show interface with adjacent work and attachment to Building.
- b. The Construction Manager's Review and Action Stamp shall contain the following language or similar:

**APPROVED FOR CONFORMANCE
WITH THE CONTRACT DOCUMENTS.**

All dimensions and quantities have been reviewed and are
accepted by _____

Construction Manager/General Contractor

All dimensions and field conditions have been or will be
verified prior to fabrication of the items described herein.

- c. Submittals received from the Construction Manager shall be signed and comply with review requirements. Submittals not certified or improperly certified (stamped but not reviewed) will be returned to the Construction Manager without Architect's review. Claims due to the return of uncertified, improperly prepared or inadequately reviewed submittals will be rejected.

3.11 PRODUCT DATA

- A. Submit Product data as specified, and as the Architect may additionally prescribe. Product data includes, but is not limited to:
 1. Catalog cuts.
 2. Complete specifications.
 3. Standard color charts.
 4. Performance data.
 - a. Compliance with recognized trade association standards.
 - b. Compliance with recognized testing agency standards, labels and seals.
 5. Environmental data including, but not limited to:
 - a. Chemical composition.
 - b. VOC content.
 - c. Material certifications as applicable to product.
 6. Certified laboratory test report data.
 7. Health and safety precautions.
 8. Illustrated capacities, characteristics, wiring diagrams, controls, and other pertinent information for complete product and product use description.
- B. If more than one size or type is shown on any printed sheet, indicate clearly intended item(s).
- C. No copies stamped REJECTED or RESUBMIT shall be sent to the job site.

3.12 SAMPLES

- A. Submit samples clearly labeled as to its material, type or make, manufacturer, size or gage, and other pertinent data, accompanied by an appropriate transmittal form. Samples shall show full range of color and texture variation that can be expected. When accepted or not accepted, the Architect will retain one set of samples and return the others to the Construction Manager. Construction Manager to keep one set of samples as a record copy for Owner. Samples will not be permitted for use in the project.

3.13 MANUFACTURER'S INSTRUCTIONS

- A. When specified in individual specification Sections, submit manufacturer's printed instructions for delivery, handling, storage, assembly, installation, start-up, adjusting, and finishing.
- B. Identify conflicts between manufacturer's instructions and Contract Documents.

3.14 MANUFACTURER'S CERTIFICATES

- A. When specified in individual specification Sections, submit manufacturer's certificates and installer certificates to Architect for review.
- B. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
- C. Certificates may be recent or previous test results on material or product, but must be acceptable to Architect.

3.15 EMERGENCY ADDRESSES

- A. Within 15 days of Notice to Proceed, submit in writing, the name, addresses and telephone numbers of key members of their organization including Construction Manager's Superintendent and personnel at the site, to be contacted in the event of emergencies at the building site, which may occur during non-working hours.

END OF SECTION

SECTION 013350
COORDINATION DRAWINGS AND COORDINATION

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes:
 - 1. Related Documents and Sections.
 - 2. Definitions.
 - 3. Scope.
 - 4. Structural, Mechanical and Electrical and Electrical Coordination.
 - 5. Contractor Responsibilities.
 - 6. Non-Conforming Work.
 - 7. Submittal Requirements.
- B. RELATED DOCUMENTS AND SECTIONS
 - 1. Section 013000 - Administrative Requirements:
 - a. Record Documents (As-Builts).
 - b. Submittal Procedures.
 - c. Project Management and Coordination.
- C. DEFINITIONS
 - 1. Coordination Drawings - Contractor-prepared drawings submitted by Contractor to Owner to demonstrate: (1) The coordination of methods, materials, equipment, systems, plans, or sequence the Contractor proposes to use when limited space is available for installation of different components; (2) The coordination required for installation of Products and materials Fabricated by separate entities; and (3) The relationship of components shown on separate Shop Drawings or Submittals, when coordination among these components is required.
- D. SCOPE
 - 1. Coordination of Utility Systems, including piping and equipment, in above-ceiling spaces, utility chases and utility rooms.
 - a. The Contract documents are generally diagrammatic in nature with respect to mechanical, electrical, Fire Protection, and security/voice data systems. Not every bend, offset and direction change is shown in the Contract Documents. The Contract Documents represent that these systems will fit in the spaces allotted; however, it is the responsibility of the Contractor to assign space priorities and lay out and route the systems so they will fit efficiently in the allotted spaces and allow for convenient and code-conforming access to all valves, dampers and other devices.
 - b. The layout of utility rooms is also diagrammatic in nature. The Contract Documents represent that that equipment identified to be installed in utility rooms will fit in the spaces allotted. However, because the Contractor must submit and provide for equipment to be installed in utility rooms, it is the Contractor's responsibility to lay-out the equipment room such that all equipment will fit.
 - c. The Contractor must examine all of the Contract drawings, especially architectural for ceiling space dimensions, and structural for beam/column obstructions, and make allowances in the Contractor's planned coordination efforts, work sequence, and routing of the systems.
 - d. Routing shown for pipes, ducts, and conduits on Drawings are shown by graphic symbols only; make runs parallel with lines of building.
 - e. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
 - f. Conceal pipes, ducts, and wiring in finished areas, unless otherwise indicated; coordinate locations of fixtures and outlets with finish elements.

- g. Size ductwork, mechanical pipe, plumbing, electrical, and sprinkler system components as shown in the Contract Documents and Drawings. Downsizing of Mechanical/Electrical (M/E) systems is not permitted.
- 2. Contractor shall prepare Coordination Drawings in order to resolve potential installation and constructability problems prior to Installation so that construction cost and schedule are not impacted.
 - a. Pricing of Coordination Drawings. The Contractor shall include, as a separate line item in the Schedule of Values (see Section 01290) the line item value for preparation of Coordination Drawings.
 - b. Unless otherwise specifically stated in the Contract Documents, or needed for proper coordination of the installation of early Work, all Coordination Drawing Submittals are due no later than 150 Days after the Start Date stated in the Notice to Proceed.
 - c. Coordination Drawings shall include dates and signatures of the Contractor and all Subcontractors whose work occurs in the space; signed Coordination Drawings shall be subject to examination by the Owner at any time.
 - d. Contractor shall require Subcontractors to develop Subcontractor Coordination Plans of the same scale as Contractor's Coordination Drawings to assist in making transcripts for transfer to Coordination Drawings; use approved Shop Drawings for Coordination Drawings.
 - e. Unless a longer period is specifically stated elsewhere in the Contract Documents, allow at least 21 Days for Owner's review and return of all Coordination Drawings Submittals and resubmittals. (See Section 013000 - Administrative Requirements.
 - f. Revise Coordination Drawings when contract change orders are issued which affect Work indicated in Coordination Drawings, and as subsequent work is added to areas containing existing work.
 - g. As part of the As-built drawing submittal, submit final Coordination drawings reflecting Work incorporated by .6.
 - h. Coordination Drawings shall clearly show:
 - 1) The layout and routing of mechanical, electrical, Fire Protection, and security/voice data systems in above-ceiling spaces, utility chases, raised flooring (if applicable), other interstitial spaces, and underground ducts. Elements to include in Coordination Drawings include:
 - (a) Mechanical ducts and pipes, including floor penetrations;
 - (b) Plumbing pipes, including supply and gravity drain lines;
 - (c) Fire branch lines and sprinkler heads;
 - (d) Electrical bus ducts;
 - (e) Voice/data cable trays and conduits;
 - (f) Interstitial space access;
 - (1) Identification and resolution of Interfering Structural elements: beams, columns, slabs, hangers, bracing, etc. and mechanical/electrical systems;
 - (2) Identification and resolution of conflicts with mechanical/electrical systems and fire-rated walls;
 - (3) Identification and resolution of conflicts between mechanical/electrical systems and Suspended ceilings and light fixtures;
 - (4) Identification and resolution of conflicts between mechanical/electrical systems and Insulation;
 - (5) Security system elements;
 - (6) The relationship of components that are shown on separate Shop Drawings or Submittals.
 - (7) Seismic restraints where required on systems.
 - (8) All Work above ceilings performed by separate entities that must interface or for which space provided is limited; and

- (9) Others as necessary.
- 2) The actual physical relationships of the various elements and systems and their interfacing with other elements and systems. The Drawings use graphic symbols to show certain physical relationships. Establishing and coordinating the actual physical relationships is the responsibility of the Contractor. Layout and arrange all elements to contribute to safety and efficiency while maintaining the intent of the design. Before work proceeds in areas of potential conflict for installing different components of the work, Contractor shall prepare Coordination drawings for review and acceptance by the Owner, that clearly demonstrate resolution of any conflicts.
 - 3) Dimensions and elevations where conflicts may exist. Final Coordination drawings shall show resolution of any potential field conflicts.
 - 4) The location, for maintenance and repair purposes, of all above-ceiling valves, fire dampers, control devices, meters and gauges, and heating coils, and the access hatches (in "hard lid) ceilings that provide a means of access to these devices. These devices and appurtenances must be located such that a workman has unimpeded access to perform maintenance, repair or replacement. "Unimpeded access" means that a workman can access the device from a location immediately below the device, via the removal of a lay-in ceiling tile, or an access door/panel. All above-ceiling valves, fire dampers, control devices and heating coils shall be located such that there are no interferences from systems furniture, or above-ceiling mechanical or electrical systems. The Coordination drawings must clearly represent this accessibility.
 - 5) How equipment, controls, valves, power panels and disconnects will fit in equipment room(s) space, and still comply with code, and manufacturer's maintenance requirements, with respect to clearance.
 - 6) The maintenance of fire-rating of so-designated walls. Contractor shall review the architectural drawings for the location of fire-rated walls, and ensure that the placement of ducts, pipes or other systems do not compromise the fire-rating of walls. If ducts do penetrate fire-rated walls, the coordination drawings must show such penetrations, and shall indicate the placement of required Fire-smoke dampers. If the fire rating of designated walls cannot be maintained due to pipe or duct penetrations, as part of the Coordination Drawing process, the Contractor shall immediately bring these situations to the attention of the Owner.
3. Coordination of schedules and sub-contractors - The Contractor shall:
- a. Meet at project site with installer and representatives of manufacturers and fabricators who are involved in or affected by unit of work prior to installation of each major unit of work which requires coordination and interfacing with other work. Review progress of other work and preparations for particular work under consideration.
 - b. Coordinate matching finish, texture, color, etc. for the new work on existing components in the project, if applicable.
 - c. Coordinate work of like materials by submitting pilot samples to the Owner for review of acceptable ranges of finish textures and color variation.
 - d. Coordinate completion and clean up Work of various trades in preparation for the Substantial Completion and for occupancy of the Building.
 - e. Coordinate schedules, submittals, and work of the various trades to ensure efficient and orderly sequence of installation of construction, with provisions for accommodating items to be installed later. Coordinate the work among the Specifications and Drawings. Work shown on any drawing or specification is required by the Contract irrespective of the trade subdivision. Contractor shall require each trade subcontractor to review all other subdivisions of the documents for related work and shall coordinate the subcontracts accordingly.

- f. Require all parties involved in the performance of the Work to cooperate in the overall coordination of the work under the direction of the Contractor. Each party, when requested to do so, shall furnish information concerning its portion of the work, and shall respond promptly and reasonably to the decisions and requests of persons designated with coordination, supervisory, administrative, or similar authority.
 - g. Coordinate the tolerances of all materials to ensure a proper fit in achieving the requirements of the Contract Documents.
- E. STRUCTURAL, MECHANICAL AND ELECTRICAL COORDINATION
1. Contractor shall coordinate steel shop drawings to include any and all penetrations of framing members resulting from the coordination of the work of the mechanical and electrical subcontractors.
 2. If penetrations in steel framing members are required, Steel shop drawings shall be reviewed and approved by the mechanical, electrical, and plumbing subcontractors prior to submission to Owner for review and subsequent fabrication by the Contractor.
- F. CONTRACTOR RESPONSIBILITIES
1. Oversee preparation of Coordination Drawings, if required by this Section.
 2. Assign space priorities
 3. Notify Owner in writing of unresolved conflicts or interferences found during preparation of Coordination Drawings.
 4. Coordination Meetings: Conduct general project coordination meetings with Subcontractors at least weekly at regularly scheduled times convenient for all parties involved. These meetings are in addition to specific meetings held for other purposes, such as regular project meetings and special pre-installation meetings. Request representation at each meeting by every party currently involved in coordination or planning for the work of the entire project. Keep the Owner informed about coordination meetings. Conduct meetings in a manner which will resolve coordination problems. Record results and minutes of each meeting and distribute copies to everyone in attendance and to the Owner. Owner may attend weekly jobsite meetings with subcontractors.
- G. NON-CONFORMING WORK
1. Work not installed within designated coordination areas in compliance with the Owner accepted Coordination Drawings will be considered non-conforming Work subject to removal and replacement at no additional cost to Owner.
- H. SUBMITTAL REQUIREMENTS
1. If Coordination Drawings are required by this Section, submit one (1) reproducible and four (4) copies of each Coordination Drawing.
 2. Submit combined, comprehensive mechanical and electrical systems Coordination Drawings.
 3. Comply with requirements of Section 013000 - Administrative Requirements.
 4. Signatures required on each sheet of Coordination Drawings:
 - a. Coordination Drawing(s) must be signed and dated by Contractor and individual Subcontractors.
 - b. By act of signature and submittal of the single combined Coordination Drawing(s), Contractor and each Subcontractor acknowledge that Work for which Contractor or said Subcontractor is responsible has been coordinated with the Work of Contractor and all other Subcontractors.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 013400

CONSTRUCTION MANAGER REQUESTS FOR INFORMATION

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Administrative requirements for requests for information.

1.2 RELATED REQUIREMENTS

- A. Section 013400.01 - Request for Information (RFI) Form: Cover form to be used when submitting a request for information.

1.3 DEFINITIONS

- A. Requests for Information:
 - 1. A document (RFI) submitted by the Construction Manager requesting clarification of a portion of the Contract Documents.
 - 2. A properly prepared request for information shall include a detailed written statement that indicates the specific drawing or specification in need of clarification and the nature of the clarification requested.
 - a. Drawings shall be identified by drawing number and location on the drawing sheet.
 - b. Specifications shall be identified by Section number, page and paragraph.
- B. Improper RFI:
 - 1. An RFI that is not properly prepared.
 - 2. An improper RFI will be processed by the Architect at the Architect's standard hourly rate and the Architect will charge the Owner; such costs will be deducted from monies still due the Construction Manager. The Construction Manager will be notified by the Architect prior to the processing of an improper RFI.
- C. Frivolous RFI:
 - 1. An RFI that requests information that is clearly indicated in the Contract Documents.
 - 2. A frivolous RFI may be returned unanswered or may be processed by the Architect at the Architect's standard hourly rate and the Architect will charge the Owner; such costs will be deducted from monies still due the Construction Manager. The Construction Manager will be notified by the Architect prior to the processing of a frivolous RFI.

1.4 CONSTRUCTION MANAGER'S REQUESTS FOR INFORMATION

- A. When the Construction Manager is unable to determine from the Contract Documents, the material, process or system to be installed, the Architect will be requested to make a clarification of the indeterminate item.
 - 1. Whenever possible, such clarification shall be requested at the next appropriate project meeting, with the response entered into the meeting minutes. When clarification at the meeting is not possible, either because of the urgency of the need, or the complexity of the item, the Construction Manager shall prepare and submit an RFI to the Architect.
- B. The Construction Manager shall endeavor to keep the RFI quantity to a minimum. In the event the process becomes unwieldy, in the opinion of the Architect, because of the quantity and frequency of requests, the Architect may require the Construction Manager to abandon the process and submit future requests as either submittals, substitutions, or requests for change.
- C. An RFI shall be submitted using the form in Section 013400.01 - Request for Information (RFI) Form as the cover for the submittal, provide additional documentation as required. Forms shall be completely filled in, and if prepared by hand, shall be fully legible after photocopying or scanning. Each page of attachments shall bear the RFI number in the lower right corner.
- D. An RFI shall be originated through the Construction Manager.
 - 1. An RFI from a subcontractor or material supplier shall be submitted to, reviewed by and signed by the Construction Manager prior to submittal to the Architect.

2. An RFI sent directly to the Architect or the Architect's consultants, by a subcontractor, will not be accepted and will be returned unanswered.
- E. The Construction Manager shall carefully study the Contract Documents to assure that the requested information is not available there. An RFI that requests information available in the Contract Documents will be deemed "improper" or "frivolous".
- F. In cases where an RFI is issued to request clarification of coordination issues, for example, pipe and duct routing, clearances, specific locations of work shown diagrammatically and similar items, the Construction Manager shall offer assistance or suggest solutions using drawings or sketches drawn to scale, and submitted with the RFI. An RFI which fails to include a suggested solution will be returned unanswered with a requirement that the Construction Manager submit a complete request.
- G. An RFI shall not be used for the following purposes:
 1. To request approval of submittals.
 2. To request approval of substitutions.
 3. To request changes that entail additional cost or credit.
 4. To request different methods of performing work than those drawn or specified.
- H. In the event the Construction Manager believes that a clarification by the Architect results in additional cost or time, the Construction Manager shall not proceed with the work indicated by the RFI until a change order is prepared and approved. An RFI shall not automatically justify a cost increase in the work or a change in the project schedule.
 1. An answered RFI shall not be construed as approval to perform extra work.
- I. The Construction Manager will prepare and maintain an RFI log, and furnish copies of the log to all parties indicating the status of all RFIs.
- J. The Construction Manager shall allow up to 14 days for review. However, the Architect and the consultants will endeavor to respond in a timely fashion to an RFI.

1.5 ARCHITECT'S RESPONSE TO REQUESTS FOR INFORMATION

- A. The Architect will respond to an RFI on one of the following forms:
 1. Properly prepared RFI:
 - a. Architect's Supplemental Instructions.
 - b. Section 013400.01 - REQUEST FOR INTERPRETATION (RFI) FORM.
 - c. Work Changes Proposal Request.
- B. Improper or frivolous RFI:
 1. Notification of processing fee.
 2. An unanswered RFI will be returned with a stamp or notation: Not Reviewed.
- C. The Architect may opt to retain an RFI for discussion during regularly scheduled project meetings, for inclusion of responses in meeting minutes in lieu of responding on a written form.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION - (NOT USED)

END OF SECTION

SECTION 013400.01
REQUEST FOR INFORMATION (RFI) FORM

DATE SUBMITTED: _____ **ARCHITECT'S ASSIGNED RFI #** _____

TO THE ARCHITECT:

E4H ENVIRONMENTS FOR HEALTH ARCHITECTURE
185 Talcott Road
Williston, VT 05495
Contact: Dan Schneider, AIA, NCARB, LEED AP, Associate Partner
Telephone: 802.377.2880
Email: dschneider@e4harchitecture.com

E4H PROJECT NUMBER: 2021073

SUBMITTED BY:

COMPANY: _____
ADDRESS: _____

REFERENCES:

Specification Section Number: _____
Article / Paragraph / Subparagraph: _____
Drawing Number: _____
Detail Number: _____

REQUEST: (Refer to attachments if applicable)

SIGNED BY: _____

RESPONSE: **DATE RECEIVED BY ARCHITECT** _____

REFER TO ATTACHMENT(S) _____ (IF APPLICABLE)

RESPONSE FROM: _____

SIGNED BY: _____

- COPIES TO:
___ OWNER
___ CONSULTANTS
___ FILE
___ OTHERS (LIST)

END OF SECTION

SECTION 014000
QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes:
 - 1. Related requirements.
 - 2. Site safety, worker safety and training.
 - 3. Reference standards.
 - 4. Quality assurance submittals.
 - 5. Testing and inspection agencies.
 - 6. Control of installation.
 - 7. Mock-ups.
 - 8. Tolerances.
 - 9. Testing and Inspection.
 - 10. Manufacturers' field services.
 - 11. Defect Assessment.

1.2 RELATED REQUIREMENTS

- A. Section 013000 - Administrative Requirements: Submittal procedures.
- B. Section 014200 - References.
- C. Section 014529 - Structural Testing and Special Inspections
- D. Section 016000 - Product Requirements: Requirements for material and product quality.

1.3 REFERENCE STANDARDS

- A. ASTM C1021 - Standard Practice for Laboratories Engaged in Testing of Building Sealants; 2008 (Reapproved 2014).
- B. ASTM C1077 - Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation; 2017.
- C. ASTM C1093 - Standard Practice for Accreditation of Testing Agencies for Masonry; 2015a, with Editorial Revision (2016).
- D. ASTM D3740 - Standard Practice for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction; 2012a.
- E. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection; 2018.
- F. ASTM E543 - Standard Specification for Agencies Performing Nondestructive Testing; 2015.
- G. For products and workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- H. Conform to reference standard of date of issue current on date of Contract Documents, except where a specific date is established by applicable code.
- I. Obtain copies of standards where required by product specification sections.
- J. Maintain copy at project site during submittals, planning, and progress of the specific work, until Substantial Completion.
- K. Should specified reference standards conflict with Contract Documents, request clarification from Architect before proceeding.

- L. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of Architect shall be altered from the Contract Documents by mention or inference otherwise in any reference document.

1.4 SITE SAFETY, WORKER SAFETY AND TRAINING

- A. General: The Construction Manager shall, at all times, exercise reasonable precautions for the safety of all persons. All rules, regulations, and laws concerning safety that are in effect at the work site, and in particular, all applicable regulations of the Occupational Safety and Health Administration (OSHA) of the U.S. Government, in addition to specified requirements shall be complied with in all respects.
 - 1. Construction Manager's responsibility for safety shall apply continuously twenty four (24) hours per Day during the term of this Contract and is not limited to normal working hours.
- B. Construction Manager's Safety Program: Prior to commencement of the Work, the Contractor shall develop and implement a Safety and Health Plan to comply with the Occupational Safety and Health Administration (OSHA) standards for the Construction Industry and all other applicable Federal, State, local laws and regulations. Construction Manager's Safety and Health Plan, and included health and safety procedures and policies, shall be submitted to the Architect and Owner's Representative within fifteen (15) Days after the date of Notice to Proceed and in no event later than commencement of the Work, whichever occurs first.
 - 1. Perform pre planning to ensure access is provided to Fire Department for all areas of the work site throughout the duration of the Contract. The Construction Manager shall provide the Fire Department site access maps, updated regularly, to reflect changes in the layout of the work site and shall notify the Fire Department when each update is made
 - 2. Post and maintain, at prominent locations throughout the Project site, emergency telephone numbers and shall insure that all personnel on site are continuously aware of this information.
 - 3. Ensure safe access to the Work for the Owner, Architect, Architect's consultants, their designated representatives; all others charged with inspection, testing and monitoring of the Work; and visitors to the site. The Construction Manager shall furnish site visitors with safety equipment, safety apparel and instructions that are required to insure their safety on site and in the performance of their duties related to the Work of this Contract.
- C. To the extent mandated by code or other regulation, and in compliance with labor agreements, employees to be employed at the worksite will have successfully completed a course in construction safety and health approved by the United States Occupational Safety and Health Administration (OSHA) that is at least 10 hours in duration. The OSHA training and certification course shall occur at the time each employee begins work. To the extent required, furnish documentation to Owner and Architect, for each employee requiring training documenting successful completion of the OSHA safety training and certification course.

1.5 QUALITY ASSURANCE SUBMITTALS

- A. Testing Agency Qualifications:
 - 1. Prior to start of work, submit agency name, address, and telephone number, and names of full time registered Engineer and responsible officer.
 - 2. Submit copy of report of laboratory facilities inspection made by NIST Construction Materials Reference Laboratory during most recent inspection, with memorandum of remedies of any deficiencies reported by the inspection.
- B. Design Data: Submit for Architect's knowledge as contract administrator for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents, or for Owner's information.
- C. Test Reports: After each test/inspection, promptly submit copies of report to Architect and to Construction Manager.
 - 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 Architect, provide interpretation of results.
2. Test report submittals are for Architect's knowledge as contract administrator for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents, or for Owner's information.
- D. Certificates: When specified in individual specification sections, submit certification by the manufacturer and Construction Manager or installation/application subcontractor to Architect, in quantities specified for Product Data.
1. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
 2. Certificates may be recent or previous test results on material or product, but must be acceptable to Architect.
- E. Manufacturer's Instructions: When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, for the Owner's information. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.
- F. Manufacturer's Field Reports: Submit reports for Architect's benefit as contract administrator, or for Owner.
1. Submit for information for the limited purpose of assessing conformance with information given and the design concept expressed in the Contract Documents.
- G. Erection Drawings: Submit drawings for Architect's benefit as contract administrator, or for Owner.
1. Submit for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.
 2. Data indicating inappropriate or unacceptable Work may be subject to action by Architect or Owner.
- 1.6 TESTING AND INSPECTION AGENCIES AND SERVICES
- A. Owner will employ and pay for services of an independent testing agency to perform specified testing.
- B. Owner Employed Agency:
1. Testing agency: Comply with requirements of ASTM E329, ASTM E543, ASTM C1021, ASTM C1077, ASTM C1093, and ASTM D3740.
 2. Inspection agency: Comply with requirements of ASTM D3740 and ASTM E329.
 3. Laboratory: Authorized to operate in the State in which the Project is located.
 4. Laboratory Staff: Maintain a full time registered Engineer on staff to review services.
 5. Testing Equipment: Calibrated at reasonable intervals either by NIST or using an NIST established Measurement Assurance Program, under a laboratory measurement quality assurance program.
- C. Employment of agency in no way relieves any contractor of the obligation to perform Work in accordance with requirements of Contract Documents.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 FIELD QUALITY CONTROL

- A. The Owner reserves the right to take samples and perform, at random, tests of approved materials delivered to the job site to verify compliance of actual materials with specifications.

3.2 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.

3.3 MOCK-UPS

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

3.4 TOLERANCES

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

3.5 TESTING AND INSPECTION

- A. See individual specification sections for testing and inspection required.
- B. Testing Agency Duties:
 - 1. Test samples of mixes submitted by Construction Manager.
 - 2. Provide qualified personnel at site. Cooperate with Architect and Construction Manager in performance of services.
 - 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 Construction Manager of observed irregularities or non-compliance of Work or products.
 - 6. Perform additional tests and inspections required by Architect.

7. Attend preconstruction meetings and progress meetings.
 8. Submit reports of all tests/inspections specified.
- C. Limits on Testing/Inspection Agency Authority:
1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
 2. Agency may not approve or accept any portion of the Work.
 3. Agency may not assume any duties of Construction Manager.
 4. Agency has no authority to stop the Work.
- D. Construction Manager Responsibilities:
1. Deliver to agency at designated location, adequate samples of materials proposed to be used that require testing, along with proposed mix designs.
 2. Cooperate with laboratory personnel, and provide access to the Work and to manufacturers' facilities.
 3. Provide incidental labor and facilities:
 - a. To provide access to Work to be tested/inspected.
 - b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
 - c. To facilitate tests/inspections.
 - d. To provide storage and curing of test samples.
 4. Notify Architect and laboratory 48 hours prior to expected time for operations requiring testing/inspection services.
 5. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Construction Manager beyond specified requirements.
- E. Re-testing required because of non-compliance with specified requirements shall be performed by the same agency on instructions by Architect.
- F. Re-testing required because of non-compliance with specified requirements shall be paid for by Construction Manager.
- 3.6 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.
- 3.7 DEFECT ASSESSMENT
- A. Replace Work or portions of the Work not complying with specified requirements.
 - B. If, in the opinion of the Architect, it is not practical to remove and replace the Work, the Owner will direct an appropriate remedy or adjust payment.

END OF SECTION

SECTION 014200
REFERENCES

PART 1 - GENERAL

1.1 SUMMARY

- A. Abbreviations and Acronyms.
- B. Definitions.
- C. Reference Standards.

1.2 ABBREVIATIONS AND ACRONYMS

- A. The following list of common abbreviations are referenced in individual specification sections. This list is provided for convenience to the Contractor and is not intended to define all abbreviations use in the Contract Documents.

1. Abbreviations for contract and specifications.

EPA	United States Environmental Protection Agency
HHS	US Department of Health and Human Services
HVAC&R	Heating, ventilating, air conditioning, and refrigeration systems
IAQ	Indoor Air Quality
IEQ	Indoor Environmental Quality
MSDS	Material Safety Data Sheet
NIC	Not in Contract
OFCI	Owner Furnished, Contractor Installed
OFI or OFOI	Owner Furnished and Installed
TJC	The Joint Commission (formerly JCAHO - Joint Commission on Accreditation of Healthcare Organizations)
VOC	Volatile Organic Compounds

2. Abbreviations for measurements and quantities:

C	Celsius
cm	Centimeter
F	Fahrenheit
Hrs	Hours
Kg	Kilogram
L	Liter
M	meter
m ² or SM	square meter
m ³ or CM	cubic meter
mm	Millimeter
Mths	Months
psi	Pounds per square inch
t	ton

1.3 DEFINITIONS

- A. Definitions of contracting parties (Owner, Owner's Project Manager, General, and Architect): Refer to Section 011000 - PROJECT SUMMARY.
- B. Definitions for terms utilized in the Contract Documents:
 - 1. "As necessary," "as directed," "when directed," "satisfactory," "good and sufficient," "approved," or other general qualifying terms are used on the Drawings: These terms are deemed to be followed by the words, "in the opinion of the Architect," or "by the Architect," as the case may be."
 - 2. "Addenda": written or graphic instruments issued prior to the execution of the Contract which modify or interpret the Bidding Documents, including the Drawings and Specifications, by additions, deletions, clarifications or corrections.

3. "Approval," "approved," "approved equal," "or equal," or "other approved" means as approved by the Architect."
4. The terms "Contractor", "General Contractor", and "Contractor" as used in the Project Manual have the same meaning and are interchangeable in Contract Documents. These terms refer to the same entity.
5. The term "Day": is defined as the following:
 - a. The term "calendar day" is a full 24 hour period, starting from 12 AM (midnight), and includes all weekends and legal holidays.
 - b. The term "working day" shall mean any calendar day except Saturdays, Sundays, and legal holidays at the place of the building.
 - c. Where the term "day" is used without the adjective of "calendar" or "working", it shall mean "calendar day".
6. "Furnish and Install" or "Provide": items identified shall be furnished and installed under this Contract. The term "Furnish", when used separately, shall mean that the items referred to shall be furnished, only. Similarly the term "install", when used separately, shall mean that the items referred to shall be installed, only.
7. "Knowledge," "recognize" and "discover," their respective derivatives and similar terms in the Contract Documents, as used in reference to the Contractor, shall be interpreted to mean that which the Contractor knows (or should know), recognizes (or should recognize) and discovers (or should discover) in exercising the care, skill and diligence required by the Contract Documents. Analogously, the expression "reasonably inferable" and similar terms in the Contract Documents shall be interpreted to mean reasonably inferable by a Contractor familiar with the Project and exercising the care, skill and diligence required of the Contractor by the Contract Documents.
8. "Not in Contract" or "N.I.C.": equipment, furnishings, or other materials not included as a part of this Contract.
9. "Product": materials, systems and equipment.

1.4 REFERENCE STANDARDS

- A. For products or workmanship specified by association, trade, or Federal Standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- B. Conform to reference standard by DATE OF ISSUE for Contract Documents, current on date of Owner- Contractor Agreement.
- C. Should specified reference standards conflict with Contract Documents, request clarification from Architect before proceeding.
- D. The contractual relationship to the parties to the Contract shall not be altered from the Contract Documents by mention or inference otherwise in any reference document.
- E. Schedule of References:
 1. Listed below are abbreviations for the names and titles of trade association names, federal government agencies and similar organizations which are referenced in the individual specification sections. The addresses and phone numbers provided are for the Contractor's convenience and are believed to be current and accurate, however addresses and phone numbers frequently change, and no assurance is made on their accuracy:

AA	Aluminum Association 900 19th Street N.W., Suite 300 Washington, DC 20006 www.aluminum.com
AAMA	American Architectural Manufacturer's Association 1827 Walden Office Sq., Suite 104 Schaumburg, IL 60173-4268 www.aamanet.org

ACI	American Concrete Institute, International 38800 Country Club Drive, Farmington Hills, Michigan 48331 www.aci-int.org
ADC	Air Diffusion Council 104 S. Michigan Ave, Suite 1500, Chicago, IL 60603 www.flexibleduct.org
AFPA	American Forest & Paper Association (Formerly NFPA National Forest Products Association) 1111 19th St. N.W., Suite 800, Washington, DC 20036 www.afandpa.org
AGA	American Gas Association Inc. 1515 Wilson Blvd. Arlington, VA 22209-2469 www.agagas.com
AGAI	American Galvanizers Association Inc. 12200 E.Liff Ave, Suite 204, Aurora, CO 80014-1252 www.galvanizeit.org
AIA	American Institute of Architects 1735 New York Avenue, N.W., Washington, DC 20006-5292 www.aia.org
AIHA	American Industrial Hygiene Association 2700 Prosperity Ave, Suite 250, Fairfax VA 22031 www.aiha.org
AISC	American Institute of Steel Construction 1 E. Wacker Dr., Suite 3100, Chicago, IL 60601-2001 www.aisc.org
AMCA	Air Movement and Control Association 30 W. University Drive, Arlington Heights, IL 60004-1893 www.amca.org
ANSI	American National Standards Institute 11 W. 42nd Street, 13 Floor, New York, NY 10036 www.ansi.org
APA	The Engineered Wood Association (formerly APA - American Plywood Association) P.O. Box 11700, Tacoma, WA 98411-0070 www.apawood.org
ARI	Air-Conditioning and Refrigeration Institute 4301 N. Fairfax Dr., Suite 425, Arlington, VA 22203 www.ari.org

ASCA	Architectural Spray Coaters Association 230 West Wells Street, Suite 311, Milwaukee WI 53203 www.aecinfo.com
ASHRAE	American Society of Heating, Refrigerating, and Air-Conditioning Engineers 1791 Tullie Circle NE, Atlanta GA.30329 www.ashrae.org
ASME	American Society of Mechanical Engineers 345 East 47th Street, New York, NY 10017-2392 www.asme.org
ASTM	American Society for Testing and Materials 100 Barr Harbor Drive, West Conshohocken, PA 19428 www.astm.org
AWI	Architectural Woodwork Institute 1952 Isaac Newton Square W., Reston, VA 20190 www.awinet.org
AWPA	American Wood Preservers' Association P.O. Box 286, Woodstock, MD 21163-0286 www.awpa.com
AWPI	American Wood Preservers' Institution 1945 Old Gallows Rd., Suite 150, Vienna, VA 22182 www.oas.org
AWS	American Welding Society 550 LeJeune Road, N.W., Miami, FL 33126 www.aws.org
BHMA	Builders Hardware Manufacturers Association, Inc. 355 Lexington Ave., 17 Floor New York, NY 10017 www.buildershardware.com
CISCA	Ceilings & Interior Systems Construction Association 579 W. North Ave., Suite 301, Elmhurst, IL 60126 www.cisca.org
CRI	Carpet and Rug Institute 310 Holiday Ave, Dalton, GA 30720 www.carpet-rug.com
CRSI	Concrete Reinforcing Steel Institute 933 N. Plum Grove Road, Schaumburg, IL 60173-4758 www.crsi.org
CPSC	Consumer Product Safety Commission 5401 Westbard Ave., Bethesda, MD 20816-1469 www.cpsc.gov

CTIOA	Ceramic Tile Institute of America 12061 W. Jefferson BLVD, Culver City, CA 90230-6219 www.ctioa.org
DHI	Door and Hardware Institute 14170 Newbrook Dr., Chantilly, VA 22021-2223 www.dhi.org
FM	Factory Mutual Engineering & Research Corp. 1151 Boston-Providence Turnpike, Norwood, MA 02062 www.fmglobal.com
GA	Gypsum Association 6525 Belcrest Road, Suite 480, Hyattsville, MD 20782 www.gypsum.org
GANA	Glass Association of North America 800 SW Jackson Street #1500, Topeka, KS 66612 www.glasswebsite.com
GICC	Glazing Industry Code Committee 3310 Harrison St., Topeka, KS 66611-2279 www.glazingcodes.net
IGCC	Insulating Glass Certification Council PO Box 730, Sackets Harbor, NY 13685 www.igcc.org
IGMA	Insulating Glass Manufacturer's Alliance 27 North Wacker Drive, Suite 365, Chicago, IL 60606 www.igmaonline.org
MIL	Military Specifications and Standards Naval Publications and Forms Center 5801 Tabor Avenue, Philadelphia, PA 19120 www.milspec.com
NAAMM	National Association of Architectural Metal Manufacturers 8 South Michigan Avenue, Suite 1000, Chicago, IL 60603 www.naamm.org
NEBB	National Environmental Balancing Bureau 8575 Government Circle, Gaithersburg, MD 20877-4121 www.nebb.org
NEMA	National Electrical Manufacturers' Association 1300 N. 17th St., Suite 1846, Rosslyn, VA 22209 www.nema.org
NFPA	National Fire Protection Association 1 Battery March Park, PO Box 9101, Quincy, MA 02269

	www.nfpa.org
NFRC	National Fenestration Rating Council 6305 Ivy Lane, Greenbelt MD 20770 www.nfrc.org
NRCA	National Roofing Contractors Association 10255 W. Higgins Road, Suite 600, Rosemont, IL 60018-5607 www.nrca.net
PCA	Portland Cement Association 5420 Old Orchard Road, Skokie, IL 60077-1083 www.cement.org
PS	Product Standard U. S. Department of Commerce www.omg.org
SDI	Steel Deck Institute P.O. Box 25, Fox River Grove, IL 60021-0025 www.sdi.org
SDI	Steel Door Institute 30200 Detroit Road, Cleveland, OH 44145-1967 www.steeldoor.org
SGCC	Safety Glass Certification Council RMS, P.O. Box 9 Henderson Harbor, NY 13651 www.sgcc.org
SJI	Steel Joist Institute 3127 10th Ave. N., Myrtle Beach, SC 29577 www.steeljoist.org
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association 4201 Lafayette Center Dr., Chantilly, VA 22022-1209 www.smacnapa.org
SPIB	Southern Pine Inspection Bureau 4709 Scenic Highway, Pensacola, FL 32504-9094 www.spib.org
SSMA	Steel Stud Manufacturer's Association 8 South Michigan Avenue, Chicago IL 60603 www.ssma.com
SSPC	The Society for Protective Coatings 40 24th Street, 6th Floor, Pittsburgh PA 15222-4623 www.sspc.org

SSWRI	Sealant, Waterproofing & Restoration Institute 2841 Main Street, Suite 585, Kansas City, MO 64108 www.swrionline.org
TCNA	Tile Council of North America, Inc. 100 Clemson Research Blvd., Anderson, SC 29625 www.tileusa.com (formerly TCA, Tile Council of America)
UL	Underwriters' Laboratories, Inc. 333 Pfingston Road, Northbrook, IL 60602 www.ul.com
WDMA	Window & Door Manufacturers Association (formerly National Wood Window & Door Association, NWWDA) 205 E. Touhy Avenue, Suite G-54, Des Plaines, IL 60018 www.nwwda.org

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 014529
STRUCTURAL TESTING AND INSPECTIONS

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. Testing indicated on the drawings and in specification sections is required. Special Inspection procedures shall be required at the specific project direction of the Building Official, state or local jurisdiction.
- B. Section includes administrative and procedural requirements for quality assurance and quality control.
- C. Section includes requirements for quality assurance and quality control to be completed by the Testing Laboratory, Contractor, and/or the Geotechnical Engineer for the following structural items:
 - 1. Concrete Forming and Accessories.
 - 2. Concrete Reinforcing.
 - 3. Cast-in-Place Concrete.
 - 4. Masonry. (AAC)
 - 5. Structural Steel.
 - 6. Steel Decking.
 - 7. Earthwork.
 - 8. Spray fireproofing
 - 9. Intumescent fire proofing
 - 10. Fire Resistant Joint systems
 - 11. MEP/FP – Seismic Certification and Anchorage
- D. Where specific requirements are not listed in this specification, the IBC requirements (Chapter 17) shall be required to be met and govern
- E. Related Requirements:
 - 1. Division 01 Sections for Quality Requirements - and testing and inspecting allowances and assignments.
 - 2. Divisions 03, 04, 05, 07 and 31 Sections for specific test and inspection requirements.
 - 3. Divisions 21-23 and 26-28 for systems requiring IBC Chapter 17, Seismic Inspections and Documentations including:
 - a. Emergency and Standby Power
 - b. Hazardous Material Piping and Units
 - c. Hazardous Material Ductwork
 - d. Vibration isolation systems where the nominal clearance of 1/4 inch or less between the equipment support frame and restraint is specified
 - e. Smoke Control

- F. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
1. Specific quality-assurance and -control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
 2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
 3. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner, Construction Manager, or authorities having jurisdiction are not limited by provisions of this Section.

1.3 PRICE AND PAYMENT PROCEDURES

A. Unit Prices:

1. Cost Proposal: The Testing Laboratory's proposal to the Owner shall contain unit price stipulations for specified tests and inspections and on an hourly basis for personnel. A total estimated price shall also be submitted.

B. Measurement and Payment

1. Payment of the Testing Laboratory: The Owner will pay for the initial Laboratory services for inspection and testing of materials for compliance with the requirements of the Contract Documents.
2. Payment for Substitution Testing: The Contractor shall arrange for and pay for any additional samples and tests above those required by the Contract Documents as requested by the Contractor for his convenience in performing the work.
3. Payment for Retesting: When initial tests indicate work does not comply with the requirements of the Contract Documents, the Contractor shall be liable to the Owner for the cost for any additional inspections, sampling, testing, and retesting done by the Testing Laboratory.
4. Payment by Contractor: The Contractor shall furnish and pay for the following items if required:
 - a. Soil survey of the location of borrow soil materials, samples of existing soil materials, and delivery to the Contractor's Testing Laboratory.
 - b. Samples of concrete aggregates and delivery to the Contractor's Testing Laboratory.
 - c. Concrete mix designs as prepared by his concrete supplier.
 - d. Site-situated storage boxes for concrete cylinders
 - e. Concrete coring, tests of below strength concrete, and load tests, if ordered by the Owner, Architect, or Engineer.
 - f. Certification of reinforcing steel and prestressing steel mill order.
 - g. Certification of structural steel mill order.
 - h. Certification of portland cement, lime, fly ash.
 - i. Certification of welders and preparation of Welding Procedure Specifications.
 - j. Tests, samples, and mock-ups of substitute material where the substitution is requested by the Contractor and the tests are necessary in the opinion of the Owner, Architect or Engineer to establish equality with specified items.
 - k. The making and testing of concrete cylinders for the purpose of evaluating strength at time of form stripping or for post-tensioning or the time spent evaluating the in situ strength of concrete using the Maturity Method.

- I. Any other tests when such costs are required by the Contract Documents to be paid by the Contractor.
5. Payment for Tests of Suspected Deficient Work: If, in the opinion of the Building Official, Owner, Architect, or Engineer, any of the work of the Contractor is not satisfactory, the Contractor shall furnish and pay for all tests that the Owner, Architect, or Engineer deem advisable to determine its proper construction. The Owner shall pay all costs if the tests prove the questioned work to be satisfactory.

1.4 OWNER RESPONSIBILITIES

- A. Threshold Inspection: The Owner shall engage a separate agency to serve as a Threshold Inspector to provide Threshold Inspection services for the items outlined in the Threshold Inspection Plan. The scope of these services is not included in this section and is to be provided separately as outlined in the Threshold Inspection Plan. These inspections are mandatory for conformance to the legal requirements of the Florida Building Code and shall be in addition to the inspections and tests otherwise defined in this specification.
- B. The Owner shall engage a Geotechnical Engineer to provide inspection services for the foundations as outlined below in Part 3
- C. The Owner shall provide a copy of the project plans and specifications to the Testing Laboratory prior to the start of construction and prior to any preinstallation meetings.

1.5 CONTRACTOR RESPONSIBILITIES

- A. The Contractor shall not engage the same Testing Laboratory for construction services as the Owner has for Structural Testing Laboratory Services as defined herein unless agreed to by the Owner.
- B. Furnishing Samples and Certificates: The Contractor shall provide to the laboratory certificates and representative samples of materials proposed for use in the work in quantities sufficient for accurate testing as specified.
- C. Furnishing Casual Labor, Equipment and Facilities: The Contractor shall furnish casual labor, equipment, and facilities as required for sampling and testing by the laboratory and otherwise facilitate the required inspections and tests.

1.6 TESTING LABORATORY RESPONSIBILITIES

- A. The Testing Laboratory shall sample and test materials as they are being installed for compliance with specified acceptance criteria. The Testing Laboratory will report and interpret the test results. The Laboratory shall monitor and report on the installation of construction work and shall perform tests on the completed construction as required to indicate Contractor's compliance with the various material specifications governing this work.
- B. The Testing Laboratory shall serve as a Special Inspector to provide Special Inspection services for the items listed below. The scope of such services for each item shall be as defined in the Building Code or as defined in the local building code of the jurisdiction wherein the project is located. These inspections are mandatory for conformance to the legal requirements of the

building code and shall be in addition to the inspections and tests otherwise defined in this specification.

1. Special Inspector Responsibilities:

- a. The special inspector shall observe the work assigned to ascertain that, to the best of his/her knowledge, it is in conformance with the approved design drawings and specifications.
- b. The special inspector shall furnish inspection reports to the Building Official, the Architect/Engineer, and the Owner. All discrepancies shall be brought to the immediate attention of the Architect/Engineer, Contractor, and Owner. A report that the corrected work has been inspected shall be sent to the Building Official, the Architect/Engineer, and the Owner.
- c. The special inspector shall create and maintain a log of all discrepancies throughout the duration of the Project. This log shall include, but is not limited to, discrepancy date, description of discrepancy, drawing and/or detail reference, description of as-built condition, description of any remedial work performed, and status of discrepancy. This log shall be submitted to the Architect/Engineer on a periodic basis for review and comment. Upon completion of the Project, this log shall be submitted in its entirety as an attachment to the final signed report described below.
- d. The special inspector shall submit a final signed report stating whether the work requiring special inspection was, to the best of the inspector's knowledge, in conformance to the approved plans and specifications and the applicable workmanship provisions of the building code.

C. The Testing Laboratory shall provide inspections on the following items:

1. Reinforcing steel placement.
2. Concrete work.
3. Welding of reinforcing steel.
4. Bolts to be installed in concrete.
5. Bolts, anchors, and reinforcing bars installed in hardened concrete (post-installed anchors).
6. Inspection of structural steel, bolting, and welding material.
7. Welding of structural steel.
8. High-strength bolting.
9. Compacted earth fill.
10. Shallow foundations.
11. Masonry work.
12. Spray fireproofing
13. Intumescent fire proofing
14. Fire Resistant Joint systems
15. MEP/FP – Seismic Certification and Anchorage

D. Inspections Required by Government Agencies: The Testing Laboratory shall perform inspections and submit reports and certifications as required by government agencies having jurisdiction over the aspects of the project covered by this specification.

E. Notification of Deficiencies in the Work: The Testing Laboratory shall notify the Architect, Engineer, and Contractor within 24 hours of discovery of observed irregularities and deficiencies of the Work and other conditions not in compliance with the requirements of the Contract Documents. Notification shall be by telephone or e-mail and then in writing.

- F. Accounting: The Testing Laboratory shall be responsible for separating and billing costs attributed to the Owner and costs attributed to the Contractor.
- G. Monitoring Product and Material Certifications: The Testing Laboratory shall be responsible for monitoring the submittals of product and material certifications from manufacturers and suppliers as specified in the Specifications and shall report to the Owner, Architect, and Engineer when those submittals are not made in a timely manner.
- H. Limitations of Authority: The Testing Laboratory is not authorized to revoke, alter, relax, enlarge upon, or release any requirements of the Specifications or to approve or accept any portion of the work or to perform any duties of the General Contractor and his Subcontractors.

1.7 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

- 1. The Testing Laboratory shall cooperate with the Architect, Engineer, and Contractor and provide qualified personnel promptly on notice.
- 2. The Contractor shall cooperate with Testing Laboratory personnel and provide access to the work and to manufacturers' operations.
- 3. Notification of Source Change: The Contractor shall be responsible for notifying the Owner, Architect, Engineer, and Testing Laboratory when the source of any material is changed after the original tests or inspections have been made.

B. Preinstallation Meetings: The Testing Laboratory shall attend preinstallation meetings with the Architect, Engineer, Contractor, and material suppliers as required to coordinate materials inspection and testing requirements with the planned construction schedule and shall participate in such meetings throughout the course of the project.

C. Scheduling:

- 1. Advance Notice: The Contractor shall be responsible for notifying the Testing Laboratory sufficiently in advance of operations to allow for assignment of personnel and scheduling of tests. Failure to sufficiently notify may result in additional costs incurred by the Testing Laboratory that may be back-charged to the Contractor by the Owner.

1.8 SUBMITTALS

A. Quality Control Reports:

- 1. Information on Reports: The Testing Laboratory shall submit copies of reports of inspections and tests promptly. The reports shall contain at least the following information:
 - a. Project name.
 - b. Date report issued.
 - c. Testing Laboratory name and address.
 - d. Name and signature of inspector/technician.
 - e. Date of inspection and/or sampling.
 - f. Date of test.
 - g. Identification of product and Specification section.
 - h. Location in the project.

- i. Identification of inspection or test.
 - j. Record of weather conditions and temperature (if applicable).
 - k. Results of test regarding compliance with Contract Documents.
 2. Copies: The Laboratory shall send signed copies of test and inspection reports to the following parties:
 - a. **Two** copies to the Owner or his/her representative.
 - b. **Two** copies to the General Contractor.
 - c. **One** copy to the Architect.
 - d. **One** electronic copy to the Engineer of Record.
 - B. Discrepancy Log: The Testing Laboratory shall create and maintain a log of all discrepancies throughout the duration of the project.
 1. Information on Log: This log shall include, but is not limited to:
 - a. Discrepancy date.
 - b. Description of discrepancy.
 - c. Drawing and/or detail reference.
 - d. Description of as-built condition.
 - e. Description of any remedial work performed.
 - f. Status of discrepancy.
 2. Submission Schedule: This log shall be submitted to the Architect/Engineer on a periodic basis for review and comment. Upon completion of the Project, this log shall be submitted in its entirety as an attachment to the final signed report described below under Certifications.
 - C. Certification: Upon completion of the job, the Laboratory shall furnish to the Owner, Architect, and Engineer of Record, a statement signed by a licensed professional engineer that, to the best of their knowledge, required tests and inspections were made in accordance with the requirements of the Contract Documents.
- 1.9 QUALITY ASSURANCE
- A. Qualifications of Special Inspector: The special inspector shall be a qualified person who shall demonstrate competence, to the satisfaction of the Building Official, for inspection of the particular type of construction or operation being inspected. The Special Inspector shall meet the legal qualifications of the building code having jurisdiction.
 - B. Qualifications of Testing Laboratory:
 1. The Testing Laboratory shall meet the basic requirements of ASTM E 329 and shall submit to the Owner, Architect, and Engineer evidence of current accreditation from the American Association for Laboratory Accreditation, the AASHTO Accreditation Program or the "NIST" National Voluntary Laboratory Accreditation Program.
 2. The Testing Laboratory shall be an Approved Agency by the Building Official to perform Special Inspections and other tests and inspections as outlined in the applicable building code.
 3. Tests and inspections shall be conducted in accordance with specified requirements, and if not specified, in accordance with the applicable standards of the American Society for

- Testing and Materials or other recognized and accepted authorities in the field.
4. Qualifications of Welding Inspectors
 - a. Inspectors performing visual weld inspection shall meet the requirements of AWS D1.1 Section 6.1.4. Inspectors shall have current certification as an AWS Certified Welding Inspector (CWI). Assistant inspectors, if any, shall be supervised by an Inspector and shall be qualified by training and experience to perform the specific functions to which they are assigned.
 - b. Inspectors performing nondestructive examinations of welds other than visual inspection (MT, PT, UT, and RT) shall meet the requirements of AWS D1.1, Section 6.14.6.
 - C. The Contractor shall not engage the same testing laboratory for construction services as the Owner has for quality assurance testing, unless agreed to by the Owner.

1.10 CONFLICTING REQUIREMENTS

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

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCOPE OF WORK

- A. The work to be performed by the Testing Laboratory shall be as specified in this Section of the Specification and as determined in meetings with the Owner, Architect, and Engineer.

3.2 CONCRETE FORMING AND ACCESSORIES

- A. Field Inspection:
 1. Shallow Foundation Elements:
 - a. Verify element width, length, depth, and elevation.
 - b. Verify that forms are plumb and straight, braced against movement, and lubricated for removal.
 - c. Verify that carton forms, if any, are dry and neatly formed around piers.

2. Slabs-on-Grade:
 - a. Verify formwork at turndowns and slab edges is plumb and straight, braced against movement and lubricated for removal.
3. Columns and Walls:
 - a. Verify that forms are plumb and straight, braced against movement, lubricated for removal, and conform to approved shop drawings.
 - b. Verify proper dimensions and orientation.
 - c. Verify top of column elevation is set in form and that it is 1/2 inch below the future slab soffit.
4. Suspended Floors and Formwork (General):
 - a. Verify that formwork conforms to signed and sealed shop drawings.
 - b. Verify that shoring layout conforms to signed and sealed shop drawings.
 - c. Verify that reshores at all levels conform to signed and sealed shop drawings.
 - d. Verify that forms are plumb and straight, braced against movement, and lubricated for removal.
 - e. Verify that the forms used for exposed finish surfaces are of the type specified and provide a joint system as shown on the Architect's drawings.
 - f. Verify the proper dimensions of girders, beams, and joists.
 - g. Verify that the slab thickness and top of slab elevation is correct.
 - h. Verify the top of columns are 1/2 inch below the deck soffit.
5. In-Situ Concrete Strength Verification Prior to Form Stripping: The Testing Laboratory shall verify that the concrete has reached the required minimum strength before form removal by evaluating the specified tests. Refer to Paragraph 3.4C.2.a for additional information regarding the tests.

3.3 CONCRETE REINFORCING

- A. Quality Assurance:
 1. Review the Welding Procedure Specification (WPS) submitted by the contractor for any reinforcing steel other than ASTM A 706 that is proposed to be welded for consistency with acceptable welding practices and AWS.
 2. Review welder qualifications by certification or verify by retesting. Obtain welder certificates.
- B. Field Testing: The following tests shall be completed by the Testing Laboratory:
 1. Mechanical Tension Splices: The Laboratory shall conduct monotonic tension tests in accordance with ASTM A 1034 of mechanical tension splices of the type as specified on the structural drawings. It is not necessary that the specimens to be tested are production splices, however, the specimens to be tested shall have been made by the Contractor's personnel under field conditions. The rate of testing shall be as follows:
 - a. Two specimens for the first 50 splices (or fraction thereof) at the beginning of the job. Splices not meeting tension requirements shall be retested at Contractor's expense until all splices meet the tension requirements.
 - b. One specimen for every 100 (or fraction thereof) additional splices occurring on the job. Any splices not meeting tension requirements shall be retested at Contractors

- expense until all splices have passed the test.
- c. A minimum of one test specimen shall also be selected from transition splices (splices of one bar size to another bar size), if any.
- C. Field Inspection: The scope of the work to be performed by the inspector on the jobsite shall be as follows:
1. Reinforcing Steel: The Testing Laboratory or designated Special Inspector shall inspect 100% of reinforcement before each concrete pour to verify the information noted below. Inspection reports shall be prepared and distributed in accordance with the local building code and as specified in this specification.
 - a. Primary and secondary longitudinal reinforcement has correct size and number in proper layers.
 - b. Longitudinal reinforcement has correct length and lap.
 - c. Ties and stirrups are of correct size, spacing, and number and have the proper termination hook geometry.
 - d. Unscheduled face reinforcement in beams are provided and are of correct size, number and spacing and have the proper end terminations.
 - e. Proper hooks are provided at bar ends as detailed.
 - f. Reinforcement is properly supported and braced to formwork to prevent movement during concrete placement.
 - g. Reinforcement has proper cover.
 - h. Sufficient spacing between reinforcement for concrete placement.
 - i. Dowel reinforcement is of proper size, at proper spacing, and has proper lap length and embedment length.
 - j. Welded wire reinforcement is composed of flat sheets, has proper wire gage and spacing, is properly supported, and is properly lapped.
 - k. Proper construction/control/expansion joint spacing and reinforcement.
 - l. Reinforcement around embedded items is placed according to details.
 - m. Welded reinforcement has been done according to AWS requirements.
 - n. Proper installation of flat slab shear head reinforcement.
 - o. Reinforcing Steel Compression Butt Splices: The Testing Laboratory shall provide 100% visual inspection of compression butt splices on the project. Inspection shall verify splice conformance with the requirements for end bearing splices as set forth in ACI 318 as well as the manufacturer's instructions.
 - p. Mechanical Tension Splices: The Testing Laboratory shall provide 100% visual inspection of mechanical tension splices on the project and consult with the manufacturer regarding recommendations for installation. Inspection shall verify compliance with specifications and conformance with the manufacturer's recommendations for installation after consulting with the manufacturer, who is to be present for the first installation of the splice on the project.
 - q. Welded Reinforcing: 100% visual inspection of the welding of reinforcing bars to ensure compliance with the requirements of AWS shall be done for the following items:
 - 1) Reinforcing steel resisting flexural and axial forces.
 - 2) Boundary elements of reinforced concrete walls.
 - 3) Shear reinforcement.

3.4 CAST-IN-PLACE CONCRETE

- A. Quality Assurance:

1. Concrete Mix Designs: The Testing Laboratory shall review the submitted mix designs for conformance to the specifications and for suitability for use in the project.
 2. Preinstallation Meetings: The Testing Laboratory shall attend the preinstallation meetings as noted in Specification **033000** "Cast-in-Place Concrete."
- B. Source Inspection:
- C. Field Testing: The following tests shall be completed by the Testing Laboratory:
1. During Concrete Placement:
 - a. Record the amount of water added and note if it exceeds the amount allowed to be added shown in the approved mix design.
 - b. Mold concrete test cylinders as specified below in Paragraph 3.a.
 - c. Perform tests to determine slump, concrete temperature, unit weight, and air entrainment as specified below.
 - d. Record information for concrete test reports as specified below.
 - e. Pick up and transport to Laboratory cylinders cast the previous day.
 2. After Concrete Placement:
 - a. In-situ Concrete Strength Verification for Form Stripping: The Testing Laboratory shall perform the tests necessary to determine the concrete strength prior to form stripping:
 - 1) If concrete strength for form stripping is to be determined using field-cured cylinders, the cylinder shall be broken at the time of form removal as directed by the Contractor.
 - 2) If concrete strength for form stripping is to be determined using the Maturity Method, the Testing Laboratory shall verify that the requirements of ASTM C 1074 are being followed and that the proper criteria for determining concrete strength by this method has been established and is being followed.
 - b. Investigation of Low Strength Concrete Test Results:
 - 1) Cost of Investigations for Low Strength Concrete: The Contractor shall reimburse the Owner for the costs of investigations of low strength concrete, as defined in Part I above.
 - 2) Scope of Investigations: See Specification Section 03 30 00 "Cast-In-Place Concrete" for the investigations that may be required by the Engineer. The Testing Laboratory will conduct these investigations if required.
 - c. Post-Installed Anchors in Concrete:
 - 1) Verify maximum anchor tightening torque for all applicable post-installed anchors.
 - 2) Verify that all drilled holes for adhesive anchors are within 6 degrees of perpendicular to the surface of the concrete member.
 - 3) Provide pull tests on individual anchors as specified in the ICC Evaluation Services Report, on the drawings, or as directed by the Engineer-of-Record.
 - d. Floor Flatness and Levelness Measuring: Perform tests as defined below.

- e. Testing of Concrete Floor Slabs for Acceptability to Receive an Adhesive-Applied, Low-Permeable Floor Covering: Perform tests as defined below.
 - f. Testing of Non-Shrink Grout for Base Plates, Bearing Plates, and Precast Wall Panels:
 - 1) Compressive Strength Tests: Compressive strength of grout shall be determined by testing grout cubes according to the requirements of ASTM C 109 - Modified. Test one set of three cubes at one day, and one set of three cubes at 28 days.
 - 2) Frequency of Testing: One set of cubes (6 cubes) shall be made for every ten base plates and bearing plates or fraction thereof but not less than one set for each day's operation. One set of cubes shall be made for each day's operation of grouting wall panels.
3. Standards for Concrete Tests:
- a. Concrete Test Cylinders: Mold and test concrete cylinders as described below:
 - 1) Cylinder Molding and Testing: Cylinders for strength tests shall be molded and Laboratory cured in accordance with ASTM C 31 and tested in accordance with ASTM C 39. Cylinders may be either 6" in diameter by 12" or 4" in diameter by 8", however, the diameter of the cylinder shall be at least three times the nominal maximum size of the coarse aggregate in the mix tested. All of the cylinders for each class of concrete shall be of the same dimension for all sets of that class.
 - 2) Field Samples: Field samples for strength tests shall be taken in accordance with ASTM C 172 at the point of placement.
 - 3) Quantity of Cylinders: Each set of test cylinders shall consist of a minimum of four standard test cylinders. If concrete strength for form stripping is to be determined using field-cured cylinders, one additional cylinder per set will be required for formed slab and pan-formed beam floors for the purpose of evaluating the concrete strength at the time of form stripping. This cylinder shall be stored on the floor where form removal is to occur under the same exposure conditions as the floor concrete. The cylinder shall be cured under field conditions in accordance with ASTM C 31. Field-cured test cylinders shall be molded at the same time and from the same samples as laboratory-cured test specimens. The Contractor shall reimburse the Owner for the cost of making and testing these cylinders.
 - 4) Frequency of Testing: A set of test cylinders shall be made according to the following minimum frequency guidelines:
 - a) One set for each class of concrete taken not less than once a day.
 - b) Mat Foundation: One set for each 150 cubic yards or fraction thereof.
 - c) Piers, Piles, Underreamed Footings: One set for each 50 cubic yards or fraction thereof.
 - d) Pressure-injected Footings: One set for each 50 cubic yards or fraction thereof.
 - e) Spread Footings: One set for each 50 cubic yards or fraction thereof.
 - f) Pile Caps: One set for each 50 cubic yards or fraction thereof.
 - g) Basement Walls: One set for each 150 cubic yards.
 - h) Floors: One set for each 150 cubic yards or fraction thereof but not less than one set for each 5,000 square foot of floor area.
 - i) Columns: One set for each 50 cubic yards or fraction thereof with a

- minimum of two sets per floor.
- j) Shear Walls: One set for each 50 cubic yards but not less than two sets per floor.
 - k) All Other Concrete: A minimum of one set for each 150 cubic yards or fraction thereof but not less than one set for each 5,000 square foot of area for walls.
 - l) No more than one set of cylinders at a time shall be made from any single truck.
 - m) If the total volume of concrete is such that the frequency of testing as specified above would provide less than five strength tests for a given class of concrete, tests shall be made from at least five randomly selected batches or from each batch if fewer than five batches are used.
 - n) The above frequencies assume that one batch plant will be used for each pour. If more than one batch plant is used, the frequencies cited above shall apply for each plant used.
- 5) The cylinders shall be numbered, dated, and the point of concrete placement in the building recorded.
 - 6) For concrete specified on the drawings to reach the required strength at 28 days, break one cylinder of the set at seven days, two 6" by 12" cylinders or three 4" by 8" cylinders at 28 days, and keep one in reserve for testing at the Engineer's direction.
 - 7) For concrete specified on the drawings to reach the required strength at 56 days, break one cylinder of the set at seven days, one cylinder at 28 days, two 6" by 12" cylinders or three 4" by 8" cylinders at 56 days, and one kept in reserve for testing at the Engineer's direction.
 - 8) For concrete specified on the drawings to reach the required strength at 90 days, break one cylinder of the set at seven days, one cylinder at 28 days, one cylinder at 56 days, two 6" by 12" cylinders or three 4" by 8" cylinders at 90 days, and one kept in reserve for testing at the Engineer's direction.
 - 9) Cylinder Storage Box: The Contractor shall be responsible for providing a protected concrete cylinder wooden storage box at a point on the job site mutually agreeable with the Testing Laboratory for the purpose of storing concrete cylinders until they are transported to the Laboratory. The box shall be constructed and equipped to maintain the environment specified for initial curing in ASTM C 31.
 - 10) Transporting Cylinders: The Testing Laboratory shall be responsible for transporting the cylinders to the Laboratory in a protected environment such that no damage or ill effect will occur to the concrete cylinders including loss of moisture, freezing temperatures or jarring.
 - 11) Information on Concrete Test Reports: The Testing Laboratory shall make and distribute concrete test reports after each job cylinder is broken. Such reports shall contain the following information:
 - a) Truck number and ticket number.
 - b) Concrete Batch Plant.
 - c) Mix design number.
 - d) Accurate location of pour in the structure.
 - e) Strength requirement.
 - f) Date cylinders made and broken.
 - g) Technician making cylinders.
 - h) Concrete temperature at placing.
 - i) Air temperature at point of placement in the structure.

- j) Amount of water added to the truck at the batch plant and at the site and whether or not it exceeds the amount allowed by the mix design.
 - k) Slump.
 - l) Unit weight.
 - m) Air content.
 - n) Cylinder compressive strengths with type of failure if concrete does not meet Specification requirements. Seven day breaks are to be flagged if they are less than 60% of the required 28 day strength. 28 day breaks are to be brought to the attention of the Architect and Engineer in writing if either cylinder fails to meet specification requirements.
- b. Slump Tests: Slump Tests (ASTM C 143) shall be completed at the beginning of concrete placement for each batch plant and for each set of test cylinders made. The slump test shall be made from concrete taken from the end of the concrete truck chute. The concrete shall be considered acceptable if the slump is within the slump tolerance noted on the mix design submittal form for that class of concrete.
- c. Air Entrainment: Air entrainment tests (ASTM C 231 or C 173, C 173 only for lightweight concrete) shall be made at the same time slump tests are made as cited above. Samples for air entrainment tests shall be taken at the point of placement.
- d. Concrete Temperature: Concrete temperature at placement shall be measured (ASTM C 1064) at the same time slump tests are made as cited above.
- e. Unit Weight Test: ASTM C 138.
- f. Floor Flatness and Levelness Measuring:
- 1) The Testing Laboratory shall measure the floor for flatness and levelness according to ASTM E 1155.
 - 2) Measurement of the finished concrete surface profile for any test section shall be made when requested by the Representative at his option. Notwithstanding, measurements shall be made within 24 hours after completion of finishing operations. For structural elevated floors measurement shall also be made prior to removal of forms and shores. The Contractor shall be notified immediately after the measurements of any section are complete and a written report of the floor measurement results shall be submitted within 72 hours after finishing operations are complete.
 - 3) The concrete surface profile shall be measured using equipment manufactured for the purpose such as a Dipstick Floor Profiler as manufactured by the Edward W. Face Company in Norfolk, Virginia, F-Meters manufactured by Allen Face & Company in Norfolk, Virginia, optical, or laser means or other method specified in ASTM E 1155.
 - 4) Each floor test section and the overall floor area shall conform to the two-tiered measurement standard as specified herein.
 - a) Minimum Local Value (MLV). The minimum local F_F/F_L values represent the absolute minimum surface profile that will be acceptable in any one floor test section.
 - b) Specified Overall Value (SOV). The specified overall F_F/F_L values represent the minimum values acceptable for all combined floor test sections representing the overall floor.
 - 5) For purposes of this specification a floor test section is defined as the smaller of the following areas:
 - a) The area bounded by column and/or wall lines.

- b) The area bounded by construction and/or control joint lines.
 - c) Any combination of column lines and/or control joint lines.
 - d) Test sample measurement lines within each test section shall be multidirectional along two orthogonal lines as defined by ASTM E 1155.
 - e) The precise layout of each test section shall be determined by the Testing Laboratory and shall be submitted for Architect/Engineer review and approval.
- g. Testing of Concrete Floor Slabs for Acceptability to Receive an Adhesive-Applied, Low-Permeable Floor Covering:
- 1) The following tests shall be performed by the Testing Laboratory as a part of quality assurance testing to ensure that the proper moisture condition and alkalinity of the substrate has been achieved prior to installing adhesive-applied, low-permeability floor coverings such as vinyl composition tile (VCT), linoleum, sheet vinyl, vinyl-backed carpet, rubber, athletic flooring, synthetic turf, wood, acrylic terrazzo, thin-set tile, epoxy overlays and adhesives, waterproofing, et.al.
 - 2) Moisture Vapor Emission Rate: Perform testing according to ASTM F 1869 to determine if the moisture emission rate from the floor is below the flooring manufacturer's maximum recommended value but not greater than five pounds per 1,000 square feet per 24 hours.
 - 3) Relative Humidity Determination Test: As an alternate to the Moisture Vapor Emission Rate Test, and if agreed to by the Contractor, Architect and Owner, perform testing according to ASTM F 2170 to determine if the relative humidity of the concrete slab is below the flooring manufacturer's maximum recommended value but not greater than 75%.
 - 4) Alkalinity Testing: Perform testing in accordance with ASTM F 710, Paragraph 5.3, to determine if the pH level of the concrete slab surface is below the flooring manufacturer's maximum recommended value but not greater than 10. Perform one test per 1,000 square feet with a minimum of three tests within the total area being tested.
4. Evaluation and Acceptance of Concrete:
- a. Strength Test: A strength test shall be defined as the average strength of two six inch cylinder breaks or three four inch cylinder breaks from each set of cylinders tested at the time indicated above.
 - b. Quality Control Charts and Logs: The Testing Laboratory shall keep the following quality control logs and charts for each class of concrete containing more than 2,000 cubic yards. The records shall be kept for each batch plant and submitted on a weekly basis with cylinder test reports:
 - 1) Number of strength tests made to date.
 - 2) Strength test results containing the average of all strength tests to date, the high test result, the low test result, the standard deviation, and the coefficient of variation.
 - 3) Number of tests under specified strength.
 - 4) A histogram plotting the number of strength test cylinders versus compressive strength.
 - 5) Quality control chart plotting compressive strength test results for each test.
 - 6) Quality control chart plotting moving average for strength where each point plotted is the average strength of three previous test results.
 - 7) Quality control chart plotting moving average for range where each point

plotted is the average of 10 previous ranges.

- c. Acceptance Criteria: The strength level of an individual class of concrete shall be considered satisfactory if both of the following requirements are met:
 - 1) The average of all sets of three consecutive strength tests equal or exceed the required f'_c .
 - 2) No individual strength test falls below the required f'_c by more than the greater of 10% of f'_c or 500 PSI.
 - d. If either of the above Acceptance Criteria requirements is not met, the Testing Laboratory shall immediately notify the Engineer by telephone. Steps shall immediately be taken to increase the average of subsequent strength tests.
- D. Field Inspection: The scope of the work to be performed by the inspector on the jobsite shall be as follows:
- 1. Before Concrete Placement:
 - a. Inspect concrete formwork per Article 3.2.
 - b. Inspect concrete reinforcing per Article 3.3.
 - c. Inspect bolts and rods to be embedded in concrete for proper grade, size, length, and embedment.
 - d. For slabs-on-grade, verify that the moisture retarder is provided, is lapped properly, and is not torn or punctured.
 - e. Verify that there is no standing water in pour area and that all debris has been removed from the area and from the formwork.
 - f. Verify that openings and sleeves in slabs or walls are correct size and location. Verify that the openings are shown on the structural drawings and notify the Engineer immediately of any openings in the field that are not shown on the drawings.
 - g. Verify that horizontal and vertical sleeves through girders, beams, or joists have been approved by the Engineer and that approved reinforcement is provided.
 - h. Verify the tops of previously poured columns and/or walls are 1/2 inch below the deck soffit.
 - 2. During Concrete Placement: Provide continuous monitoring to:
 - a. Upon arrival of concrete, inspect the concrete to verify that the proper concrete mix number, type of concrete, concrete strength is being placed at the proper location. Verify that the mix meets the project specifications and is not over 90 minutes old at the time of placement. Report concrete not meeting the specified requirements and immediately notify the Contractor, Batch Plant Inspector, Architect, Engineer, and Owner.
 - b. Inspect plastic concrete upon arrival at the jobsite to verify proper batching. Observe mix consistency and adding of water as required to achieve target slumps in mix designs. The responsibility for adding water to trucks at the job site shall rest only with the Contractor's designated representative. The Contractor is responsible that all concrete placed in the field is in conformance to the Contract Documents.
 - c. Verify that the Contractor is following appropriate Hot Weather or Cold Weather concreting practices consistent with any extreme environmental conditions at the point of placement in the structure.
 - d. Verify that concrete deposited is uniform and that vertical drop does not exceed six feet and is not permitted to drop freely over reinforcement causing segregation.

- e. Verify that the formwork has remained stable during the concreting operation.
- f. Verify that there are no cold joints.
- g. Verify that the concrete is properly vibrated.
- h. Inspect bolts embedded in concrete during concrete placement for verification that they have been properly installed to the specified embedment.
- i. Verify that the finishing of the concrete surface is done according to specifications.

The Testing Laboratory shall report any irregularities that occur in the concrete at the job site or test results to the Contractor, Architect, Owner, and Engineer.

3. After Concrete Placement:

- a. Verify that the curing process is according to Specifications and that any curing compound used is applied in accordance with the manufacturer's recommendations.
- b. Verify that sawcut control joints in slab-on-grades are cut within 12 hours of placement.
- c. Post-Installed Anchors in Concrete: Provide inspection of post-installed anchor installations at the frequency noted in the specifications and in accordance with the published, currently valid, Evaluation Service Report (ESR) for each anchor product. Post-installed anchors include anchors and reinforcing steel. Inspection of post-installed anchors shall include but not be limited to the following:
 - 1) Periodic Inspection: Verify initial installation of post-installed anchors in concrete for each individual installer with each individual anchor product in accordance with the requirements stated below for each type of anchor. Periodically inspect anchor installation after the initial verification.
 - 2) Continuous Inspection: Verify each installation of post-installed anchors in concrete in accordance with the requirements stated below for each type of anchor.
 - 3) All Post-Installed Anchors: Verify that the anchor is installed in accordance with manufacturer's printed installation instructions as well as the following design requirements.
 - a) Concrete type, concrete strength and concrete thickness are in accordance with design drawings.
 - b) Anchor manufacturer and product, including material, is in accordance with design drawings or approved substitution.
 - c) Anchor diameter, length and installed embedment depth.
 - d) Drill bit type and diameter.
 - e) Anchor edge distance and spacing.
 - f) Hole diameter and depth.
 - g) Hole cleaning procedure and cleanliness.
 - h) Anchor maximum tightening torque.
 - 4) Adhesive Anchors: In addition to the requirements for All Post-Installed Anchors, verify adhesive identification and expiration date.
 - a) The installation of all adhesive anchors shall be continuously inspected when anchors are subject to sustained tension loads, such as anchors for shelf angles, or when anchors are installed in an upwardly inclined condition.

- E. Causes for Rejection of Concrete: The Contractor shall reject concrete delivered to the site for any of the following reasons:

1. Wrong class of concrete (incorrect mix design number).
2. Environmental Conditions: Environmental condition limits shall be as follows unless appropriate provisions in concreting practices have been made for cold or hot weather:
 - a. Cold Weather: Air temperature must be 40°F and rising or the average daily temperature cannot have been lower than 40°F for 3 consecutive days unless the temperature rose above 50°F for at least one-half of any of those 24 hour periods.
 - b. Hot Weather: Environmental conditions must be such that cause an evaporation rate from the concrete surface of 0.2 lb./sq. ft./hr. or less as determined by Figure 2.1.5 in ACI 305R-91.

Concrete may be placed at other environmental condition ranges only with approval of the job inspector for the Testing Laboratory or other duly appointed representative.

3. Concrete with temperatures exceeding 95°F shall not be placed in the structure.
 4. Air contents outside the limits specified in the mix designs.
 5. Slumps outside the limits specified.
 6. Excessive Age: Concrete shall be discharged within 90 minutes of plant departure or before it begins to set if sooner than 90 minutes unless approved by the Laboratory job inspector or other duly appointed representative.
- F. Concrete Batch Trip Tickets: Concrete batch trip tickets shall be collected and retained by the Contractor. Compressive strength, slump, air, and temperature tests shall be identified by reference to a particular trip ticket. Tickets shall contain the information specified in ASTM C 94. Each ticket shall also show the amount of water that may be added in the field for the entire batch that will not exceed the specified water cement ratio for the design mix. The Contractor and Testing Laboratory shall immediately notify the Architect/Engineer and each other of tickets not meeting the criteria specified.

3.5 MASONRY (applicable ASTM or ICC-ES applies)

A. Quality Assurance:

1. Masonry Unit: For each type of masonry unit indicated, verify compliance with ASTM and the strength required by design. Verification may be by reviewing certification from unit producer showing compliance.
2. Review field welder qualifications by certification or verify by retesting. Obtain welder certificates.

B. Field Testing:

1. Masonry Strength Testing:
 - a. Verification Testing Frequency: Verification of masonry strength (f'm) will be performed at the beginning of masonry construction [and during construction for each 500 square feet of wall area or portion thereof.
 - b. Mortar:
 - 1) As construction begins, verify the proportions of the site-prepared mortar mix comply with the requirements of ASTM for the type specified.
 - 2) Verify the proportions of materials in premixed or preblended mortar comply with the requirements of ASTM for the type specified as delivered to the site.
 - c. Grout:
 - 1) Prior to grouting, verify the proportions of site-prepared grout mix comply with the requirements of ASTM for each type of grout used.
 - 2) Verify the proportions of materials in premixed or preblended grout comply with the requirements of ASTM as delivered to the site.
 - 3) For grout pre-mixed at a batch plant or otherwise not prepared on site, grout

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- shall be sampled and tested in accordance with ASTM. Prepare one set of grout samples for testing at seven days and two sets for testing at 28 days.
- d. For each type of wall construction indicated for testing, test representative masonry prisms by methods of sampling and testing of ASTM, and as follows:
 - 1) Prepare one set of prisms for testing at 7 days and one set for testing at 28 days.
 - 2) For concrete masonry prisms adhere to requirements as specified under preconstruction testing. Build prisms on job using same materials and methods as for wall construction. Store prisms in air at temperature not less than 65°F in a facility supplied by the contractor where they will be undisturbed for seven (7) days. After seven (7) days, transport to laboratory in a manner which will not disturb mortar bond.
 - 3) Cap each prism with suitable material to provide bearing surfaces on each end.
 - a) Plane within 0.003 inch.
 - b) Approximately perpendicular to the axis of the prism.
 - 4) The preparation of prisms shall be observed by the testing agency that will test the prisms.
 - e. Report test results in writing and in form specified under each test method, to Architect and Contractor, on same day tests are made.
 - f. Retests: Where prism tests indicate non-compliance with specified requirements, additional testing shall be performed at the frequency of two additional tests for each unsatisfactory test. The cost of such additional testing shall be the responsibility of the Contractor. Where retesting fails to indicate conformance with specified requirements, any masonry construction represented by unsatisfactory tests shall be removed and replaced with acceptable masonry construction.
- C. Field Inspection:
1. Mortar Joints: As construction begins, verify that mortar joints are being prepared in accordance with these specifications and ACI 530.1/ASCE 6/TMS 602.
 2. Reinforcement and Connectors: Prior to grouting, verify the size, grade, type and placement of reinforcement and connectors is in compliance with specified requirements.
 3. Grouting: Prior to any grouting procedure, the grout space shall be inspected to verify that it is clean and that cleanouts, if required, are in place and conform to requirements. Verify through continuous inspection that the placement of grout is in compliance with the requirements of the contract specifications and ACI 530.1/ASCE 6/TMS 602.
 4. Anchors: Periodically verify the type, size and location of anchors including anchors of masonry to other structural members, frames, or construction is in compliance with specified requirements.
 5. Welding of Reinforcing Bars: Observe the welding of reinforcing bars.
 6. Installed items: Verify that installed flashing, weep holes, construction joints, control joints and wall vents are installed in accordance with specifications.

3.6 STRUCTURAL STEEL

- A. Scope of Work:
1. Contract Obligations:
 - a. Owner Responsibility: The Owner shall pay for initial shop and field inspections and tests as required during the fabrication and erection of the structural steel.
 - b. Testing Laboratory Responsibility: The inspection by the Testing Laboratory of the Fabricator's work shall be in sequence, timely, and performed in such a manner so

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that corrections can be made without delaying the progress of the work. Inspections shall be performed by qualified technicians with a minimum of two years of experience in structural steel testing and inspection. Refer to Paragraph 1.9B.4 for special requirements for welding inspectors. The Testing Laboratory shall provide test reports of inspections. All test reports shall indicate types and locations of defects found during inspection, the measures required and performed to correct such defects, statements of final approval of welding and bolting of shop and field connections, and other fabrication and erection data pertinent to the safe and proper welding and bolting of shop and field connections. Weld inspection reports shall be signed by an inspector with current certification as an AWS Certified Welding Inspector (CWI). In addition to the parties listed in this Specification the Fabricator and Erector shall receive copies of the test reports.

- c. Rejection of Material or Workmanship: The Owner, Architect, Engineer, and Testing Laboratory reserve the right to reject any material or workmanship not in conformance with the Contract Documents at any time during the progress of the work. However, this provision does not allow waiving the obligation for timely, in sequence inspections.

B. Quality Assurance:

1. Verify the fabrication shop's certification from AISC.
2. Verify that the fabricator's fabrication and quality control procedures provide a sound basis for inspection control of workmanship and of the ability to conform to construction documents and industry standards. Review the procedures for completeness and adequacy relative to code requirements for the fabricator's finished product.
3. Review field welder qualifications by certification or verify by retesting. Obtain welder certificates.

C. Source Testing: The Testing Laboratory shall provide the following tests at the designated fabrication shops:

1. Test welds completed in the shop according to Paragraph H "Weld Testing" below.
2. Test bolted connections completed in the shop according to Paragraph I "High-Strength Bolt Testing."

D. Source Inspection: The Testing Laboratory shall provide the following inspections at the designated fabrication shops:

1. Shop Inspection Waiver: The requirement to perform fabricating shop inspections may be waived if the Fabricator produces evidence from the Building Official of being a registered, approved fabricating shop and if allowed by the Engineer.
2. An initial shop inspection prior to the start of any fabricating work shall be made to accomplish the following:
 - a. Perform tasks outlined in Paragraphs G.1, G.2 and G.3 of welding inspection duties described below in Paragraph G "Weld Inspection and Process Monitoring" when shop welding is to be performed.
 - b. Perform tasks outlined in paragraph J.1 of bolt inspection duties described below in Paragraph I "High-Strength Bolt Inspection and Process Monitoring" when shop bolting involves joints that are designated on the plans as Pretensioned or Slip-Critical.

3. Process Monitoring:

- a. Provide continuous or periodic monitoring of welding as described below in Paragraph G “Weld Inspection and Process Monitoring.”
 - b. Provide continuous or periodic monitoring of bolting as described below in Paragraph I “High-Strength Bolt Inspection and Process Monitoring” of high-strength bolt installation in pre-tensioned or slip-critical joints using turn-of-the-nut without matchmarking or calibrated wrench method of bolt installation.
 - c. Provide periodic verification of specified camber of steel beams.
- E. Field Testing: The Testing Laboratory shall provide the following tests in the field:
1. Test welds completed in the field according to Paragraph H “Weld Testing:” below.
 2. Test bolted connections completed in the field according to Paragraph I “High-Strength Bolt Testing.”
 3. Perform bend tests on completed shear connectors attached to beams as required according to procedures outlined in AWS D1.1. In addition, perform field bend tests on an additional 2% of completed shear connectors on each beam but not less than one connector per beam.
 4. Testing of Non-Shrink Grout for Base Plates, Bearing Plates, and Precast Wall Panels:
 - a. Compressive Strength Tests: Compressive strength of grout shall be determined by testing grout cubes according to the requirements of ASTM C 109 - Modified. Test one set of three cubes at one day, and one set of three cubes at 28 days.
 - b. Frequency of Testing: One set of cubes (6 cubes) shall be made for every ten base plates and bearing plates or fraction thereof but not less than one set for each day's operation. One set of cubes shall be made for each day's operation of grouting wall panels.
- F. Field Inspection: The Testing Laboratory shall provide the following inspections in the field:
1. Inspect galvanized HSS and other cold-worked structural steel members for cracking or other damage resulting from galvanizing process. Endeavor to complete inspections prior to erection of these members. Immediately notify Contractor and Architect/Engineer of any irregularities discovered.
 2. Provide continuous or periodic monitoring of field welding as described below in Paragraph G “Weld Inspection and Process Monitoring.”
 3. Provide continuous or periodic monitoring of field bolting as described below in Paragraph I “High-Strength Bolt Inspection and Process Monitoring” of high-strength bolt installation in pre-tensioned or slip-critical joints using turn-of-the-nut without matchmarking or calibrated wrench method of bolt installation.
 4. Inspect welded or bolted connections that were completed, but not inspected, in the shop. Perform inspections according to Paragraph G “Weld Inspection and Process Monitoring” and/or Paragraph I “High-Strength Bolt Inspection and Process Monitoring” as appropriate.
 5. Obtain the planned erection procedure, and review with the Erector's supervisory personnel.
 6. Check the installation of base plates for proper leveling, grout type, and grout application.
 7. Check structural steel as received in the field for possible shipping damage, workmanship, and identification marking to conform to AISC 360 for structural steel and specified ASTM standards for other steel.
 8. Verify that surveys are occurring as specified to check plumbness and frame alignment as erection progresses. Review the submitted survey report.
 9. Periodically inspect the steel frame for such items as bracing and stiffening details, member locations, and joint details at each connection for compliance with approved construction documents.
 10. Inspect 100% of the column compression and base joints for verification that gaps in

contact bearing do not exceed 1/16 inch. Gaps greater than 1/16 inch but less than 1/4 inch shall be reported to the Owner and Engineer for assessment. All gaps greater than 1/4 inch shall be shimmed according to Specification 05 12 00 "Structural Steel Framing."

11. Endeavor to guard the Owner against the Contractor cutting, grinding, reaming, or making any other field modification to structural steel without the prior approval of the Engineer. Report any noted unauthorized modifications to the Owner and Engineer.

G. Weld Inspection and Process Monitoring: The Testing Laboratory shall make the following inspections of the welds and welding processes. Welds performed in the fabricating shop may be inspected in the field unless continuous monitoring of the welding process is herein specified or if access in the field due to other work or shop finishes makes field inspection impractical:

1. Approve Welding Procedure Specifications submitted by the Contractor. Approve any changes submitted by the Contractor to any WPS that has already been approved. Obtain the Welding Procedure Qualification Record (WPQR) for each successful WPS qualification.
2. Periodically verify welding electrodes to be used and other welding consumables as the job progresses.
3. Periodically observe joint preparation, assembly practice, welding techniques including preheating and sequence, and the performance of welders with sufficient frequency to assure compliance with code and contract document requirements. Check preheating to assure conformance with AWS D1.1, Section 5.6. Verify procedure for control of distortion and shrinkage stresses.
4. Continuously observe joint preparation and fit up, backing strips, and runout plates for welded moment connections and column splices.
5. Periodically provide visual inspection of the root pass of partial and complete joint penetration welds.
6. Visually inspect 100 % of welds for proper size, length, location, and weld quality in accordance with AWS D1.1 requirements. Unless specifically noted otherwise, all welding shall be considered statically loaded nontubular connections.
7. Visually inspect 100% of completed shear connectors on each beam.
8. Visually inspect 100% of the welds of anchors to embedded plates that are to be cast into concrete elements.
9. In addition to the inspections above, perform the following:
 - a. Continuously monitor and observe joint preparation, assembly practice, welding techniques including preheating and sequence, and the performance of welders for 100% of complete and partial joint penetration welds, plug and slot welds, multiple-pass fillet welds, and single-pass fillet welds greater than 5/16 inch. Check preheating to assure conformance with AWS D1.1, Section 5.6. Verify procedure for control of distortion and shrinkage stresses.
 - b. Periodically monitor welding of single-pass fillet welds that are less than or equal to 5/16 inch.
 - c. Periodically monitor the welding of headed studs to floor beams.
 - d. Periodically monitor the welding of anchors to embedded plates that are to be cast into concrete elements.

H. Weld Testing:

1. Perform nondestructive examination services using a qualified technician with the necessary equipment to perform the following:
 - a. Nondestructive examination conducted in accordance with the specific requirements for the item being examined including radiographic (RT), ultrasonic (UT), magnetic

- particle (MT), or dye-penetrant inspection (PT). Nondestructive inspection procedures shall conform to AWS D1.1.
- b. Interpret, record, and report results of the nondestructive tests.
 - c. Mark for repair, any area not meeting Specification requirements. Correction of rejected welds shall be made in accordance with AWS D1.1.
 - d. Re-examine repair areas and interpret, record, and report the results of examinations of repair welds.
 - e. Verify that quality of welds meet the requirements of AWS D1.1.
2. Fillet Welds: Provide the following:
 - a. MT test a minimum of 10% of the length of each fillet weld exceeding 5/16".
 - b. Periodic MT testing of representative fillet welds 5/16" and less but need not exceed 10% of all such welds, except as required for high rejection rates as indicated in the following paragraph.
 - c. Increase MT testing rate for welders having a high rejection rate as required to ensure acceptable welds.
 3. Partial Joint Penetration (PJP) Welds, including Flare-Bevel Groove Welds: Provide the following:
 - a. MT test a minimum of 25% of the length of each PJP weld exceeding 5/16" effective throat.
 - b. Periodic MT testing of representative PJP welds 5/16" and less but need not exceed 10% of all such welds, except as required for high rejection rates as indicated in the following paragraph.
 - c. Increase MT testing rate for welders having a high rejection rate as required to ensure acceptable welds.
 4. Complete Joint Penetration (CJP) Welds: Provide the following:
 - a. All CJP welds exceeding 5/16" thickness shall be 100% UT tested per AWS D1.1 Clause 6 Part F. The Testing Laboratory shall review the CJP joints to determine where geometry or accessibility precludes the use of standard scanning patterns per AWS D1.1 Clause 6 Part F. At these locations the testing laboratory shall develop and submit for approval a written testing procedure in accordance with AWS D1.1 Annex S.
 - b. Periodic MT testing of representative CJP welds 5/16" and less not to exceed 10% of all such welds, except as required for high rejection rates as indicated in the following paragraph.
 - c. Increase MT testing rate for welders having a high rejection rate as required to ensure acceptable welds.
 5. Acceptance Criteria:
 - a. Visual, MT, PT shall be per AWS D1.1 Table 6.1.
 - b. UT testing shall be per AWS D1.1 6.13.1 and Table 6.2.
 6. Base metal thicker than 1.5 inches, where subjected to through-thickness weld shrinkage strains, shall be UT tested for discontinuities behind and adjacent to such welds. UT testing shall occur no sooner than 24 hours after the weld has cooled to ambient temperatures. Any material discontinuities shall be recorded on the basis of ASTM A 435 or ASTM A 898 (Level 1 criteria) and reported for Engineer disposition.

7. Welds of Anchors to Embedded Plates:
 - a. Headed Studs: Perform field bend tests according to AWS D1.1 on 2% of the studs welded to plates, but not less than one stud per plate.
 - b. Deformed Bar Anchors: Perform MT testing on 10% of deformed bar anchors larger than 5/8" diameter.
 8. The costs of repairing defective welds and the costs of retesting by the Testing Laboratory providing services for the Owner shall be borne by the Contractor. If removal of a backing strip is required by the Testing Laboratory to investigate a suspected weld defect, such cost shall be borne by the Contractor.
 - I. High-Strength Bolt Inspection and Process Monitoring: The Testing Laboratory shall perform the following inspections for connections joined with high-strength bolts. Bolting performed in the shop may be inspected in the field unless continuous monitoring of the bolting operation is specified herein:
 1. Observe preinstallation verification testing of the pretensioning method to be used in accordance with the requirements of the "Specification for Structural Joints Using High-Strength Bolts".
 2. Check daily the calibration of impact wrenches used in field bolted connections.
 3. Inspect bolt installation for 100% of high strength bolted connections according to inspection procedures outlined in the "Specification for Structural Joints Using High-Strength Bolts".
 4. Monitoring of Bolting Installation:
 - a. Continuous Monitoring: The Testing Laboratory shall be continuously present and monitor the bolting installation for compliance with the selected procedure for installation as specified in the "Specification for Structural Joints Using High-Strength Bolts" for joints using high-strength bolts that are designated on the plans as Pretensioned (PT) or Slip-Critical (SC) type joints and that are being installed using the calibrated wrench method or the turn-of-nut without matchmarking method of installation.
 - b. Periodic Monitoring: All <other> joint types and bolt installation methods shall be monitored on a periodic basis.
 - J. High-Strength Bolt Testing: The Testing Laboratory shall perform the following tests for connections joined with high-strength bolts:
 1. Perform Arbitration Testing according to procedures outlined in the "Specification for Structural Joints using High-Strength Bolts" when a disagreement exists between the Testing Laboratory and the Fabricator as to the minimum tension of installed bolts that have been inspected according to paragraph below.
- 3.7 STEEL DECKING
- A. Field Inspection:
 1. Check steel deck as received in the field for possible shipping damage, workmanship, and identification marking to conform to specified ASTM standards for steel deck.
 2. Periodically monitor the method of attaching the steel floor and roof decking to the structural frame.

3. Visually inspect 100% of the welding or other attachment method of steel deck to the structure and at sidelaps.

3.8 EARTHWORK

A. Quality Assurance:

1. Welder Qualifications: Verify welder qualifications either by certification and/or by retesting. Obtain welder certificates.

B. Field Testing:

1. Compacted Fill:

- a. Verification of Fill Material: Perform classification and testing to verify that the fill material to be used complies with the project specifications.
- b. Field Density Testing: Perform field density testing as described below:
 - 1) Field density tests shall be run according to ASTM D 2937 or ASTM D 6938 as applicable.
 - 2) Acceptance Criteria: The results of field density tests by the Laboratory will be considered satisfactory if the average of any three consecutive tests has a value not less than the required density with no single test falling more than 2 percent below the required density and the moisture content conforms to the requirements of the specification.
 - 3) Test Frequency for Paved Areas and Building Slab Subgrade:
 - a) Make at least one field density test of the natural subgrade for every 2500 square feet of paved area or building slab but in no case less than three tests.
 - b) In each compacted fill layer or lift, make one field density test for every 2500 square feet of building slab or paved area but in no case less than three tests.
 - 4) Test Frequency for Foundation Wall Backfill: Make at least one field density test for each 200 lineal feet of wall with a minimum of 4 tests for the basement walls around the perimeter of each building and a minimum of one test for every other type of foundation wall on the site. Tests shall be performed in random lifts along each wall.
 - 5) Test Frequency for Compacted Fill beneath Column and Wall Footings and Mat Foundations: Make at least one field density test in each compacted fill layer or lift for each column footing, one for each twenty-five lineal feet of wall and one for each 2,500 square feet of mat foundation area or fraction thereof.
- c. Report Copies: Moisture-density curves and results of field density tests shall be submitted to the parties specified earlier in this section.
- d. Additional Testing: If reports by the Laboratory indicate field densities lower than specified, additional tests will be run by the Laboratory with at least the frequencies scheduled above on recompacted fill and/or natural subgrade. The Testing Laboratory shall notify the Contractor on a timely basis for any required retesting so as not to delay the work. The costs of such tests shall be liable to the Owner for repayment by the Contractor.

2. Spread (Excavated) Footings
 - a. Concrete Cylinders: Make and test concrete cylinders as specified for Cast-in-Place Concrete.
- C. Field Inspection by the Testing Laboratory:
 1. The Testing Laboratory shall provide inspection of materials used in foundation elements as described below.
 2. Compacted Fill:
 - a. Subgrade below Compacted Fill: Observe and verify that the subgrade below compacted fill has been properly prepared before compact fill construction begins.
 - b. During placement and compaction of fill, determine that the material being used and the maximum lift thickness comply with the specifications.
 3. Spread (Excavated) Footings:
 - a. Reinforcing Steel: Inspect reinforcing steel size, number of bars, and placement and confirm dowel or anchor rod placement into footing.
- D. Foundation Inspection by the Geotechnical Engineer: The Geotechnical Engineer of Record shall provide inspection service for the following items before and during foundation installation as appropriate for the foundation type. The Geotechnical Engineer shall submit written field inspection reports promptly after inspection to the parties listed above and report his findings after each inspection by telephone or e-mail to the Engineer.
 1. Spread (Excavated) Footing:
 - a. Subgrade: Verify that foundation bearing conditions are consistent with soil report tests and that the footing is being installed in the proper soil strata at the proper elevation. Make recommendations regarding adjustment to subgrade or bearing elevation if subgrade is not adequate to support footing.

END OF SECTION

SECTION 015000
TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Staging.
- B. Temporary telecommunications services.
- C. Temporary sanitary facilities.
- D. Temporary Controls: Barriers and enclosures.
- E. Security requirements.
- F. Vehicular access and parking.
- G. Waste removal facilities and services.
- H. Field offices.
- I. Removal of temporary facilities and controls.

1.2 RELATED REQUIREMENTS

- A. Section 015100 - Temporary Utilities.
- B. Section 015611 - Temporary Dust, Fume, and Odor Control.
- C. Section 017000 - Execution and Closeout Requirements.

1.3 REFERENCE STANDARDS

- A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2018.
- B. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009 (Reapproved 2016).

1.4 STAGING

- A. The Construction Manager shall be provided access to a limited laydown area outside the Break Room, as approved and coordinated with the Owner.

1.5 TEMPORARY TELECOMMUNICATIONS SERVICES

- A. Provide, maintain, and pay for telecommunications services to field office at time of project mobilization.
- B. Telecommunications services shall include:
 - 1. Windows-based personal computer dedicated to project telecommunications, with necessary software and laser printer.
 - 2. Telephone Land Lines: One line, minimum; one handset per line.
 - 3. Internet Connections: Minimum of one; DSL modem or faster.

1.6 TEMPORARY SANITARY FACILITIES

- A. Required facilities will be coordinated between the Owner and Construction Manager prior to start of construction.
- B. Maintain daily in clean and sanitary condition.
- C. At end of construction, return facilities to same or better condition as originally found.

1.7 BARRIERS

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

1.8 INTERIOR ENCLOSURES

- A. Provide temporary partitions and ceilings as indicated to separate work areas from Owner-occupied areas, to prevent penetration of dust and moisture into Owner-occupied areas, and to prevent damage to existing materials and equipment.
- B. Construction: Metal (3-5/8") framing and gypsum board, taped and pained from the floor to the underside of the existing ceiling grid, with closed joints and sealed edges at intersections with existing surfaces.
 - 1. Minimum STC rating of 35 in accordance with ASTM E90.
 - 2. Maximum flame spread rating of 75 in accordance with ASTM E84.
 - 3. Assembly shall comply with NFPA 241.
- C. Temporary poly protection shall be used, and shall extend from the existing ceiling grid to the underside of the structure above.
- D. Where fire-resistant rated enclosures are required, construct barriers utilizing 1 hour fire resistance rated construction, consisting of Type "X" gypsum wallboard and studs. Thickness of wallboard and the type of studs to be used, shall be as required by any of manufacturer's or industry's tests to obtain a 1 hour fire rated wall.
- E. Construct closures, using new materials only, in accordance with the general carpentry requirements in Section 061000 - Rough Carpentry, Section 092216 - Non-Structural Metal Framing and Section 092900 - Gypsum Board.
- F. All door openings within temporary partitions shall have pressed metal frames, 1-3/4" thick solid core wood doors, door closer and lock set.
 - 1. Doors in temporary closures must be constructed of solid new lumber and must be positively latching.
- G. Paint surfaces exposed to view from Owner-occupied areas.

1.9 SECURITY

- A. Provide security and facilities to protect Work, existing facilities, and Owner's operations from unauthorized entry, vandalism, or theft.

1.10 VEHICULAR ACCESS AND PARKING

- A. Comply with regulations relating to use of streets and sidewalks, access to emergency facilities, and access for emergency vehicles.
- B. Coordinate access and haul routes with governing authorities and Owner.
- C. Provide and maintain access to fire hydrants, free of obstructions.
- D. Provide means of removing mud from vehicle wheels before entering streets.
- E. Designated existing on-site roads may be used for construction traffic.
- F. A limited temporary parking area may be available to accommodate construction personnel. The space available will be viewed at the Pre-Bid Conference. When site space is not adequate, provide additional off-site parking.

1.11 WASTE REMOVAL

- A. See Section 017419 - Construction Waste Management and Disposal, for additional requirements.
- B. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.
- C. Provide containers with lids. Remove trash from site periodically.
- D. If materials to be recycled or re-used on the project must be stored on-site, provide suitable non-combustible containers; locate containers holding flammable material outside the structure unless otherwise approved by the authorities having jurisdiction.

- E. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

1.12 FIELD OFFICES

- A. Availability of Field Office space will be coordinated between the Owner and Construction Manager.

1.13 REMOVAL OF TEMPORARY FACILITIES AND CONTROLS

- A. Remove temporary equipment, facilities, materials, prior to Date of Substantial Completion inspection.
- B. Remove underground installations to a minimum depth of 2 feet (600 mm). Grade site as indicated.
- C. Clean and repair damage caused by installation or use of temporary work.
- D. Restore existing facilities used during construction to original condition.
- E. Restore new permanent facilities used during construction to specified condition.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 015100
TEMPORARY UTILITIES

PART 1 - GENERAL

1.1 SECTION INCLUDES

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

1.2 RELATED REQUIREMENTS

- A. Section 015000 - Temporary Facilities and Controls:
 - 1. Temporary telecommunications services for administrative purposes.
 - 2. Temporary sanitary facilities required by law.

1.3 TEMPORARY ELECTRICITY

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

1.4 TEMPORARY LIGHTING FOR CONSTRUCTION PURPOSES

- A. Provide and maintain lighting for construction operations to achieve a minimum lighting level of 2 watt/sq ft (21 watt/sq m).
- B. Provide branch wiring from power source to distribution boxes with lighting conductors, pigtails, and lamps as required.
- C. Maintain lighting and provide routine repairs.

1.5 TEMPORARY HEATING

- A. Cost of Energy: By Construction Manager.
- B. Provide heating devices and heat as needed to maintain specified conditions for construction operations.
- C. Maintain minimum ambient temperature of 50 degrees F (10 degrees C) in areas where construction is in progress, unless indicated otherwise in specifications.
- D. Owner's existing heat plant may be used as permitted by the Owner.
 - 1. Exercise measures to conserve energy.
 - 2. Coordinate use and connections with the Owner.
- E. Prior to operation of permanent equipment for temporary heating purposes, verify that installation is approved for operation, equipment is lubricated and filters are in place. Provide and pay for operation, maintenance, and regular replacement of filters and worn or consumed parts.

1.6 TEMPORARY COOLING

- A. Cost of Energy: By Construction Manager.

- B. Provide cooling devices and cooling as needed to maintain specified conditions for construction operations.
- C. Maintain maximum ambient temperature of 80 degrees F (26 degrees C) in areas where construction is in progress, unless indicated otherwise in specifications.

1.7 TEMPORARY VENTILATION

- A. Ventilate enclosed areas to assist curing of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors or gases.

1.8 TEMPORARY WATER SERVICE

- A. Cost of Water Used: By Owner.
- B. Provide and maintain suitable quality water service for construction operations at time of project mobilization.
- C. Connect to existing water source.
 - 1. Exercise measures to conserve water.
- D. Extend branch piping with outlets located so water is available by hoses with threaded connections. Provide temporary pipe insulation to prevent freezing.

1.9 REMOVAL OF TEMPORARY UTILITIES

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

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

**SECTION 01 51 00
CONSTRUCTION INDOOR AIR QUALITY**

PART 1- GENERAL

1.1 RELATED DOCUMENTS

- A. Section 018113 Sustainable Design Requirements

1.2 REQUIREMENTS INCLUDED IN THIS SECTION

- A. Indoor Air Quality Management Goals
- B. Indoor Air Quality Management Plan
- C. Indoor Air Quality Management Plan Implementation

1.3 INDOOR AIR QUALITY MANAGEMENT GOALS

- A. The Owner has established that this Project shall prevent indoor air quality problems resulting from the construction process, to sustain long-term installer and occupant health and comfort.
- B. Protect the ventilation system components during construction and cleanup of contaminated components after construction is complete.
- C. Control sources of potential Indoor Air Quality (IAQ) pollutants by controlling selection of materials and processes used in project construction.
- D. With regard to these goals the Contractor shall develop, for Owner and Architect's review, an IAQ Management Plan for this Project

PART 2 – PRODUCTS

2.1 SUBMITTALS:

- A. Construction IAQ Management Plan highlighting the five requirements of the Sheet Metal and Air Conditioning National Contractors Association (SMACNA) IAQ Guidelines for Occupied Buildings under Construction, 2nd edition, 2007, ANSI/SMACNA 008–2008, Chapter 3, including a no-smoking policy.
- B. Photographs documenting construction IAQ management measures implemented during construction of each of the five SMACNA requirements.
- C. Cut sheets of filtration media used during construction and installed immediately prior to occupancy with MERV values highlighted.
- D. Submit a letter from the Contractor describing building flush-out procedures including actual dates of building flush-out, hours of ventilation, ventilation rates, and indoor temperature and humidity levels.

2.2 IAQ MANAGEMENT PLAN

- A. Develop a Draft Indoor Air Quality (IAQ) Management Plan for the construction and pre-occupancy phases of the building as follows: (1) during construction meet or exceed the minimum requirements of the Sheet Metal and Air Conditioning National Contractors Association (SMACNA) IAQ Guidelines for Occupied Buildings under Construction, 2nd edition, 2007, ANSI/SMACNA 008–2008, Chapter 3, (2) Protect stored on-site or installed absorptive materials from moisture damage, and (3) conduct a building flush-out after construction ends and prior to occupancy.
1. The SMACNA IAQ Guidelines for Occupied Buildings under Construction provides an overview of air pollution associated with construction, control measures, construction process management, quality control, communicating with occupants, and case studies. These guidelines can be accessed at www.smacna.org. Chapter 3 of the SMACNA Guidelines recommends Control Measures in five areas: HVAC protection, source control, pathway interruption, housekeeping, and scheduling. Review the applicability of each Control Measure and include those that apply in the Draft IAQ Management Plan.
 - a. HVAC Protection: Shut down the return side of the HVAC system whenever possible during heavy construction. If the system must remain operational during construction include the following strategies that apply:
 - i. If conditioning is required during construction, use supplementary HVAC units instead of permanently installed equipment if possible.
 - ii. Seal all ductwork, registers, diffusers, and returns with plastic when stored on site or not in service. Seal unfinished runs of ductwork at the end of each day
 - iii. Fit the return side of the HVAC system with temporary filters.
 - iv. Isolate the return side of the HVAC system from the surrounding environment as much as possible (e.g., place all tiles for the ceiling plenum, repair all ducts and air handler leaks).
 - v. Damper off the return system in the heaviest work areas and seal the return system openings with plastic.
 - vi. Upgrade the filter efficiency where major loading is expected to affect operating HVAC system.
 - vii. Clean permanent return air ductwork per National Air Duct Cleaning Association standards upon completion of all construction and finish installation work.
 - viii. If permanently installed air handlers are used during construction, filtration media with a Minimum Efficiency Reporting Value (MERV) of 8 shall be used at each return air grille during construction, as determined by ASHRAE 52.2-1999.
 - ix. Install new clean media just prior to substantial completion and occupancy that has a Minimum Efficiency Reporting Value (MERV) of 13.
 - b. Source Control: Keep sources of contaminants out of the building and have a plan to eliminate any that are introduced:
 - i. Use low-toxicity and low-VOC materials to the greatest extent possible.
 - ii. Develop protocols for the use of any high-toxicity materials. Isolate areas where high-toxicity materials are being installed and use temporary ventilation for that area.
 - iii. Prevent exhaust fumes (from idling vehicles, equipment, and fossil-fueled tools) from entering the building.

- iv. **Enforce the no-smoking job site policy.**
 - v. Protect stored materials from moisture because absorbent materials exposed to moisture during construction can mold and degenerate long after installation. Store materials in dry conditions indoors, under cover, and off the ground or floor.
 - vi. If materials are improperly exposed to moisture, replace the material and consider testing air quality before occupancy to make sure no mold contamination has occurred.
- c. Pathway Interruption: Prevent contamination of clean spaces. Include the following strategies that apply:
- i. Use 100% outside air ventilation (when outside temperatures are between 55 degrees F and 85 degrees F and humidity is between 30% and 60%) with air exhausted directly to the outside during installation of finishes and other VOC emitting materials.
 - ii. Isolate areas of work to prevent contamination of other spaces, whether they are finished or not. Seal doorways, windows, or tent off areas as needed using temporary barriers, such as plastic separations. Provide walk-off mats at entryways to reduce introduced dirt and pollutants.
 - iii. Use dust guards and collectors on saws and other tools.
 - iv. Depressurize the work area to allow a differential between construction areas and clean areas. Exhaust to the outdoors using 100% outdoor air, if possible
- d. Housekeeping: Reduce construction contamination in the building prior to occupancy through HVAC and regular space cleaning activities.
- i. Maintain good job site housekeeping on a daily basis. Use vacuum cleaners with high-efficiency particulate filters and use sweeping compounds or wetting agents for dust control when sweeping
 - ii. Store building materials in a weather tight, clean area prior to unpacking for installation.
 - iii. Check for possible damage to the HVAC system and Building assemblies from high humidity.
 - iv. Clean all coils, air filters, and fans before testing and balancing procedures are performed.
- e. Scheduling: Specify construction sequencing to reduce absorption of VOC's by materials that act as sinks or contaminant sources. Complete application of wet and odor-emitting materials such as paints, sealants, and coatings before installing sink materials such as ceiling tiles, carpets, insulation, gypsum products, and fabric-covered furnishings are installed.
- i. Consider after-hours or weekend work if practical.
2. Protect stored on-site or installed absorptive materials from exposure to moisture through precipitation, plumbing leaks, or condensation from the HVAC system to prevent microbial contamination.

PART 3 – EXECUTION

3.1 FLUSH-OUT

As part of Indoor air quality management, the following requirements have to be met:

FLUSH OUT: Provide a summary data log sheet indicating outside air cfm provided on an hourly basis during flush out. Provide cut sheets of filters use during flush out and verify replacement air filters after flush out. Refer to Section 018113 for LEED requirements.

Or

AIR TESTING: Provide an IAQ Testing report that includes a narrative describing procedures and how locations were determined, and date/results of each test.

- A. Building Flush Out: Select one of the following two options (prior to occupancy or during occupancy), to be implemented after construction ends and the building been completely cleaned. All interior finishes, such as millwork, doors, paint, carpet, acoustic tiles, and movable furnishing, must be installed, and major VOC punch list items must be finished.
- a. Prior to Building Occupancy: Prime Trade Contractor shall install new filtration media and perform a building flush-out by supplying a total air volume of 14,000 cubic feet of outdoor air per square foot of gross floor area while maintaining an internal temperature of at least 60°F (15°C) and no higher than 80°F (27°C) and relative humidity no higher than 60%. The duration of the flush-out must be calculated as follows:
$$\text{Cubic feet of outdoor air needed prior to occupancy} = \text{Area (ft}^2\text{)} \times 14,000 \text{ cfm}$$
$$\text{Duration (Days)} = \text{Cubic Feet needed}/(\text{air handler capacity}/1440 \text{ minutes/day})$$
 - i. Replace all outside air filtration media prior to occupancy. Filtration media shall have a MERV of 13 as determined by ASHRAE 52.2.
 - b. During Occupancy: if occupancy is desired before the flush-out is completed, the space may be occupied only after delivery of a minimum of 3,500 cubic feet of outdoor air per square foot of gross floor area while maintaining an internal temperature of at least 60°F (15°C) and no higher than 80°F (27°C) and relative humidity no higher than 60%.

Once the space is occupied, it must be ventilated at a minimum rate of 0.30 cubic foot per minute (CFM) per square foot of outdoor air or the design minimum outdoor air rate determined by the ASHRAE 62.1-2010 calculations determined in IEQ Prerequisite Minimum indoor Air Quality performance, whichever is greater. During each day of the flush-out period, ventilation must begin at least three hours before occupancy and continue during occupancy. These conditions must be maintained until a total of 14,000 cubic feet per square foot of outdoor air has been delivered to the space. The duration of the flush-out must be calculated as follows:

$$\text{Cubic feet of outdoor air needed prior to occupancy} = \text{Area (ft}^2\text{)} \times 3,500 \text{ cfm}$$
$$\text{Cubic feet of outdoor air needed during occupancy} = \text{Area (ft}^2\text{)} \times 10,500 \text{ cfm}$$
$$\text{Duration (Days)} = (\text{Area (ft}^2\text{)} \times 14,000 \text{ cfm})/(\text{air handler capacity}/1440 \text{ minutes/day})$$

- B. IAQ Testing: After construction ends and before occupancy, but under ventilation conditions typical for occupancy, conduct IAQ testing using protocols consistent with the methods in the table below for all occupied spaces.
- C. Use current versions of ASTM standard methods, EPA compendium methods, or ISO methods, as indicated.
- D. Conduct all measurements before occupancy during normal occupied hours, with the building ventilation system started at the normal daily start time and operated at the minimum outdoor airflow rate for the occupied mode throughout the test. F
- E. or each sampling point where the concentrations exceed the limit, take corrective action and retest for the noncompliant contaminants at the same sample points. Repeat until all requirements are met.

Test for the particulate matter (PM) and inorganic gases listed in Table 1, using an allowed test method, and demonstrate the contaminants do not exceed the concentration limits listed in the table.

Table 1.

Contaminant (CAS#)	Concentration Limit (µg/m3)	Allowed Test Methods
Carbon monoxide (CO)	9 ppm; no more than 2 ppm above outdoor levels	ISO 4224 EPA Compendium Method IP-3 GB/T 18883-2002 for projects in China Direct calibrated electrochemical instrument with accuracy of (+/- 2% ppm <50 ppm minimum accuracy).
PM 10	ISO 14644-1:2015, cleanroom class of 8 or lower 50 µg/m3 Healthcare only: 20 µg/m3	Particulate monitoring device with accuracy greater of 5 micrograms/m3 or 20% of reading and resolution (5 min average data) +/- 5 µg/m3
PM 2.5	12 µg/m3 or 35 µg/m3**	
Ozone	0.07 ppm	Monitoring device with accuracy greater of 5 ppb or 20% of reading and resolution (5 min average data) +/- 5 ppb ISO 13964 ASTM D5149 -- 02 EPA designated methods for Ozone

Perform a screening test for Total Volatile Organic Compounds (TVOC). Use ISO 16000-6, EPA TO-17, or EPA TO-15 to collect and analyze the air sample. Calculate the TVOC value per EN 16516:2017, CDPH Standard Method v1.2 2017 section 3.9.4, or alternative calculation method as long as full method description is included in test report. If the TVOC levels exceed 500 µg/m3, investigate for potential issues by comparing the individual VOC levels from the GC/MS results to associated cognizant authority health-based limits. Correct any identified issues and re-test if necessary.

Additionally, test for the individual volatile organic compounds listed in Table 2 using an allowed test method and demonstrate the contaminants do not exceed the concentration limits listed in the table.

Table 2.

Contaminant (CAS#)	Concentration Limit (µg/m3)	Allowed Test Methods
Formaldehyde 50-00-0	20 µg/m3 (16 ppb)	ISO 16000-3, 4; EPA TO-11a, EPA comp. IP-6A ASTM D5197-16
Acetaldehyde 75-07-0	140 µg/m3	

Benzene 71-43-2	3 µg/m ³	ISO 16000-6 EPA IP-1, EPA TO-17, EPA TO-15 ISO 16017-1, 2; ASTM D6196-15
Hexane (n-) 110-54-3	7000 µg/m ³	
Naphthalene 91-20-3	9 µg/m ³	
Phenol 108-95-2	200 µg/m ³	
Styrene 100-42-5	900 µg/m ³	
Tetrachloroethylene 127-18-4	35 µg/m ³	
Toluene 108-88-3	300 µg/m ³	
Vinyl acetate 108-05-4	200 µg/m ³	
Dichlorobenzene (1,4-) 106-46-7	800 µg/m ³	
Xylenes-total 108-38-3, 95-47-6, and 106-42-3	700 µg/m ³	

F. Draft IAQ Management Plan Review Meeting: Once the Owner and Architect have reviewed the Draft IAQ Management Plan and prior to construction at the site, schedule and conduct a meeting to review the Draft IAQ Management Plan and discuss procedures, schedules and specific requirements for IAQ during the construction and pre-construction phases of the building. Discuss coordination and interface between the Contractor and other construction activities. Identify and resolve problems with compliance to the requirements. Record minutes of the meeting, identify all conclusions reached and matters requiring further resolution.

1. Attendees: The Contractor and related Contractor personnel associated with the work of this section, including personnel to be in charge of the IAQ management program, Architect, Owner and such additional personnel as the Architect or Owner deems appropriate.

G. Final IAQ Management Plan: Make any revisions to the Draft IAQ Management Plan agreed upon during the meeting identified in item (B) above and incorporate resolutions agreed to be made subsequent to the meeting. Submit the revised plan to the Owner and Architect for approval within 10 calendar days of the meeting.

3.2 IMPLEMENTATION OF IAQ MANAGEMENT PLAN

A. Manager: The Contractor shall designate an on-site party (or parties) responsible for instructing workers and overseeing and the IAQ Management Plan for the Project.

B. Progress Meetings: Construction related IAQ procedures shall be included in the pre-construction and construction progress meeting agendas.

C. Distribution: The Contractor shall distribute copies of the IAQ Management Plan to the Job Site Foreman, each Subcontractor, the Owner, and the Architect.

D. Instruction: The Contractor shall provide on-site instruction of the IAQ procedures and ensure that all participants in the construction process understand the importance of the goals of the IAQ Management Plan.

END OF SECTION

SECTION 015611
TEMPORARY DUST, FUME, AND ODOR CONTROL

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Dust and fume emission control is required to maintain a healthful healing environment for patients and users, maintain good public relations with neighbors and employees, prevent damage, minimize cleaning and maintenance costs, and to comply with regulations and laws. All contractors (including subcontractors, lower-tier subcontractors, and suppliers) are required to control dust and fume emissions from their operations and/or activities.
- B. The work includes the control of all nuisance or noxious dust, vapors, fumes, odors or emissions caused by construction, demolition, renovation, restoration, or related activities including, but not limited to sawing, cutting, grinding, sanding, abrading, sweeping, crushing, scraping, gluing, prying, plowing, heating, finishing, painting, welding, torch cutting or burning, or any other related processes that can create noxious dust, fumes or odors.
- C. No visible emissions or unreasonable odors shall be permitted outside the work area.
- D. All products to be used, that could potentially emit dusts, fumes, vapors or odors, and so forth, shall be submitted to the Architect with accompanying MSDS for approval prior to the use of the product.

1.2 RELATED REQUIREMENTS

- A. Section 015000 - TEMPORARY FACILITIES AND CONTROLS.
- B. Section 015100 - TEMPORARY UTILITIES.
- C. Section 017000 - EXECUTION AND CLOSEOUT REQUIREMENTS.

1.3 REFERENCE STANDARDS

- A. The Contractor is responsible for compliance with all applicable federal, state, county and municipal laws, regulations and ordinances including, but not limited to, those listed below, which are incorporated by reference.
- B. The following laws, regulations and standards are incorporated by reference:
 - 1. 29 CFR 1910: US OSHA General Industry Standards.
 - 2. 29 CFR 1926: US OSHA Construction Standards.
 - 3. 40 CFR Part 61: USEPA National Emissions Standards for Hazardous Air Pollutants
 - 4. (NESHAP).
 - 5. Section 24-146© of the New York City Administrative Code.

1.4 DEFINITIONS

- A. In addition to the terms listed below, all definitions in the laws and regulations specified elsewhere in this Section are incorporated by reference, whether or not restated herein.
- B. **Architect of Record (AOR):** means the entity that assembles the overall documents and bid package, and approves the completed work.
- C. **Board Authorized Representative:** The entity responsible for overall project coordination and completion.
- D. **General Contractor (GC):** Or in case of stand-alone projects Abatement Contractor means the entity responsible for performing the complete scope of work in the Documents. The GC may elect to self-perform or subcontract out any portion of the work.
- E. **Construction Manager (CM):** Or in case of stand-alone projects Abatement Contractor means the entity responsible for performing the complete scope of work in the Documents. The GC may elect to self-perform or subcontract out any portion of the work.
- F. **HEPA Filter:** A High Efficiency Particulate Air filter capable of trapping 99.97% percent of particles greater than 0.3 micrometers in mass median aerodynamic equivalent diameter.

- G. **MSD:** Material Safety Data Sheets, required by OSHA for any chemical in the workplace that that could be expected to cause an exposure to workers during normal use or in emergency situations.
- H. **Plasticize:** To apply plastic sheeting over surfaces or objects to protect them from contamination or water damage.
- I. **Personal Protective Equipment (PPE):** Protective suits, head and foot covers, gloves, respirators and other items used to protect persons from potential hazard.
- J. **Work Area:** The area or areas where work is being conducted.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 BARRIERS OR WORK AREA ISOLATION

- A. Contractors shall prevent the spread of dust, fumes and odors from their immediate work areas by:
 - 1. Erecting dust-tight barriers between indoor work areas and adjacent occupied areas.
 - a. Construction barriers may be used for this purpose if suitably constructed to prevent dust, fume or odor migration.
 - 2. Closing and or covering windows, intake vents, louvers, or other building openings in the immediate vicinity of outdoor work, sufficient to prevent dust, fume or odor mitigation into the building interior. If such openings cannot be adequately sealed by closing, then poly sheeting, tape, or other impermeable covers shall be used.
 - 3. The Contractor shall provide a filtered, local exhaust system for the isolated work area.
- B. Contractor is prohibited from creating other hazardous or uncomfortable conditions for building occupants, such as very hot, humid, cold, or other conditions created by ventilation system alterations or blockages, closed or open windows in hot or cold weather conditions.
- C. Contractor is responsible for making itself familiar with building conditions and shall take care to isolate its work area in such a manner that building occupant activities and comfort are not unreasonably disrupted.

3.2 DUST, FUME AND ODOR CONTROL

- A. Dust, fume or odor release shall be prevented by a suitable means, including but not limited to:
 - 1. Portable HEPA Ventilation & Vacuum Systems
 - 2. Tools equipped with shrouds, HEPA filter equipped vacuum pickups.
 - 3. Alteration, shut down, or isolation of building ventilation systems in the immediate work vicinity.
 - 4. Shrouding around work activities.
 - 5. Shrouding stages, scaffolds, or other work platforms.
 - 6. Local exhaust ventilation systems exhausted to the outside of the building.
 - 7. Wet work methods.
- B. It is the Contractor's responsibility to select the means and methods it considers most suitable to achieve dust, fume and odor control.
- C. In the event that dust or fumes escape from the work area or create dirty conditions or contamination to nearby building spaces or grounds, the Contractor is responsible for all costs associated with the cleaning, testing and/ or repair deemed necessary by the Owner.

END OF SECTION

SECTION 015639

TEMPORARY TREE AND PLANT PROTECTION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes general protection and pruning of existing trees and plants that are affected by execution of the Work, whether temporary or permanent construction.

1.2 DEFINITIONS

- A. Plant-Protection Zone: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction and indicated on Drawings.
- B. Tree-Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction and defined by a circle concentric with each tree with a radius 1.5 times the diameter of the drip line unless otherwise indicated.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings:
 - 1. Include plans and locations of protection-zone fencing and signage, showing relation of equipment-movement routes and material storage locations with protection zones.
- C. Tree Pruning Schedule: Written schedule detailing scope and extent of pruning of trees to remain that interfere with or are affected by construction.

1.5 INFORMATIONAL SUBMITTALS

- A. Existing Conditions: Documentation of existing trees and plantings indicated to remain, which establishes preconstruction conditions that might be misconstrued as damage caused by construction activities.

1.6 QUALITY ASSURANCE

- A. Arborist Qualifications: Certified Arborist as certified by ISA, licensed arborist in jurisdiction where Project is located, current member of ASCA, or registered Consulting Arborist as designated by ASCA.

1.7 FIELD CONDITIONS

- A. The following practices are prohibited within protection zones:
 - 1. Storage of construction materials, debris, or excavated material.
 - 2. Moving or parking vehicles or equipment.
 - 3. Foot traffic.
 - 4. Erection of sheds or structures.
 - 5. Impoundment of water.
 - 6. Excavation or other digging unless otherwise indicated.
 - 7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.
- B. Do not direct vehicle or equipment exhaust toward protection zones.
- C. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones and organic mulch.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Backfill Soil: Stockpiled soil mixed with planting soil of suitable moisture content and granular texture for placing around tree; free of stones, roots, plants, sod, clods, clay lumps, pockets of coarse sand, concrete slurry, concrete layers or chunks, cement, plaster, building debris, and other extraneous materials harmful to plant growth.
- B. Organic Mulch: Free from deleterious materials and suitable as a top dressing for trees and shrubs, consisting of one of the following:
 - 1. Type: Shredded hardwood.
- C. Protection-Zone Fencing: Fencing fixed in position and meeting the following requirements:
 - 1. Plastic Protection-Zone Fencing: Plastic construction fencing constructed of high-density extruded and stretched polyethylene fabric with 2-inch (50-mm) maximum opening in pattern and supported by tubular or T-shape galvanized-steel posts spaced not more than 96 inches (2400 mm) apart. High-visibility orange color.
 - a. Height: 48 inches (1200 mm).
 - 2. Gates: Swing access gates matching material and appearance of fencing, to allow for maintenance activities within protection zones.

- D. Protection-Zone Signage: Shop-fabricated, rigid plastic or metal sheet with attachment holes prepunched and reinforced; legibly printed with nonfading lettering.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Erosion and Sedimentation Control: Examine the site to verify that temporary erosion- and sedimentation-control measures are in place. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.

3.2 PREPARATION

- A. Protect tree root systems from damage caused by runoff or spillage of noxious materials while mixing, placing, or storing construction materials. Protect root systems from ponding, eroding, or excessive wetting caused by dewatering operations.
- B. Tree-Protection Zones: Mulch areas inside tree-protection zones and other areas indicated. Do not exceed indicated thickness of mulch.
 - 1. Apply 2-inch (50-mm) uniform thickness of organic mulch unless otherwise indicated. Do not place mulch within 6 inches (150 mm) of tree trunks.

3.3 PROTECTION ZONES

- A. Protection-Zone Fencing: Install protection-zone fencing along edges of protection zones in a manner that will prevent people from easily entering protected areas except by entrance gates.
- B. Protection-Zone Signage: Install protection-zone signage in visibly prominent locations in a manner approved by Architect.
- C. Maintain protection zones free of weeds and trash.
- D. Maintain protection-zone fencing and signage in good condition as acceptable to Architect and remove when construction operations are complete and equipment has been removed from the site.

3.4 EXCAVATION

- A. General: Excavate at edge of protection zones and for trenches indicated within protection zones according to requirements in Section 312000 "Earth Moving" unless otherwise indicated.
- B. Trenching within Protection Zones: Where utility trenches are required within protection zones, excavate under or around tree roots by hand or with air spade, or tunnel under the roots by drilling, auger boring, or pipe jacking. Do not cut main lateral tree roots or taproots; cut only smaller roots that interfere with installation of utilities. Cut roots as required for root pruning.
- C. Do not allow exposed roots to dry out before placing permanent backfill.

3.5 ROOT PRUNING

- A. Prune tree roots that are affected by temporary and permanent construction. Prune roots as follows:
 - 1. Cut roots manually by digging a trench and cutting exposed roots with sharp pruning instruments; do not break, tear, chop, or slant the cuts. Do not use a backhoe or other equipment that rips, tears, or pulls roots.
 - 2. Temporarily support and protect roots from damage until they are permanently redirected and covered with soil.
 - 3. Cover exposed roots with burlap and water regularly.
 - 4. Backfill as soon as possible according to requirements in Section 312000 "Earth Moving."
- B. Root Pruning at Edge of Protection Zone: Prune tree roots by cleanly cutting all roots to the depth of the required excavation.
- C. Root Pruning within Protection Zone: Clear and excavate by hand or with air spade to the depth of the required excavation to minimize damage to tree root systems. If excavating by hand, use narrow-tine spading forks to comb soil to expose roots. Cleanly cut roots as close to excavation as possible.

3.6 CROWN PRUNING

- A. Prune branches that are affected by temporary and permanent construction. Prune branches as directed by arborist.
 - 1. Prune to remove only injured, broken, dying, or dead branches unless otherwise indicated. Do not prune for shape unless otherwise indicated.
 - 2. Do not remove or reduce living branches to compensate for root loss caused by damaging or cutting root system.
 - 3. Pruning Standards: Prune trees according to ANSI A300 (Part 1).
- B. Cut branches with sharp pruning instruments; do not break or chop.
- C. Do not paint or apply sealants to wounds.
- D. Chip removed branches and dispose of off-site.

3.7 REGRADING

- A. Lowering Grade: Where new finish grade is indicated below existing grade around trees, slope grade beyond the protection zone. Maintain existing grades within the protection zone.
- B. Raising Grade: Where new finish grade is indicated above existing grade around trees, slope grade beyond the protection zone. Maintain existing grades within the protection zone.
- C. Minor Fill within Protection Zone: Where existing grade is 2 inches (50 mm) or less below elevation of finish grade, fill with backfill soil. Place backfill soil in a single uncompacted layer and hand grade to required finish elevations.

3.8 FIELD QUALITY CONTROL

- A. Inspections: Engage a qualified arborist to direct plant-protection measures in the vicinity of trees, shrubs, and other vegetation indicated to remain and to prepare inspection reports.

3.9 REPAIR AND REPLACEMENT

- A. General: Repair or replace trees, shrubs, and other vegetation indicated to remain or to be relocated that are damaged by construction operations, in a manner approved by Architect.
 - 1. Perform repairs of damaged trunks, branches, and roots within 24 hours according to arborist's written instructions.
 - 2. Replace trees and other plants that cannot be repaired and restored to full-growth status, as determined by Architect.

3.10 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Disposal: Remove excess excavated material, displaced trees, trash, and debris and legally dispose of them off Owner's property.

END OF SECTION 015639

SECTION 016000
PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

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

1.2 RELATED REQUIREMENTS

- A. Section 014000 - Quality Requirements: Product quality monitoring.
- B. Section 016200 - Product Substitutions: Procedures for requesting product substitutions.
- C. Section 017419 - Construction Waste Management and Disposal: Waste disposal requirements potentially affecting product selection, packaging and substitutions.

1.3 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 15 days after date of Agreement.
 - 2. For products specified only by reference standards, list applicable reference standards.
- 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.
- E. Indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

PART 2 - PRODUCTS

2.1 EXISTING PRODUCTS

- A. Do not use materials and equipment removed from existing premises unless specifically required or permitted by Contract Documents.
- B. Unforeseen historic items encountered remain the property of the Owner; notify Owner promptly upon discovery; protect, remove, handle, and store as directed by Owner.
- C. Existing materials and equipment indicated to be removed, but not to be re-used, relocated, reinstalled, delivered to the Owner, or otherwise indicated as to remain the property of the Owner, become the property of the Construction Manager; remove from site.

2.2 NEW PRODUCTS

- A. Provide new products unless specifically required or permitted by Contract Documents.
- B. Use of products having any of the following characteristics is not permitted:

1. Made using or containing CFC's or HCFC's.
 2. Made of wood from newly cut old growth timber.
- C. Where other criteria are met, Construction Manager shall give preference to products that:
1. Are extracted, harvested, and/or manufactured closer to the location of the project.
 2. Have longer documented life span under normal use.
 3. Result in less construction waste. See Section 017419
 4. Are made of vegetable materials that are rapidly renewable.

2.3 GENERAL ENVIRONMENTAL REQUIREMENTS FOR PRODUCTS

- A. General: Prohibit the use of or incorporation into the work of materials which contain toxic, hazardous and harmful materials.
1. Hazardous materials: Defined as pesticides, biocides, and carcinogens as listed by recognized authorities, such as the Environmental Protection Agency (EPA), the International Agency for Research on Cancer (IARC) or regulated under OSHA Hazard Communication Standard, 29 CFR 1910.1200.
 2. Harmful materials: Defined as materials which contain the presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances; or degrade the utility of the environment for aesthetic, cultural, or historical purposes.
 3. Owner restricted materials: Defined as all products to which the Owner has a reasonable objection because of its content, composition, properties, or characteristics.
- B. Vapors, Gases, Fumes, Odors:.
1. General: Comply with all state and federal VOC requirements. Where ever possible use non-VOC materials.
 - a. Limit use of products to the greatest extent possible which have "off-gassing", fumes, flammability, and other harmful characteristics.
 - 1) Prohibit use of products which contain substances that contribute significantly to the production of photochemical smog, tropospheric ozone, or poor indoor-air quality.
 - b. Limit use of ozone-depleting compounds to the greatest extent possible. An ozone-depleting compound is any compound with an ozone-depletion potential greater than 0.01 (CFC 11 = 1).
 - c. Use organic and biodegradable cleaners to the greatest extent possible.
 2. Do not install, use for installation, and use for cleaning those materials which may produce objectionable (to Owner and public) vapors, gases, fumes, odors, or similar conditions.
 3. Do not install or use products which may have possible chemical or biological reactions with other on-site materials.
- C. Toxicity of prefabricated wood products (composite wood and agrifiber products): Products shall contain no added urea-formaldehyde resins.
1. Laminating adhesives used to fabricate on-site and shop-applied composite wood and agrifiber assemblies shall contain no added urea-formaldehyde resins.
- D. Adhesives: Provide adhesives approved by the manufacturers of the products being adhered which are Low-VOC or non-VOC, non-flammable, water-proof after cured, and odor free.

2.4 PRODUCT OPTIONS

- A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.
- B. Products Specified by Naming One or More Manufacturers: Use a product of one of the manufacturers named and meeting specifications, no options or substitutions allowed.
- C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

2.5 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

3.1 SUBSTITUTION PROCEDURES - BIDDING PHASE

- A. Instructions to Bidders specify time restrictions for submitting requests for substitutions during the bidding period. Comply with requirements specified in this section.
- B. Substitution Submittal Procedure:
 - 1. Limit each request to one proposed substitution.
 - 2. Submit request per requirements of Section 016200 - Product Substitutions using "Substitution Request Form" cover sheet, see Section 016200.01 - Substitution Request Form.

3.2 OWNER-SUPPLIED PRODUCTS

- A. Owner's Responsibilities:
 - 1. Arrange for and deliver Owner reviewed shop drawings, product data, and samples, to Construction Manager.
 - 2. Arrange and pay for product delivery to site.
 - 3. On delivery, inspect products jointly with Construction Manager.
 - 4. Submit claims for transportation damage and replace damaged, defective, or deficient items.
 - 5. Arrange for manufacturers' warranties, inspections, and service.
- B. Construction Manager's Responsibilities:
 - 1. Review Owner reviewed shop drawings, product data, and samples.
 - 2. Receive and unload products at site; inspect for completeness or damage jointly with Owner.
 - 3. Handle, store, install and finish products.
 - 4. Repair or replace items damaged after receipt.

3.3 TRANSPORTATION AND HANDLING

- A. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.
- 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, and to minimize handling.
- F. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

3.4 STORAGE AND PROTECTION

- A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication. See Section 017419.
- B. Store and protect products in accordance with manufacturers' instructions.
- C. Store with seals and labels intact and legible.

- D. Store sensitive products in weathertight, climate-controlled enclosures in an environment favorable to product.
- E. For exterior storage of fabricated products, place on sloped supports above ground.
- F. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
- G. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.
- 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 016200
PRODUCT SUBSTITUTIONS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Product substitutions.

1.2 RELATED SECTIONS

- A. Section 016000 - PRODUCT REQUIREMENTS: Product requirements.

1.3 SUBSTITUTIONS

- A. Base Bid shall be in accordance with the Contract Documents.
- B. After the end of the bidding period, substitution requests will be considered by the Architect only in case of:
 - 1. Product unavailability.
 - 2. Other conditions beyond the Construction Manager's control.
- C. Substitutions will not be considered for acceptance when:
 - 1. A substitution is indicated or implied on shop drawings or product data submittals without a formal request from the Construction Manager.
 - 2. Acceptance will require substantial revision of Contract Documents.
 - 3. In the judgement of the Architect, the substitution request does not include adequate information necessary for a complete evaluation.
 - 4. Requested directly by a subcontractor or supplier.
- D. The Architect will determine acceptability of proposed substitutions.
- E. No verbal or written approvals other than by Addendum or Change Order will be valid.

1.4 SUBMITTALS

- A. Submit a separate request for each substitution. Support each request with complete data substantiating compliance of proposed substitution with requirements stated in Contract Documents:
 - 1. Product identification, including manufacturer's name and address.
 - 2. Manufacturer's literature, identifying:
 - a. Product description.
 - b. Reference standards.
 - c. Performance and test data.
 - 3. Samples, as applicable.
 - 4. Name and address of similar projects on which product has been used and date of each installation.
 - 5. Itemized comparison of the proposed substitution with product specified, listing significant variations.
 - 6. Data relating to changes in construction schedule.
 - 7. Effects of substitution on separate contracts.
 - 8. List of changes required in other work or products.
 - 9. For post-bid substitution requests, accurate cost data comparing proposed substitution with product specified, including amount of net change to the Contract Sum.
 - 10. Designation of required license fees or royalties.
 - 11. Designation of availability of maintenance services and sources of replacement materials.

1.5 QUALITY ASSURANCE

- A. In making formal request for substitution the Construction Manager represents that:
 - 1. The proposed product has been investigated and it has been determined that it is equivalent to or superior in all respects to the product specified.

2. The same warranties or bonds will be provided for the substitute product as for the product specified.
3. Coordination and installation of the accepted substitution into the Work will be accomplished and changes as may be required for the Work to be complete will be accomplished.
4. Claims for additional costs caused by substitution that may subsequently become apparent will be waived by the Construction Manager.
5. For post-bid substitution requests, complete cost data is attached and includes related costs under the Contract, but does not include:
 - a. Costs under separate contracts.
 - b. The Architect's costs for redesign or revision of the Contract Documents.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION

3.1 PREPARATION

- A. Do not order or install substitute products without written acceptance of the Architect.

3.2 PRODUCT SUBSTITUTION REQUEST FORM

- A. Refer to Document 016200.01 - SUBSTITUTION REQUEST FORM, following this section.
- B. Substitutions will be considered only when the Substitution Request Form is completed and included with the substitution request and back-up data.
- C. All product substitution requests shall be made to the Architect through the Construction Manager.

END OF SECTION

SECTION 016200.01
SUBSTITUTION REQUEST FORM

E4H ENVIRONMENTS FOR HEALTH ARCHITECTURE

185 Talcott Road
Williston, VT 05495
ATTENTION: Dan Schneider, AIA, NCARB, LEED AP, Associate Partner
Phone: 802.377.2880
Email: dschneider@e4harchitecture.com

We hereby submit for your consideration the following product instead of the specified item:

DRAWING NO. _____ DRAWING NAME _____

SPEC. SECT.	SPEC NAME	PARAGRAPH	SPECIFIED ITEM
_____	_____	_____	_____

Proposed Substitution: _____

Attach complete information on changes to Drawings and/or Specifications that proposed substitution will require for its proper installation.
Submit with request necessary samples and substantiating data to prove equal quality and performance to that which is specified. Clearly mark manufacturer's literature to indicate equality in performance.
The undersigned certifies that the function, appearance and quality are of equal performance and assumes liability for equal performance, equal design and compatibility with adjacent materials.

Submitted By:

Signature (Construction Manager) Title

Name

Firm

Address

Telephone Date

Signature shall be by person having authority to legally bind the Construction Manager to the above terms. Failure to provide legally binding signature will result in retraction of approval.

(See second page for additional information to be provided)

Fill in blanks below:

Does the substitution affect dimensions indicated on the Drawings?
Yes ____ No ____ if yes, clearly indicate changes.

Will the undersigned pay for changes to the building design, including engineering and detailing costs caused by the requested substitution?
Yes ____ No ____ if no, fully explain:

What effect does the substitution have on other Contracts or other trades?

What effect does the substitution have on construction schedule?

Manufacturer's warranties of the proposed and specified items are:
Same ____ Different ____ Explain:

Reason for Request:

Itemized comparison of specified item(s) with the proposed substitution; list significant variations:

This substitution will amount to a credit or extra cost to the Owner of:

Designation of maintenance services and sources:

(Attach additional sheets if required)

For use by the Architect

____ Recommended
____ Not Recommended

____ Recommended as noted
____ Insufficient data received

By _____ Date _____

For use by the Owner

____ Approved
____ Not Approved

____ Approved as noted
____ Insufficient data received

By _____ Date _____

END OF SECTION

SECTION 017000
EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

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

1.2 RELATED REQUIREMENTS

- A. Section 011000 - Summary: Limitations on working in existing building; continued occupancy; work sequence; identification of salvaged and relocated materials.
- B. Section 013000 - Administrative Requirements: Submittals procedures, Electronic document submittal service.
- C. Section 014000 - Quality Requirements: Testing and inspection procedures.
- D. Section 015000 - Temporary Facilities and Controls: Temporary exterior enclosures.
 - 1. Temporary exterior enclosures.
 - 2. Temporary interior partitions.
- E. Section 015100 - Temporary Utilities: Temporary heating, cooling, and ventilating facilities.
- F. Section 017800 - Closeout Submittals: Project record documents, operation and maintenance data, warranties, and bonds.
- G. Individual Product Specification Sections:
 - 1. Advance notification to other sections of openings required in work of those sections.

1.3 REFERENCE STANDARDS

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

1.4 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Demolition Plan: Submit demolition plan as specified by OSHA and local authorities.
 - 1. Indicate extent of demolition, removal sequence, bracing and shoring, and location and construction of barricades and fences. Include design drawings and calculations for bracing and shoring.
 - 2. Identify demolition firm and submit qualifications.
 - 3. Include a summary of safety procedures.
- C. Cutting and Patching: Submit written request in advance of cutting or alteration that affects:
 - 1. Structural integrity of any element of Project.
 - 2. Integrity of weather exposed or moisture resistant element.
 - 3. Efficiency, maintenance, or safety of any operational element.
 - 4. Visual qualities of sight exposed elements.
 - 5. Work of Owner or separate Contractor.

6. Include in request:
 - a. Identification of Project.
 - b. Location and description of affected work.
 - c. Necessity for cutting or alteration.
 - d. Description of proposed work and products to be used.
 - e. Effect on work of Owner or separate Contractor.
 - f. Written permission of affected separate Contractor.
 - g. Date and time work will be executed.

D. Project Record Documents: Accurately record actual locations of capped and active utilities.

1.5 QUALIFICATIONS

- A. For field engineering, employ a professional engineer of the discipline required for specific service on Project, licensed in the State in which the Project is located. Employ only individual(s) trained and experienced in establishing and maintaining horizontal and vertical control points necessary for laying out construction work on project of similar size, scope and/or complexity.
- B. For design of temporary shoring and bracing, employ a Professional Engineer experienced in design of this type of work and licensed in the State in which the Project is located.

1.6 PROJECT CONDITIONS

- A. Use of explosives is not permitted.
- B. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.
- C. Dust Control: Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere and over adjacent property.
 1. Provide dust-proof enclosures to prevent entry of dust generated outdoors.
 2. Provide dust-proof barriers between construction areas and areas continuing to be occupied by Owner.
- D. Noise Control: Provide methods, means, and facilities to minimize noise produced by construction operations.
- E. Pest and Rodent Control: Provide methods, means, and facilities to prevent pests and insects from damaging the work.
- F. Rodent Control: Provide methods, means, and facilities to prevent rodents from accessing or invading premises.
- G. Pollution Control: Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations. Comply with federal, state, and local regulations.

1.7 COORDINATION

- A. See Section 011000 for occupancy-related requirements.
- B. Coordinate scheduling, submittals, and work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.
- C. Notify affected utility companies and comply with their requirements.
- D. Verify that utility requirements and characteristics of new operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.
- E. Coordinate space requirements, supports, and installation of mechanical and electrical work that are indicated diagrammatically on drawings. Follow routing indicated for pipes, ducts, and

conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

- F. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.
- G. Coordinate completion and clean-up of work of separate sections.
- H. After Owner occupancy of premises, 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

2.1 PATCHING MATERIALS

- A. New Materials: As specified in product sections; match existing products and work for patching and extending work.
- B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.
- C. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 016000 - Product Requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that existing site 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.

3.2 PREPARATION

- A. Clean substrate surfaces prior to applying next material or substance.
- B. Seal cracks or openings of substrate prior to applying next material or substance.
- C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

3.3 PREINSTALLATION MEETINGS

- A. When required in individual specification sections, convene a preinstallation meeting at the site prior to commencing work of the section.
- B. Require attendance of parties directly affecting, or affected by, work of the specific section.
- C. Notify Architect four days in advance of meeting date.
- D. Prepare agenda and preside at meeting:
 - 1. Review conditions of examination, preparation and installation procedures.
 - 2. Review coordination with related work.

- E. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

3.4 LAYING OUT THE WORK

- A. Verify locations of survey control points prior to starting work.
- B. Promptly notify Architect of any discrepancies discovered.
- C. Construction Manager shall locate and protect survey control and reference points.
- D. Control datum for survey is that indicated on drawings.
- E. Protect survey control points prior to starting site work; preserve permanent reference points during construction.
- F. Promptly report to Architect the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.
- G. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Architect.
- H. Utilize recognized engineering survey practices.
- I. Establish a minimum of two permanent bench marks on site, referenced to established control points. Record locations, with horizontal and vertical data, on project record documents.
- J. Establish elevations, lines and levels. Locate and lay out by instrumentation and similar appropriate means:
 - 1. Site improvements including pavements; stakes for grading, fill and topsoil placement; utility locations, slopes, and invert elevations.
 - 2. Grid or axis for structures.
 - 3. Building foundation, column locations, ground floor elevations.
- K. Periodically verify layouts by same means.
- L. Maintain a complete and accurate log of control and survey work as it progresses.
- M. On completion of foundation walls and major site improvements, prepare a certified survey illustrating dimensions, locations, angles, and elevations of construction and site work.

3.5 GENERAL INSTALLATION REQUIREMENTS

- A. In addition to compliance with regulatory requirements, conduct construction operations in compliance with NFPA 241, including applicable recommendations in Appendix A.
- B. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.
- C. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.
- D. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.
- E. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.
- F. Make neat transitions between different surfaces, maintaining texture and appearance.

3.6 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 samples of installed work for testing when requested.

8. Remove and replace defective and non-complying work.
 - C. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.
 - D. Employ original installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.
 - E. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.
 - F. Restore work with new products in accordance with requirements of Contract Documents.
 - G. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
 - H. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material in accordance with Section 078400, 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.
- 3.7 PROGRESS CLEANING
- A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.
 - B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.
 - C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.
 - D. Collect and remove waste materials, debris, and trash/rubbish from site periodically and dispose off-site; do not burn or bury.
 - E. Clean up spillage and wind-blown debris from adjacent public and private lands.
- 3.8 PROTECTION OF INSTALLED WORK
- A. Protect installed work from damage by construction operations.
 - B. Provide special protection where specified in individual specification sections.
 - C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.
 - D. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
 - E. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
 - F. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.
 - G. Prohibit traffic from landscaped areas.
 - H. Remove protective coverings when no longer needed; reuse or recycle coverings if possible.
- 3.9 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 lubrication, drive rotation, belt tension, control sequence, and for conditions that may cause damage.
- D. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.
- E. Verify that wiring and support components for equipment are complete and tested.
- F. Execute start-up under supervision of applicable Construction Manager personnel and manufacturer's representative in accordance with manufacturers' instructions.
- G. When specified in individual specification Sections, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.
- H. Submit a written report that equipment or system has been properly installed and is functioning correctly.

3.10 DEMONSTRATION AND INSTRUCTION

- A. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at scheduled time, at equipment location.
- B. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.
- C. Provide a qualified person who is knowledgeable about the Project to perform demonstration and instruction of Owner's personnel.
- D. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with Owner's personnel in detail to explain all aspects of operation and maintenance.
- E. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.

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

- B. Accompany Project Coordinator on preliminary inspection to determine items to be listed for completion or correction in Contractor's Notice of Substantial Completion.
- C. Notify Architect 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 Final Correction Punch List and comply with requirements for access to Owner-occupied areas.
- F. Accompany Project Coordinator on preliminary final inspection.
- G. Notify Architect when work is considered finally complete.
- H. Complete items of work determined by Architect's final inspection.

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 017329
CUTTING AND PATCHING

PART 1 - GENERAL

1.1 SUMMARY

- A. Examination of existing conditions and acceptance of conditions.
- B. Administrative and procedural requirements for cutting and patching, including attendant excavation and backfill as required to complete the Work. Contractors are responsible for coordinating all cutting and patching work, including but not limited to:
 - 1. Perform all cutting, altering, patching, and fitting of the Work (new and existing) as necessary for the Work and the existing improvements. Fully integrate with existing and new construction, all cutting, alterations and patching, to present the visual appearance of an entire, completed, and unified project.
 - a. Make all products and their components of the work fit together properly.
 - 2. Provide openings in elements of the Work, and the patching of same, for penetrations required by all trades, including but not limited to mechanical, plumbing, fire protection and electrical work.
 - a. Individual subcontract trades are responsible for designated types of coring and drilling penetrations for piping, conduit, ducts and other penetrations as defined elsewhere in this Section.
 - 3. Uncover work to provide for installing, inspecting, or both, of ill-timed work;
 - 4. Remove and replace work not conforming to requirements of the Contract Documents or as otherwise determined to be defective.
 - 5. Patch and match all surfaces and products disturbed or damaged by the Work.
 - 6. Remove samples of installed work as specified for testing.

1.2 RELATED REQUIREMENTS

- A. Individual Product Specification Sections:
 - 1. Cutting and patching of not-exposed-to-view materials incidental to work of the Section.
 - 2. Core drilling (up to 8 inches in diameter) of interior building components, incidental to work of individual Sections.
 - 3. Cutting and Patching work of particular exposed-to-view finish work, performed by trades as specified herein.

1.3 SUBMITTALS

- A. Submit written proposals to perform cutting and patching under provisions of Section 013000 - ADMINISTRATIVE PROCEDURES. Describe cutting and patching procedures in advance of the time cutting and patching.
 - 1. Submit a written request when cutting work affects the following:
 - a. Structural integrity of any element in the project.
 - b. Integrity of weather-exposed or moisture-resistant elements.
 - c. Integrity of any fire suppression, fire alarm, or life safety system.
 - d. Interruption or disturbance of utilities service. List utilities that will be relocated and those that will be temporarily out-of-service. Indicate how long service will be disrupted.
 - e. Efficiency, maintenance, or safety of operational elements and systems.
 - f. Aesthetic and visual qualities of exposed-to-view elements.
 - g. Efficiency, operational life, maintenance, or safety of operational elements.
 - h. Work of Owner or work performed under separate Contract.
 - i. Owners on-going operations or schedule.
 - 2. Include in the request:
 - a. Identification of project.
 - b. Location and description of affected work.

- c. Necessity for cutting or alteration.
 - d. Alternatives to cutting and patching.
 - e. Scope of proposed cutting, patching, alteration or excavation.
 - f. List of tradespeople who will execute the work.
 - g. Description of products to be used.
 - h. Extent of refinishing and cleaning to be performed.
 - i. Effect on work by Owner or work performed under separate Contract, and written permission of affected party.
 - j. Date and time cutting and patching is scheduled to be executed.
 - k. Cost proposal, when applicable.
 - l. Written permission of separate contractor(s) whose work will be affected.
3. Review by the Architect does not waive the Architect's right to later require complete removal and replacement of Work found to be unsatisfactory.
 4. Should conditions of Work or the schedule indicate a change of products from original installation, Contractor shall submit a request for substitution in accordance with Section 016200 - PRODUCT SUBSTITUTIONS.

1.4 QUALITY ASSURANCE

- A. Only tradespersons skilled and experienced in cutting and patching shall perform such Work.
- B. In performing Work which requires cutting, fixing, or patching, Contractor shall oversee and ensure contractor(s) and subcontractors utilize best efforts to protect and preserve the visual appearance and aesthetics of the Project to the reasonable satisfaction of both Owner and Architect.
- C. In performing Work which requires cutting, fixing, or patching, Contractor and subcontractors shall utilize best efforts to protect and preserve the visual appearance and aesthetics of the Project to the reasonable satisfaction of both Owner and Architect.

1.5 PERFORMANCE REQUIREMENTS

- A. General Performance Requirements: Execute work by methods to avoid damage to other Work, and which will provide appropriate surfaces to receive patching and finishing.
- B. Structural Elements: Do not cut and patch structural elements in a manner that would reduce the load-carrying capacity or load deflection ratio. Always obtain written approval of the cutting and patching proposal before cutting and patching structural elements.
 1. Do not drill through structural beams, slabs or columns. Core drilling through concrete block walls and stair platforms must be approved by the Architect.
 2. Where cutting and patching involves adding reinforcement to structural elements, submit details and engineering calculations showing integration of reinforcement with the original structure.
- C. Exposed Elements:
 1. Employ original installer of new construction to perform cutting and patching for weather exposed and moisture resistant elements, and sight exposed surfaces.
 2. Employ an appropriate tradesperson to perform cutting and patching of existing weather-exposed and moisture-resistant construction, and exposed-to-view surfaces.
- D. Penetrating Elements: Fit work tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces. At penetrations of fire rated walls, partitions, ceiling or floor construction, completely seal voids with fire rated materials in accordance to applicable codes and regulations, and compatible to surrounding construction.
- E. Visual Requirements: Do not cut and patch construction exposed on the exterior or in occupied spaces, in a manner that would, in the Architect's opinion, reduce the building's aesthetic qualities, or result in visual evidence of cutting and patching. Remove and replace Work cut and patched in a visually unsatisfactory manner.

1. General: Restore work with new products in accordance with the requirements of the Contract Documents.
 2. Engage a firm recognized and experienced in the trade or specialty operation required to cut and patch the exposed-to-view work listed below.
 - a. Concrete masonry and brick masonry concrete.
 - b. Windows, storefront and curtainwall wall systems.
 - c. Gypsum and plaster work.
 - d. Acoustical ceilings.
 - e. Carpeting.
 - f. Resilient flooring.
 - g. HVAC enclosures, cabinets, or covers.
 3. Engage a firm recognized and experienced in firestopping for patching of existing firestopping, smoke seals and firesafing in compliance with applicable codes and as additionally required by authorities having jurisdiction. Comply with requirements of Section 078400 - FIRESTOPPING.
- F. Operational and Safety Limitations: Do not cut and patch operating elements or safety components in a manner that would reduce their capacity to perform as intended, or would increase maintenance, or decrease operational life or safety.
1. Obtain approval of the cutting and patching proposal before cutting and patching the following operating elements or safety related systems:
 - a. Primary operational systems and equipment.
 - b. Fire resistance rated barriers and smoke barriers.
 - c. Water, moisture, or vapor barriers.
 - d. Membranes and flashings.
 - e. Fire protection systems.
 - f. Noise and vibration control elements and systems.
 - g. Control systems.
 - h. Communication systems.
 - i. Conveying systems.
 - j. Electrical wiring systems.

1.6 WARRANTY

- A. Existing Warranties: Replace, patch, and repair material and surfaces cut or damaged by methods and with materials in such a manner as not to void existing applicable warranties.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Patching Materials: Use patching materials identical to existing materials. If identical materials are not available or cannot be used where exposed surfaces are involved, use materials that match existing adjacent surfaces to the fullest extent possible. Use materials whose installed performance will equal or surpass that of the existing materials. Comply with specifications and standards for each specific product involved.
1. All materials used shall be approved by the Architect for consistency with the existing surfaces.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Pre-Bid Examination: Contractors shall inform themselves of existing conditions before submitting bids, and are fully responsible for carrying out all work required to completely and properly execute the work of the Contract, regardless of the conditions encountered in the actual work. No claim for extra compensation or extension of time will be allowed on account of actual conditions which are inconsistent with those assumed, except for fully concealed conditions.

- B. Examination: Inspect existing conditions prior to commencing Work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, inspect conditions affecting performance of work. Take corrective action before proceeding, if unsafe or unsatisfactory conditions are encountered.

3.2 PREPARATION

- A. Prior to commencement of selective demolition work, inspect areas in which work will be performed. Photograph existing damage to structure surfaces, equipment, or to surrounding properties which could be misconstrued as damage resulting from selective demolition work; file with Architect prior to starting work.
- B. Protection:
 - 1. Provide temporary supports to ensure structural integrity of the Work.
 - 2. Protect existing construction during cutting and patching to prevent damage.
 - 3. Provide protection from adverse weather conditions.
 - 4. Provide protection from elements for areas which may be exposed by uncovering work.

3.3 GENERAL CUTTING AND PATCHING

- A. Performance: Execute work by methods to avoid damage to other Work, and which will provide appropriate surfaces to receive repairs, patching, and finishing.
- B. Execute cutting, fitting, and patching, including excavation and fill, to complete the work.
 - 1. Cut rigid materials using masonry saw or core drill. Pneumatic tools are not permitted without prior approval, from Architect
 - 2. Fit products together, to integrate with other work.
 - 3. Uncover work to install ill-timed work.
 - 4. Remove and replace defective or non-conforming work.
 - 5. Remove samples of installed work for testing, when requested.
 - 6. Provide openings in the work for penetration of mechanical and electrical work.
- C. Cutting: Cut existing construction using methods least likely to damage elements retained or adjoining construction. Where possible, review proposed procedures with the original Installer; comply with the original Installer's recommendations.
 - 1. In general, where cutting, use hand or small power tools designed for sawing or grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 - 2. To avoid marring existing finished surfaces, cut or drill from the exposed or finished side into concealed surfaces.
 - 3. Cut through concrete and masonry using a cutting machine, such as a Carborundum saw or a diamond-core drill.
 - 4. Where services are required to be removed, relocated, or abandoned, by-pass utility services, such as pipe or conduit, before cutting. Cut-off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal the remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after by-passing and cutting.

3.4 FINISHING OF PATCHED AREAS

- A. General: Refinish surfaces to match adjacent finish. For continuous surfaces, refinish to nearest intersection or natural break; for assemblies, refinish entire unit.
 - 1. Patching: Patch with durable seams that are as invisible as possible, showing no evidence of patching and refinishing. Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction Comply with specified tolerances.

2. At penetrations of fire rated walls, partitions, ceiling or floor construction, completely seal voids with fire rated materials in accordance to applicable codes and regulations, and compatible to surrounding construction.
3. Fit work tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces. Provide vapor and air seal when penetrating existing vapor and air seals.
4. Where feasible, inspect and test patched areas to demonstrate integrity of the installation.
5. Where removing walls or partitions extends one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform color and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
 - a. Where patching occurs in a painted surface, extend final paint coat over entire unbroken surface containing the patch after the area has received primer and second coat. Extend re-painting to entire surface plane up to where plane changes direction.
6. Patch, repair, or rehang existing ceilings as necessary to provide an even-plane surface of uniform appearance.

3.5 CORING AND DRILLING

- A. Coring and drilling of holes incidental to work of individual sections shall be performed by the trade requiring the penetration, except as follows:
 1. Coring and drilling of holes greater than 8 inches in diameter in concrete decks and slabs.
 2. Coring and drilling requiring patching of the following existing surfaces shall be performed by the trade requiring the penetration with patching performed by the appropriate trade subcontractor.
 - a. Gypsum board
 3. The Construction Manager is responsible for performing core drilling in wall and roof surfaces leading to, or from, the outside of the Building.
 4. The Construction Manager is responsible for coordination of all coring and drilling and resultant patches necessary for the completion of this Contract and for the quality and appearance of all patch Work in exposed-to-view finished materials.

3.6 CLEANING

- A. Cleaning patched areas: Thoroughly clean areas and spaces where cutting and patching is performed or used as access. Remove paint, mortar, oils, putty and similar items.

END OF SECTION

SECTION 017419

CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

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. This Section includes administrative and procedural requirements for the following:
 - 1. Recycling nonhazardous construction waste.
 - 2. Disposing of nonhazardous construction waste.
- B. Related Sections include the following:
 - 1. Section 018119 Construction Indoor Air Quality
 - 2. Section 018113 Sustainable Design Requirements

1.3 DEFINITIONS

- A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
- B. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.
- C. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.

1.4 PERFORMANCE GOALS

- A. General: Develop waste management plan that results in end-of-Project rates for recycling of 75 percent by weight of total waste generated by the Work. Another option is to divert at least 50% of the total construction and demolition material with at least three material streams diverted. A third option is to divert 75% of the total construction and demolition material with at least four material streams diverted.
- B. Recycle Goals: Owner's goal is to salvage and recycle as much nonhazardous construction waste as possible. Owner has established minimum goals for the following materials:
 - 1. Demolition Waste:

CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

Material	Percentage Diverted
Asphaltic concrete paving	75%
Concrete	50%
Concrete reinforcing steel	50%
Electrical conduit	70%
Copper wiring	90%
Lighting fixtures	80%
Lamps	70%
Ballasts	75%
Electrical devices	75%

2. Construction Waste:

Material	Percentage Diverted
Site-clearing waste	50%
Masonry and CMU	95%
Lumber	70%
Wood sheet materials	80%
Wood trim	65%
Metals	100%
Roofing	80%
Insulation	65%
Carpet and pad	70%
Gypsum board	65%
Piping	50%
Electrical Conduit	80%

3. Packaging: Regardless of salvage/recycle goal indicated above, salvage or recycle 100 percent of the following uncontaminated packaging materials:

Material	Percentage Diverted
Paper	100%
Cardboard	100%
Boxes	100%
Plastic Sheet and Film	100%
Polystyrene Packaging	100%
Wood Crates	100%
Plastic Pails	100%

1.5 ACTION SUBMITTALS

- A. Waste Management Plan: Submit 3 copies of plan within 30 days of date established for commencement of the Work.

1.6 WASTE MANAGEMENT PLAN

- A. General: Develop a waste management plan according to ASTM E 1609 and requirements in this Section. Plan shall consist of waste identification (at least 5 materials, structural and nonstructural), waste reduction work plan, and cost/revenue analysis. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.
- B. Waste Identification: Indicate anticipated types and quantities of construction waste generated by the Work. Include estimated quantities and assumptions for estimates. Identify at minimum five materials (both structural and nonstructural) targeted for diversion. Approximate the overall project waste that these materials represent.
- C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.
1. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
 2. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
 3. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location on Project site where materials separation will be located.

CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

4. NOTE: Land clearing debris, excavated soil, an alternative daily cover are excluded from waste diversion goals.

D. Specify whether materials will be source separated or commingled

1.7 INFORMATIONAL SUBMITTALS

A. Waste Reduction Progress Reports: Submit reports by the 15th day of each month. Include the following information for the prior month in an editable excel format, except where indicated:

1. Material category.
2. Generation point of waste.
3. Recycling/ hauling location
4. Total quantity of waste in tons.
5. Quantity of waste recycled, separated by material stream, in tons.
6. Total quantity of waste recovered (recycled) as a percentage of total waste.
7. PDF scans of all hauling tickets for the month
8. A sample report is attached at the end of this section.

B. Final Waste Reduction Report that details all major waste streams generated, including disposal and diversion rates.

1.8 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Waste Management Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." Review methods and procedures related to waste management including, but not limited to, the following:

1. Review and discuss waste management plan including responsibilities of Waste Management Coordinator.
2. Review requirements for documenting quantities of each type of waste and its disposition.
3. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
4. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
5. Review waste management requirements for each trade.

C. Commingled waste shall be reported with Project specific diversion rates or taken to a USGBC Approved Certified Recycling Facility. A certified recycling facility must process and recycle commingled construction and demolition materials and receive independent third-party certification of their recycling rates.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

- A. General: Implement waste management plan as approved by Architect, LEED Consultant, General Contractor, and Owner. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.
- B. Waste Management Coordinator: Engage a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan. Coordinator shall be present at Project site full time for duration of Project. Superintendent may be the waste management coordinator.
- C. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work occurring at Project site.
 - 1. Distribute waste management plan to everyone concerned within three days of submittal return.
 - 2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.
- D. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
 - 1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.
 - 2. Comply with Division 01 Section "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control.

3.2 RECYCLING CONSTRUCTION WASTE, GENERAL

- A. General: Recycle paper and beverage containers used by on-site workers.
- B. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to Owner.
- C. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical.
 - 1. Provide appropriately marked containers or bins for controlling recyclable waste until they are removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.
 - a. Inspect containers and bins for contamination and remove contaminated materials if found.

CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
4. Store components off the ground and protect from the weather.
5. Remove recyclable waste off Owner's property and transport to recycling receiver or processor.

- D. Divert from landfill at a minimum 75% of construction and demolition waste, from at least four different material streams.

3.3 RECYCLING CONSTRUCTION WASTE

A. Packaging:

1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
2. Polystyrene Packaging: Separate and bag materials.
3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.

B. Site-Clearing Wastes: Chip brush, branches, and trees on-site or at landfill facility.

1. Comply with requirements in Division 32 Section "Plants" for use of chipped organic waste as organic mulch.

C. Wood Materials:

1. Clean Cut-Offs of Lumber: Grind or chip into small pieces.
2. Clean Sawdust: Bag sawdust that does not contain painted or treated wood.
 - a. Comply with requirements in Division 329310 Section "Trees, Shrubs, and Groundcovers." for use of clean sawdust as organic mulch.

D. Gypsum Board: Stack large clean pieces on wood pallets and store in a dry location.

3.4 DISPOSAL OF WASTE

A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.

1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: Do not burn waste materials.

CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

- C. Disposal: Transport waste materials off Owner's property and legally dispose of them.

END OF SECTION 017419

SECTION 017800
CLOSEOUT SUBMITTALS

PART 1 - GENERAL

1.1 SECTION INCLUDES

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

1.2 RELATED REQUIREMENTS

- A. Section 013000 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.
- B. Section 017000 - 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.

1.3 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

3.1 PROJECT RECORD DOCUMENTS

- A. Maintain on site one set of the following record documents; record actual revisions to the Work:
 - 1. Drawings.
 - 2. Specifications.
 - 3. Commissioning Agent Specifications.
 - 4. Addenda.
 - 5. Change Orders and other modifications to the Contract.
 - 6. Reviewed shop drawings, product data, and samples.
 - 7. 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.
- 3.2 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.
- 3.3 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. Fire/Smoke contribution characteristics.
 - 3. 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.
 - C. Moisture protection and weather-exposed products: Include product data listing applicable reference standards, chemical composition, and details of installation. Provide recommendations for inspections, maintenance, and repair.
 - D. Additional information as specified in individual product specification sections.
- 3.4 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. Panelboard Circuit Directories: Provide electrical service characteristics, controls, and communications; typed.
 - C. Include color coded wiring diagrams as installed.

- D. 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.
- E. 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.
- F. Provide servicing and lubrication schedule, and list of lubricants required.
- G. Include manufacturer's printed operation and maintenance instructions.
- H. Include sequence of operation by controls manufacturer.
- I. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- J. Provide control diagrams by controls manufacturer as installed.
- K. Provide Construction Manager's coordination drawings, with color coded piping diagrams as installed.
- L. Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
- M. Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
- N. Include test and balancing reports.
- O. Additional Requirements: As specified in individual product specification sections.

3.5 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 (216 by 280 mm) three D side ring binders with durable plastic covers; 2 inch (50 mm) 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, Construction Manager 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 24 pound paper.
- I. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.
- J. Arrange content by systems under section numbers and sequence of Table of Contents of this Project Manual.
- K. Contents: Prepare a Table of Contents for each volume, with each product or system description identified, in three parts as follows:

1. **Part 1:** Directory, listing names, addresses, and telephone numbers of Architect, Construction Manager, Subcontractors, and major equipment suppliers.
2. **Part 2:** Operation and maintenance instructions, arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:
 - a. Significant design criteria.
 - b. List of equipment.
 - c. Parts list for each component.
 - d. Operating instructions.
 - e. Maintenance instructions for equipment and systems.
 - f. Maintenance instructions for special finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
3. **Part 3:** Project documents and certificates, including the following:
 - a. Shop drawings and product data.

3.6 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 017900
DEMONSTRATION AND TRAINING

PART 1 GENERAL

1.1 SUMMARY

- A. Demonstration of products and systems to be commissioned and where indicated in specific specification sections.
- B. Training of Owner personnel in operation and maintenance is required for:
 - 1. All software-operated systems.
 - 2. HVAC systems and equipment.
 - 3. Plumbing equipment.
 - 4. Electrical systems and equipment.
- C. Training of Owner personnel in care, cleaning, maintenance, and repair is required for:
 - 1. Finishes, including flooring, wall finishes, ceiling finishes.
 - 2. Fixtures and fittings.
 - 3. Items specified in individual product Sections.

1.2 RELATED REQUIREMENTS

- A. Section 017800 - Closeout Submittals: Operation and maintenance manuals.

1.3 SUBMITTALS

- A. Draft Training Plans: Owner will designate personnel to be trained; tailor training to needs and skill-level of attendees.
 - 1. Provide an overall schedule showing all training sessions.
 - 2. Include at least the following for each training session:
 - a. Identification, date, time, and duration.
 - b. Description of products and/or systems to be covered.
 - c. Name of firm and person conducting training; include qualifications.
 - d. Intended audience, such as job description.
 - e. Objectives of training and suggested methods of ensuring adequate training.
 - f. Media to be used, such a slides, hand-outs, etc.
 - g. Training equipment required, such as projector, projection screen, etc., to be provided by Construction Manager.
- B. Training Manuals: Provide training manual for each attendee; allow for minimum of two attendees per training session.
 - 1. Include applicable portion of O&M manuals.
 - 2. Include copies of all hand-outs, slides, overheads, video presentations, etc., that are not included in O&M manuals.
 - 3. Provide one extra copy of each training manual to be included with operation and maintenance data.
- C. Training Reports:
 - 1. Identification of each training session, date, time, and duration.
 - 2. Sign-in sheet showing names and job titles of attendees.
 - 3. List of attendee questions and written answers given, including copies of and references to supporting documentation required for clarification; include answers to questions that could not be answered in original training session.

1.4 QUALITY ASSURANCE

- A. Instructor Qualifications: Familiar with design, operation, maintenance and troubleshooting of the relevant products and systems.
 - 1. Provide as instructors the most qualified trainer of those contractors and/or installers who actually supplied and installed the systems and equipment.

2. Where a single person is not familiar with all aspects, provide specialists with necessary qualifications.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 DEMONSTRATION - GENERAL

- A. Demonstrations conducted during system start-up do not qualify as demonstrations for the purposes of this section, unless approved in advance by Owner.
- B. Demonstrations conducted during Functional Testing need not be repeated unless Owner personnel training is specified.
- C. Demonstration may be combined with Owner personnel training if applicable.
- D. Operating Equipment and Systems: Demonstrate operation in all modes, including start-up, shut-down, seasonal changeover, emergency conditions, and troubleshooting, and maintenance procedures, including scheduled and preventive maintenance.
 1. Perform demonstrations not less than two weeks prior to Substantial Completion.
 2. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.
- E. Non-Operating Products: Demonstrate cleaning, scheduled and preventive maintenance, and repair procedures.
 1. Perform demonstrations not less than two weeks prior to Substantial Completion.

3.2 TRAINING - GENERAL

- A. Conduct training on-site unless otherwise indicated.
- B. Owner will provide classroom and seating at no cost to Construction Manager.
- C. Do not start training until Functional Testing is complete, unless otherwise specified or approved by the Commissioning Authority.
- D. Provide training in minimum two hour segments.
- E. Training schedule will be subject to availability of Owner's personnel to be trained; re-schedule training sessions as required by Owner; once schedule has been approved by Owner failure to conduct sessions according to schedule will be cause for Owner to charge Construction Manager for personnel "show-up" time.
- F. Review of Facility Policy on Operation and Maintenance Data: During training discuss:
 1. The location of the O&M manuals and procedures for use and preservation; backup copies.
 2. Typical contents and organization of all manuals, including explanatory information, system narratives, and product specific information.
 3. Typical uses of the O&M manuals.
- G. Product- and System-Specific Training:
 1. Review the applicable O&M manuals.
 2. For systems, provide an overview of system operation, design parameters and constraints, and operational strategies.
 3. Review instructions for proper operation in all modes, including start-up, shut-down, seasonal changeover and emergency procedures, and for maintenance, including preventative maintenance.
 4. Provide hands-on training on all operational modes possible and preventive maintenance.
 5. Emphasize safe and proper operating requirements; discuss relevant health and safety issues and emergency procedures.
 6. Discuss common troubleshooting problems and solutions.
 7. Discuss any peculiarities of equipment installation or operation.

8. Discuss warranties and guarantees, including procedures necessary to avoid voiding coverage.
 9. Review recommended tools and spare parts inventory suggestions of manufacturers.
 10. Review spare parts and tools required to be furnished by Construction Manager.
 11. Review spare parts suppliers and sources and procurement procedures.
- H. Be prepared to answer questions raised by training attendees; if unable to answer during training session, provide written response within three days.

END OF SECTION

SECTION 018113 SUSTAINABLE DESIGN REQUIREMENTS

PART 1 – GENERAL

1.1 SUMMARY

- A. This Section includes administrative requirements and procedures for compliance and documentation for the UVMC Outpatient Center to obtain minimum LEED Silver for Building Design and Construction for (LEED-BD+C) certification under the US Green Building Council's LEED-NC v4 & LEED NC v4.1 (where indicated) rating system.
- B. Related Sections:
 - 1. Section 013300 - SUBMITTAL PROCEDURES
 - 2. Section 017419 - CONSTRUCTION WASTE MANAGEMENT
 - 3. Section 015 100 – CONSTRUCTION INDOOR AIR QUALITY
 - 4. Section 019119 – GENERAL COMMISSIONING REQUIREMENTS
 - 5. Section 312500 – SEDIMENTATION AND EROSION CONTROL
 - 6. Section 017823 – OPERATION AND MAINTENANCE DATA
 - 7. Divisions 03 through 12, 31, and 32 Sections: Specific requirements for materials in those Sections.

1.2 DEFINITIONS

- A. United States Green Building Council (USGBC): A non-profit group of leaders from every sector of the building industry working to promote buildings that are environmentally responsible, profitable and healthy places to live and work. The USGBC is administrator of the LEED Green Building Rating Systems.
- B. Leadership in Energy & Environmental Design (LEED): A green building rating system that provides independent third party verification of a project's sustainability.
- C. Indoor Air Quality (IAQ) Management Plan: Plan developed by the contractor to provide a healthy and safe indoor environment for workers during construction as well as the building's current and eventual occupants. The IAQ Management Plan must meet or exceed the recommendations of the Sheet Metal and Air Conditioning National Contractors Association (SMACNA) IAQ Guidelines for Occupied Buildings under Construction, 2nd edition, 2007, ANSI/SMACNA 008–2008, Chapter 3.
- D. Material Cost: The dollar value of materials being provided to the site, after any contractor mark-ups, inclusive of all transportation and tax fees but excluding equipment and labor costs.
- E. Environmental Product Declaration (EPD): An independently verified report based on life-cycle assessment studies that have been conducted according to a set of common rules for each product category and then peer-reviewed.
- F. Cradle to Gate Assessment: Analysis of a product's partial life cycle, from resource extraction (cradle) to the factory gate (before it is transported for distribution and sale). It omits the use and the disposal phases of the product.
- G. Cradle to Grave: Analysis of a product's full life cycle, from resource extraction (cradle) to the disposal phase (grave).

- H. Life Cycle Assessment: An evaluation of the environmental effects of a product from cradle to grave, as defined by ISO 14040-2006 and ISO 14044-2006.
- I. Third-party Verified Corporate Sustainability Reports (CSR): A report that outlines the environmental impacts of extraction operations and activities associated with the manufacturer's product and the product's supply chain. Corporate sustainability reports must be in line with one of the following: Global Reporting Initiative (GRI) Sustainability Report, Organization for Economic Co-operation and Development (OECD) Guidelines for Multinational Enterprises, U.N. Global Compact, and ISO 26000.
- J. Extended Producer Responsibility (EPR): Products whose manufacturer has established measures to reclaim its products at the end of their useful life and to recycle them into the same product.
- K. Product Category Rules: A set of rules, requirements, and guidelines for developing Environmental Product Declarations.
- L. Program Operator: An organization that ensures EPDs meet the product category rules (PCRs) for the associated product category. The program operator doesn't do the actual life-cycle assessments. UL Environment is the leading program operator in the United States.
- M. Product-Specific Environmental Product Declaration (EPD): A product with a publicly available, critically reviewed life-cycle assessment conforming to ISO 104044 that has at least a cradle to gate scope.
- N. Product-Specific Type III Environmental Product Declaration (EPD): A product with a with third-party certification, including external verification, in which the manufacturer is explicated recognized by the program operator. The product specific Environmental Product Declaration shall conform to ISO 14025, ISO 14040, ISO 14044, and EN 15804 or ISO 21930 and have at least a cradle to gate scope.
- O. Industry-wide Environmental Product Declaration (EPD): A product with a with third-party certification, including external verification, in which the manufacturer is explicated recognized by the program operator. The industry-wide Environmental Product Declaration shall conform to ISO 14025, ISO 14040, ISO 14044, and EN 15804 or ISO 21930 and have at least a cradle to gate scope. Also referred to as a "generic" Environmental Product Declaration.
- P. Bio-based Materials: A product that meets the Sustainable Agriculture Network's Sustainable Agriculture Standard. Bio-based raw materials shall be tested using ASTM Test Method D6866 and be legally harvested, as defined by the exporting and receiving country.
- Q. Composite Wood and Agrifiber: Products such as particleboard, medium density fiberboard (MDF), plywood, wheatboard, strawboard, panel substrates, and door cores that are a composite of wood and/or plant material pressed and adhered together.
- R. Chain of Custody (COC): Certificates signed by manufacturers certifying that wood used to make products was obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship." Certificates shall include evidence that manufacturer and supplier are certified for chain of custody by an FSC-accredited certification body.
- S. Recycled Content: The percentage by weight of a material's constituents that have been recovered or otherwise diverted from the solid waste stream, either during the manufacturing process (pre-consumer), or after consumer use (post-consumer).
 - a. Spills and scraps from the original manufacturing process that are combined with other constituents after a minimal amount of reprocessing for use in further production of the same product are not recycled materials.
 - b. Discarded materials from one manufacturing process that are used as constituents in another manufacturing process are pre-consumer or post industrial recycled materials.

- c. Recycled content of materials shall be defined in accordance with the International Organization for Standardization document, ISO 14021-1999 – Environmental labels and declarations – self declared environmental claims (Type II environmental labeling). www.iso.org
- T. Pre-consumer Recycled Content: Matter diverted from the waste stream during the manufacturing process, determine as the percentage of material, by weight.
- U. Post-consumer Recycled Content: Waste generated by households or commercial, industrial, and institutional facilities in their role as end users of a product that can no longer be used for its intended purpose.
- V. Regionally Extracted, Processed and Manufactured Materials: Materials that are extracted, harvested, or recovered; processed; and manufactured within a radius of 100 miles (160 km) from the Project location. Manufacturing refers to the final assembly of components into the building product that is installed at the Project site.
- W. Health Product Declaration: A standard format for reporting product content and associated health information for building products and materials.
- X. GreenScreen® for Safer Chemicals: A method for comparative chemical hazard assessment and their potential effect on human health and the environment.
- Y. Volatile Organic Compound (VOC): Carbon compounds considered indoor air contaminants that are odorous, irritating, and/or harmful to the comfort and wellbeing of installers and occupants.
- Z. Wet Products: Materials and products installed in wet form, including paints, sealants, adhesives, and special coatings.

1.3 PROJECT GOALS

- A. The proposed project is designed to be sustainable, with the intent of incorporating the following qualities:
 - 1. The project will minimize its effect on the environment by selecting environmentally friendly building materials and utilizing sustainable construction practices.
 - 2. The project will provide a healthy and comfortable space for its occupants by developing and following an Indoor Air Quality Management Plan during construction, by selecting only non-toxic and low-emitting materials, and by designing the building's systems to provide tenants with exceptional indoor air quality.
 - 3. The finished project will consume significantly less energy and water than a typical code-compliant building through the use of premium efficiency equipment and designing efficient building systems.
- B. The proposed project is targeting a minimum LEED Silver from the US Green Building Council's (USGBC) Leadership in Energy and Environmental Design Building Design and Construction (LEED-BD+C) version 4.0 and version 4.1 (where indicated) Green Building Rating System. The following are expected of all contractors and sub-contractors:
 - 1. Comply with LEED-NC version 4.0 and 4.1 (where indicated) requirements for those credits being targeted.
 - 2. Refer to LEED Scorecard that follows this Section.
 - 3. Refer to individual Specification Sections for additional requirements.

1.4 MEETINGS

- A. Prime Contractor shall conduct LEED Certification meetings at 25%, 50% and 100% construction completion, in addition to those meetings outlined in Section 013100 Project Management and Coordination.
 - 1. The meetings shall include, at a minimum:
 - a. Prime Contractor's Project Manager
 - b. Owner's Representative
 - c. Prime Contractor's LEED Representative
 - d. All other attendees designated by Owner's Representative
 - e. Sub-Contractor Representatives as appropriate to stage of work
 - 2. At a minimum, LEED certification goals and issues shall be discussed at the following meetings:
 - a. Preconstruction Meetings
 - b. Progress Meetings
 - c. Subcontractor Meetings
 - d. LEED Certification Meetings (outlined above). Meeting should be scheduled as a part of regularly scheduled job meetings on site.

1.5 SUBMITTAL REQUIREMENTS

- A. Coordination of Submittals: Coordinate LEED submittals with general submittal requirements as indicated in Section 013300 – SUBMITTAL PROCEDURES.
- B. LEED Action Plans: Provide preliminary hard copy submittals within 14 days of date established for commencement of the Work indicating how the following requirements will be met.
 - 1. Materials & Resources Prerequisite and Credit: Construction and Demolition Waste Management complying with Division 01 Section "Construction Waste Management."
 - 2. Materials & Resources Credit: Building product disclosure and optimization – sourcing of raw materials: list of proposed materials with recycled content, proposed regionally extracted, processed and manufactured materials, and proposed FSC-certified wood products
 - 3. Indoor Environmental Quality Credit: Construction Indoor Air Quality Management Plan: submit a draft copy of the plan for review, complying with Section 015100 – Construction Indoor Air Quality
- C. Contractor is responsible for completion and transmittal of ALL construction-related tracking required for LEED certification including:
 - 1. LEED Submittal Coversheets: All project submittals must be accompanied by a completed LEED coversheet. Submittal packages must also include documentation in support of the sustainability claims made on the LEED coversheet, including:
 - 2. Cost of each material or product, excluding labor and equipment
 - 3. From manufacturer, for each product's environmental attributes. The team's sustainability consultant will be responsible for obtaining a report describing raw materials suppliers, complete content inventory for the product, and/or environmental product declaration.
 - 4. Highlight compliance with all requirements for low-emitting materials as noted in Section 2 (Products)
 - 5. Providing and following an Erosion and Sedimentation Control Plan. See Section 312500 – Erosion and Sedimentation Control Plan.
 - 6. Providing and following a Construction Waste Management Plan and ongoing documentation of construction and demolition waste recycling / salvage rates for all categories of waste. See Section 017419 - Construction Waste Management.

7. During construction, meet or exceed all applicable recommended control measures of the Sheet Metal and Air Conditioning National Contractors Association (SMACNA) IAQ Guidelines for Occupied Buildings under Construction, 2nd edition, 2007, ANSI/SMACNA 008–2008, Chapter See Section 015100 – Construction Indoor Air Quality
8. Providing monthly tracking and progress updates on the following credits. The sustainability consultant will be responsible for final documentation for submission to the Green Business Certification Inc (GBCI).
 1. Materials & Resources Prerequisite and Credit: Construction and Demolition Waste Management
 2. Materials & Resources Credit: Building Product Disclosure and Optimization – Sourcing of Raw Materials
 3. Indoor Environmental Quality Credit: Low Emitting Interiors
 4. Indoor Environmental Quality Credit: Construction IAQ Management Plan
 5. Indoor Environmental Quality Credit: Indoor Air Quality Assessment
9. Contractor to maintain Materials Credit Tracking Sheet monitoring the project's progress towards targeted LEED Materials and Resources Credits. Tracking Sheet to be presented at construction meetings.
10. Contractor to maintain a Low Emitting Materials Tracking Sheet monitoring the project's progress towards targeted LEED Indoor Environmental Quality Credits. Tracking Sheet to be presented at construction meetings.
11. Contractor to package each submittal individually using a LEED Transmittal Cover Sheet verifying that submittals comply with LEED Requirements and that appropriate documentation is included. See sample provided.
12. Project Materials Cost Data: Provide itemized and total cost for ALL building materials under Divisions 2-10, 12, 31, and 32 used for Project, excluding labor and equipment.
13. Contractor to provide Commissioning Authority with a copy of approved submittals for all equipment to be commissioned as well as documentation requested by the Commissioning Authority which is necessary for the commissioning process. This may include: detailed manufacturer installation and start-up, operating, troubleshooting and maintenance procedures, full details of any owner-contracted tests, fan and pump curves, full factory testing reports, if any, and full warranty information including all responsibilities of the Owner to keep the warranty in force clearly identified. The actual field checkout sheet forms to be used by the factory or field technicians shall be provided to the Commissioning Authority.

1.6 SPECIAL PRODUCTS AND SUBSTITUTION PROCEDURES

- A. In addition to the requirements of Section 012500 – Substitution Procedures, the special substitution requirements described here apply only to the LEED certification related materials and requirements and environmental products and procedures identified in this Section.
- B. Notify Owner and Architect when contractor wishes to substitute materials, equipment, or products that meet the aesthetic and programmatic intent of the Construction Documents and offer equivalent or increased environmental sensitivity to materials, equipment, or products specified to meet LEED requirements as indicated in the Construction Documents.
- C. Substitutions that may affect LEED certification must be clearly stated as such.
- D. Comply with the requirements of Section 012500 – Substitution Procedures, except as follows:

1. Prior to submitting detailed information required under Section 012500 – Substitution Procedures, submit the following for initial review by the architect.
 - a. Product data including manufacturer's names, address, and phone number.
 - b. Include copy of Material Safety Data Sheet (MSDS) if applicable.
 - c. Description of the differences of the proposed substitution from specified product related to LEED requirements. Include description of environmental advantages of proposed substitution over specified product.
 - d. The contractor is responsible for re-submittal of all calculations, and documentation of products or material substitutions that affect LEED prerequisites and credits referenced in this Section, and any credits previously submitted as part of the project's LEED Design Application Submittal, and all credits included in the LEED Construction Submittal. Products that do not meet these requirements should not be submitted for substitution.
 - e. Substitutions of materials and products specified as part of the Contract documents in the following areas (but not necessarily limited to these items) will require review and potential re-submittal of LEED Design Credit Application Pre-requisites and Credits:
 - i. Irrigation System
 - ii. Rainwater Management System
 - iii. Roofing products and materials
 - iv. Plumbing fixtures and controls
 - v. Interior and Exterior Lighting systems and controls
 - vi. HVAC equipment, systems and controls
 - vii. CO₂ monitoring system
 - viii. Acoustical Performance
 - f. Substituted products shall not be ordered or installed without written acceptance by the owner.
2. Requests for Substitutions
 - a. Submit a Submit a separate request for each LEED related product substitution.
 - b. Identify product by Specification Section and LEED credit or credits, if applicable.
 - c. List similar projects using product, dates of installation, and names of Contractor and Owner.
 - d. Give itemized comparison of proposed substitution with specified product, listing variations, and reference Specification section and Article number.
 - e. Include copy of Material Safety Data Sheet (MSDS) if applicable.
 - f. Give cost data comparing proposed substitution with specified product and amount of net change to Contract Sum. The cost data should be based on life cycle analysis for each affected product including annual energy consumption and maintenance costs.
 - g. State effect of substitution on construction schedule and changes required in other work of products.

1.7 LEED DOCUMENTATION SUBMITTALS

- A. For all credits: LEED documentation submittals must be prepared and submitted using the LEED-Online Credit web based application (<https://www.usgbc.org/leedonline/>) and minimum system requirements.
- A. Once the Contractor has joined the project through LEED-Online, the LEED Project Administrator will assign the LEED credits that the contractor is responsible for completing.
 - a. NOTE: LEED Online is only accessible through Safari, Internet Explorer and Firefox at this time.
 - b. NOTE: Each "Credit Form" is an editable Adobe pdf document. It may be completed or updated at any time prior to the LEED Construction Submittal. After you have completed documenting the credit, use the 'Save' button at the lower right hand corner of the Form to save the data online.
 - c. Additional submittal documentation and back-up requirements should be uploaded to the "File Uploads" section of LEED-Online following the required documentation support for each credit.

- B. Sustainable Sites Prerequisite Construction Activity Pollution Prevention. Using the LEED Online Credit form, provide:
 - a. A narrative describing the implemented erosion and sedimentation control measures and how these were maintained
 - b. Photographic evidence of the implemented measures from various stages throughout construction.
- C. Water Efficiency Prerequisite and Credit Water Metering and Energy & Atmosphere Prerequisite and Credit Energy Metering: Product Data and wiring diagrams for sensors and data collection system used to provide continuous metering of building energy and water consumption performance over time.
- D. Materials & Resources Prerequisite and Credit: Construction and Demolition Waste Management: Comply with Division 01 Section "Construction Waste Management." Using the LEED Construction and Demolition Waste Calculator and the LEED Credit Form:
 - a. Complete the construction waste calculation tables including: General description of each type/category of waste generated; location of receiving agent (recycler/landfill) for waste; quantity of waste diverted (by category) in tons or cubic yards.
 - b. Provide a narrative describing the project's construction waste management approach including a copy of the project's construction waste management plan. Please provide any additional comments or notes to describe special circumstances or considerations regarding the project's credit approach.
 - c. Provide the Construction Waste Management Plan.
 - d. Provide the hauling/recycling tags/tickets or receipts from the project
 - e. Provide project-specific documentation of recycling rate for commingled facilities
- E. Materials & Resources Credit: Building Product Disclosure and Optimization –Environmental Product Declaration- EPDs - Environmental Product Declarations Using the LEED Building Product Disclosure and Optimization Calculator and the LEED Online Credit Form:
 - a. Provide a list of manufactures providing EPDs.
 - b. Provide a list of each separate product holding an EPD.
 - c. Provide copy of each EPD including statement type for each EPD.
- F. Materials & Resources Credit: Building Product Disclosure and Optimization – Sourcing of Raw Materials, Leadership Extraction Practices - Recycled Content Using the LEED Building Product Disclosure and Optimization Calculator and the LEED Online Credit Form:
 - a. Provide the total project materials cost per "Project Materials Cost Data" in the Submittals section above.
 - b. Provide a tabulation of each material used on the project that is being tracked for recycled content. The tabulation must include a description of the material, the manufacturer of the material, the product cost, the pre-consumer and/or post-consumer recycled content percentage, and the source of the recycled content data.
 - c. Provide a tabulation of each material used on the project that is being tracked for regional content. The tabulation must include a description of the material; the manufacturer of the material; the product cost; the percentage of the product by weight that meets both the extraction and manufacturer location criteria; distance between the project site and extraction/harvest/recovery site; and distance between the project site and final manufacturing location.
 - d. Provide Manufacturer cut sheets, literature, or letters highlighting the overall post-consumer and/or post-industrial recycled content percentages (by weight) of each listed product
 - e. Provide Manufacturer cut sheets, literature, or letters highlighting address location of each material's extraction/harvest/recovery and manufacturing / processing sites AND a map (Yahoo Maps, Google Maps or equivalent) indicating distances from each location to the project site.

- G. Materials & Resources Credit: Building Product Disclosure and Optimization – Sourcing of Raw Materials, Leadership Extraction Practices - FSC Certified Wood Products. Using the LEED Building Product Disclosure and Optimization Calculator and the LEED Online Credit Form:
- Provide total of all new, permanently installed wood-based construction materials cost per “Project Materials Cost Data” in the Submittals section above.
 - Provide a list of items (and/or components of products) claimed as FSC-certified, including product type, manufacturer, and the entity’s Chain of Custody (COC) certification number. (Each product name can then be cross-referenced with the manufacturer or vendor COC number during the LEED certification review.) Visit www.fscus.org/green_building for more information.
 - Provide official proof of FSC Chain of Custody certification of all fabricators including, but not limited to, millworkers and cabinet-makers, who modify or alter the FSC wood products before they are installed in the project.
 - Provide materials invoices (showing costs) for each listed product
- H. Materials & Resources Credit: Building Product Disclosure and Optimization – Material Ingredients- Material Ingredient Reporting- Material Ingredient Reporting Using the LEED Building Product Disclosure and Optimization Calculator and the LEED Online Credit Form:
- Provide a list of manufactures providing material ingredient reporting.
 - Provide a list of each separate product providing material ingredient reporting.
 - Provide copy of each material reporting statement including: Health Product Declaration, Cradle to Cradle Declare, ANSI/BIFMA e3 Furniture Sustainability Standard, Cradle to Cradle Material Health Certificate, or other USGBC approved program.
- I. Indoor Environmental Quality Credit low-Emitting Materials. Using the LEED Low Emitting Calculator and LEED Online Credit Form, provide the following:
- A listing of each interior applied paints and coating. Include the manufacture’s name, product name, specific VOC data (in g/L less water) for each product, and the corresponding allowable VOC from the referenced standard: California Department of Public Health (CDPH) Standard Method v1.2-2017, using the applicable exposure scenario, VOC limits of the California Air Resources Board (CARB) 2007, Suggested Control Measure (SCM) for Architectural Coatings, or the South Coast Air Quality Management District (SCAQMD) Rule 1113, effective February 5, 2016. Include cut sheets, MSDS, or other manufacturer’s data confirming compliance with the VOC limits.
 - A listing of each indoor adhesive, sealant and sealant primer product used on the project. Include the manufacture’s name, product name, specific VOC data (in g/L less water) for each product, and the corresponding allowable VOC from the referenced standard, California Department of Public Health (CDPH) Standard Method v1.2-2017, using the applicable exposure scenario, or SCAQMD Rule 1168, October 6, 2017. Include cut sheets, MSDS, or other manufacturer’s data confirming compliance with the VOC limits.
 - A listing of each composite wood and agrifiber product installed in the building interior, including those manufactured off-site, such as toilet partitions, backer board, door cores and engineered wood, including manufacture’s name and product name. Confirm that the product meets the low formaldehyde emissions that meet the EPA TSCA Title VI or California Air Resources Board ATCM for formaldehyde requirements for ultra-low-emitting formaldehyde (ULEF) resins or no added formaldehyde resins. Include cut sheets or manufacturer literature or letters indicating the bonding agents for each composite wood and agrifiber material used in the project, showing that no added urea-formaldehyde resins were used in these products or meets ULEF criteria.
 - A listing of each structural composite wood installed in the building interior, such as plywood, oriented-strand board, structural composite lumber, glued laminated timber, i-joists, cross-laminated timber, and finger-jointed lumber, including manufacture’s name and product name. Confirm that the product meets. Confirm that wood products are made with moisture resistant adhesives meeting ASTM 2559, have no surface treatments with added urea-formaldehyde resins or coatings, and are certified according to the applicable industry standard. Include cut sheets or manufacturer literature or letters indicating the bonding agents for each composite wood and agrifiber material used in the project, showing compliance with the applicable industry standard:

- i. Plywood: compliant in accordance with Voluntary Product Standard - Structural Plywood (PS 1-09), Voluntary Product Standard – Performance Standard for Wood-Based Structural-Use Panels (PS 2-10), or one of the standards considered by CARB to be equivalent to PS 1 or PS 2: (AS/NZS 2269, EN 636 3S (including CE label), Canadian
 - ii. Standards Association CSA O121 for Douglas fir plywood, CSA O151 for Canadian softwood plywood, for CSA O153 Poplar plywood, or CSAO325 for Construction sheathing)
 - iii. Oriented strand board: specified with the Exposure 1 or Exterior bond classification in accordance with Voluntary Product Standard – Performance Standard for Wood-Based Structural-Use Panels (PS 2-10)
 - iv. Structural composite lumber: compliant in accordance with Standard Specification for Evaluation of Structural Composite Lumber Products (ASTM D 5456-13)
 - v. Glued laminated timber: compliant in accordance with Structural Glued Laminated Timber (ANSI A190.1-2012)
 - vi. I-joists compliant in accordance with Standard Specification for Establishing and Monitoring Structural Capacities of Prefabricated Wood I-Joists (ASTM D 5055-13)
 - vii. Cross-laminated timber: compliant in accordance with Standard for Performance-Rated Cross-Laminated Timber (PRG 320-15)
 - viii. Finger-jointed lumber labeled “Heat Resistant Adhesive (HRA)” in accordance with the American Softwood Lumber Standard (DOC PS-20 2015)
 - e. A listing of flooring installed in the project. Include manufacturer’s documentation confirming that the product has been tested and determined compliant in accordance with California Department of Public Health (CDPH) Standard Method v1.2-2017, using the applicable exposure scenario.
 - f. A listing of ceiling products, including ceiling panels, ceiling tile, surface ceiling structures such as gypsum or plaster, suspended systems, and glazed skylights, installed in the project. Include manufacturer’s documentation confirming that the product has been tested and determined compliant in accordance with California Department of Public Health (CDPH) Standard Method v1.2-2017, using the applicable exposure scenario.
 - g. A listing of insulation, including thermal and acoustic boards, batts, rolls, blankets, sound attention fire blankets, foamed-in place, loose-fill, blown, and sprayed insulation, installed in the project. Include manufacturer’s documentation confirming that the product has been tested and determined compliant in accordance with California Department of Public Health (CDPH) Standard Method v1.2-2017, using the applicable exposure scenario.
- J. Indoor Environmental Quality Credit Construction IAQ Management Plan. Provide the following:
- a. A copy of the project’s Indoor Air Quality Management Plan, highlighting the no-smoking policy
 - b. Confirm if the permanently installed air handling equipment was used during construction.
 - c. Six photographs at each of three different times during the construction period to highlight the implemented construction IAQ practices.
 - d. List all filtration media (manufacturer, model number, MERV rating, location of installed filter) installed during construction and confirm that each unit was replaced prior to occupancy.
 - e. A narrative describing protection measures for absorbent materials
- K. Indoor Air Quality Assessment: Provide the following:
- a. A Flush-out Report documenting the required volume and duration of the flush-out and describing the project’s specific flush-out procedures, with product data for filtration media used during flush-out and during occupancy.

OR

- b. A copy of the Air Testing Report documenting the procedures for air testing, the locations, dates and results of each test.

PART 2 PRODUCTS

2.1 SUSTAINABLE MATERIALS

- A. Environmental Product Declarations: Provide at least 20 (after weighting) separate permanently installed products from at least five different manufacturers that met one of the criteria below.
- a. Products with a publicly available, critically reviewed life-cycle assessment conforming to ISO 14044 that have at least a cradle to gate scope are valued as one whole product for the purposes of credit achievement calculation.
 - b. Product-specific Type III EPD -- Internally Reviewed. Products with an internally critically reviewed LCA in accordance with ISO 14071. Products with product-specific internal EPDs which conform to ISO 14025, and EN 15804 or ISO 21930 and have at least a cradle to gate scope are valued as one whole product for the purposes of credit achievement calculation.
 - c. Industry-wide Type III EPD -- Products with third-party certification (Type III), including external verification, in which the manufacturer is explicitly recognized as a participant by the program operator. Products with industry-wide EPDs, which conform to ISO 14025, and EN 15804 or ISO 21930 and have at least a cradle to gate scope are valued as one whole product for purposes of credit achievement calculation.
 - d. Environmental Product Declarations which conform to ISO 14025 and EN 15804 or ISO 21930 and have at least a cradle to gate scope.
 - i. Product-specific Type III EPD -- Products with third-party certification (Type III), including external verification and external critical review in which the manufacturer is explicitly recognized as the participant by the program operator are valued as 1.5 products for the purposes of credit achievement calculation.
- B. Environmental Product Declarations - Multi-Attribute Optimization: Use products that comply with one of the criteria below for 10%, by cost, of the total value of permanently installed products in the project, or use at least 10 permanently installed products sourced from at least three different manufacturers. Products will be valued as below.
- a. Life Cycle Impact Reduction Action Plan (value at 50% by cost or ½ product)
 - i. The manufacturer has produced a product specific LCA using EN 15804 or ISO 21930 for the product and has provided a publicly available action plan to mitigate or reduce life cycle impacts. The action plan must be product-specific using the specified PCR functional unit, be critically reviewed, and must include the following information:
 1. Description of the LCA conducted including the dataset, software or platform used by manufacturer to complete the analysis.
 2. Identification of the largest life cycle impact areas identified in the analysis and a narrative description of the impact areas targeted for reduction in the action plan.
 3. Description of specific steps anticipated in implementation of the action plan. Include proposed changes in formulation or manufacturing processes that are planned as part of impact reduction strategy.
 4. Specific dates and a full timeline for completion of all the steps described in the action plan.
 - b. Life Cycle Impact Reductions in Embodied Carbon.
 - i. Products that have demonstrated environmental impact reductions for the specified functional unit based on a current third-party EPD or verified LCA that conforms to the comparability requirements of ISO 14025 and ISO 21930.
 1. The comparative analysis must show impact reduction in the global warming potential (GWP) impact category and must include a narrative describing how reductions in impacts were achieved. The published comparisons must be third-party verified (value at 100% by cost or 1 product).
 2. The comparative analysis must show impact reduction(s) of at least 10% in the global warming potential (GWP) impact category and must include a narrative describing how the impact reductions were achieved. The published comparisons must be third-party verified (value at 150% by cost or 1.5 products).

3. The comparative analysis must show impact reduction(s) of at least 20% in the global warming potential (GWP) impact category, and demonstrate at least 5% reduction in two additional impact categories. A narrative describing how the impact reductions were achieved is required. The published comparisons must be third-party verified (value at 200% by cost or 2 products).
- c.
- C. Leadership extraction practices: Provide products which meet at least one of the responsible extraction criteria below for at least 20%, by cost, of the total value of permanently installed building products in the project. Products sourced (extracted, harvested, manufactured, and purchased) within 100 miles (160 km) of the project site are valued at 200% of their cost.
- a. Bio-based materials. Bio-based products shall meet the Sustainable Agriculture Network's Sustainable Agriculture Standard. Bio-based raw materials shall be tested using ASTM Test Method D6866 and be legally harvested, as defined by the exporting and receiving country. Exclude hide products, such as leather and other animal skin material.
 - b. New wood products. Wood products shall be certified by the Forest Stewardship Council or USGBC-approved equivalent.
 - c. Materials reuse. Reuse includes salvaged, refurbished, or reused products.
 - d. Recycled content. Recycled content is the sum of postconsumer recycled content plus one-half the pre-consumer recycled content, based on cost.
 - e. Extended producer responsibility (ie Cradle to Cradle Certified Products) Products purchased from a manufacturer (producer) that participates in an extended producer responsibility program or is directly responsible for extended producer responsibility. Products meeting extended producer responsibility criteria are valued at 50% of their cost for the purposes of credit achievement calculation.
- D. Health Product Declarations: Provide at least 20 (after weighting) separate permanently installed products from at least five different manufacturers that met one of the criteria below and demonstrate the chemical inventory of the product to at least 0.1% (1000 ppm).
- a. Manufacturer Inventory. The manufacturer has published complete content inventory for the product following these guidelines:
 - i. A publicly available inventory of all ingredients identified by name and Chemical Abstract Service Registration Number (CASRN) and/or European Community Number (EC Number).
 - ii. Materials defined as trade secret or intellectual property may withhold the name and/or CASRN/EC Number but must disclose ingredient/chemical role, amount and hazard score/class using either:
 1. Greenscreen List Translator (LT) score and/or Full GreenScreen Benchmark (BM)
 2. The Globally Harmonized System of Classification and Labeling of Chemicals rev.6 (2015) (GHS)
 - a. The hazard screen must be applied to each trade secret ingredient and the inventory lists the hazard category for each of the health hazards included in Part 3 of GHS (e.g. "GHS Category 2 Carcinogen").
 - b. Health Product Declaration. The end use product has a published and complete Health Product Declaration with full disclosure of known hazards in compliance with the Health Product Declaration open Standard.
 - c. Cradle to Cradle. Product has Material Health Certificate or is Cradle to Cradle Certified™ under standard version 3 or later with a Material Health achievement level at the Bronze level or higher.
 - d. Declare. The Declare product label meet the following requirements:

- i. Declare labels designated as Red List Free or Declared.
 - ii. Declare labels designated as LBC Compliant that demonstrate content inventory to 0.1% (1000 ppm).
 - e. ANSI/BIFMA e3 Furniture Sustainability Standard. The documentation from the assessor or scorecard from BIFMA must demonstrate the product earned at least 3 points under 7.5.1.3 Advanced Level in e3-2014 or 3 points under 7.4.1.3 Advanced Level in e3-2012.
 - f. USGBC approved program. Other USGBC approved programs meeting the material ingredient reporting criteria.
 - E. Health Product Declaration - Material Ingredient Optimization: Use permanently installed products from at least three different manufacturers that document their material ingredient optimization using the paths below. Choose either 10 compliant products, or select products that constitute at least 10%, by cost, of the total value of permanently installed products in the project.
 - a. Material Ingredient Screening and Optimization Action Plan (value at 50% by cost or ½ product)
 - i. The manufacturer has screened the product to at least 1,000 ppm and has provided a publicly available inventory meeting the requirements of Option 1 and completed a detailed action plan to mitigate or reduce known hazards using the principles of green chemistry. The action plan must be product-specific (not company, manufacturer or brand), and must include the following information:
 - 1. Description of the screening or assessment platform used by manufacturer to complete the material ingredient screening and analysis.
 - 2. Identification of the specific green chemistry principles targeted for implementation in the action plan.
 - 3. Description of specific steps anticipated in implementation of the action plan. Include proposed changes in formulation or manufacturing processes that are planned as part of green chemistry optimization strategy.
 - 4. Specific dates and a full timeline for completion of all the steps described in the action plan.
 - b. Advanced Inventory & Assessment (value at 100% by cost or 1 product):
 - i. The end use product meets the requirements of any of the following:
 - 1. Manufacturer Inventory or Health Product Declaration: The product has demonstrated a chemical inventory to at least 0.01% by weight (100 ppm) with no GreenScreen LT-1 hazards or GHS Category 1 hazards. The HPD or Manufacturer Inventory must be third party verified.
 - 2. Manufacturer Inventory or HPD: The product has demonstrated a chemical inventory to at least 0.01% by weight (100ppm) and at least 75% by weight of product is assessed using GreenScreen Benchmark assessment. The remaining 25% by weight of product has been inventoried. The GreenScreen assessment must be publicly available. The HPD or Manufacturer Inventory must be third-party verified.
 - 3. Declare labels designated as Red List Free that are third-party verified.
 - 4. Cradle to Cradle. Product has Material Health Certificate or is Cradle to Cradle Certified™ under standard version 3 or later with a Material Health achievement level at the Bronze level or higher.
 - c. Material Ingredient Optimization (value at 150% by cost or 1.5 products)
 - i. The end use product has demonstrated a product inventory and assessment of ingredients using any of the following programs:
 - ii. Manufacturer Inventory or HPD: The product has demonstrated a chemical inventory to at least 0.01% by weight (100ppm) and at least 95% by weight of product is assessed using GreenScreen Benchmark assessment. No Benchmark 1 hazards (BM-1) are present in the end use product. The remaining 5% by weight of product not assessed has been inventoried and screened using GreenScreen List Translator and no GreenScreen LT-1 hazards are present in the end use product. The documents must be third party verified.
 - iii. Cradle to Cradle. Product has Material Health Certificate or is Cradle to Cradle Certified™ under standard version 3 or later with a Material Health achievement level at the Silver level or higher.

- d. USGBC approved program.
 - i. Products that comply with USGBC approved building product optimization criteria for material ingredient optimization and/or advanced inventory & assessment pathways.
 - ii. For credit achievement calculation, products sourced (extracted, manufactured, purchased) within 100 miles (160 km) of the project site are valued at twice their base contributing cost (or number of products), up to a maximum of 200% of cost, or 2 products.

2.2 LOW-EMITTING MATERIALS

Building products shall be in accordance with California Department of Public Health (CDPH) Standard Method v1.2–2017, and comply with the VOC limits in Table 4-1 of the method. Additionally, the range of total VOCs after 14 days (336 hours) was measured as specified in the CDPH Standard Method v1.2 and is reported (TVOC ranges: 0.5 mg/m³ or less, between 0.5 and 5 mg/m³, or 5 mg/m³ or more). Laboratories that conduct the tests must be accredited under ISO/IEC 17025 for the test methods they use. Products used in school classrooms must be evaluated using the classroom scenario, products used in other spaces must be evaluated using the default private office scenario

- A. All paints and coatings wet-applied on site shall meet the applicable VOC limits of the California Air Resources Board (CARB) 2007, Suggested Control Measure (SCM) for Architectural Coatings, or the South Coast Air Quality Management District (SCAQMD) Rule 1113, effective February 5, 2016.
 - i. Interior Flat Coating or Primer – 50 g/L
 - ii. Interior Non-Flat Coating or Primer – 50 g/L
 - iii. Anti-corrosive/Anti-rust coating – 100 g/L
 - iv. Primers/Sealers/ and Undercoaters – 100 g/L
 - v. Clear Wood Finish: Lacquer- 275 g/L
 - vi. Clear Wood Finish: Sanding Sealer -275 g/L
 - vii. Clear Wood Finish: Varnish – 275 g/L
 - viii. Clear Wood Finish: Brushing Lacquer- 275 g/L
 - ix. Floor Coatings – 50 g/L
 - x. Fire Protective Coatings – 150 g/L
 - xi. Sealers and Undercoaters – 100 g/L
 - xii. Shellac: Clear – 730 g/L
 - xiii. Shellac: Pigmented – 550 g/L
 - xiv. Stain: 100 g/L
 - xv. Concrete Curing Compounds: 100 g/L
 - xvi. Japans/Faux Finishing Coatings: 350 g/L
 - xvii. Magnesite Cement Coatings: 450 g/L
 - xviii. Waterproofing Sealers – 100 g/L
 - xix. Waterproofing Concrete/Masonry Sealers – 100 g/L
 - xx. Wood Preservatives – 350 g/L
 - xxi. Low-Solids Coatings – 120 g/L
 - xxii. Colorant – Architectural coatings – 50 g/L

- B. All adhesives and sealants wet-applied on site shall meet the applicable chemical content requirements of SCAQMD Rule 1168, October 6, 2017, Adhesive and Sealant Applications, as analyzed by the methods specified in Rule 1168. The provisions of SCAQMD Rule 1168 do not apply to adhesives and sealants subject to state or federal consumer product VOC regulations.
 - i. Indoor Carpet Adhesives - 50 g/L
 - ii. Carpet Pad Adhesives - 50 g/L
 - iii. Wood Flooring Adhesive – 100 g/L
 - iv. Rubber Floor Adhesives - 60 g/L
 - v. Sub floor Adhesives - 50 g/L

- vi. Ceramic Tile Adhesives - 65 g/L
- vii. VCT and Asphalt Tile Adhesives - 50 g/L
- viii. Dry Wall and Panel Adhesives - 50 g/L
- ix. Cove Base Adhesives - 50 g/L
- x. Multipurpose Construction Adhesives - 70 g/L
- xi. Structural Glazing Adhesives - 100 g/L
- xii. PVC Welding - 510 g/L
- xiii. CPVC Welding - 490 g/L
- xiv. ABS Welding – 325 g/L
- xv. Plastic Cement Welding - 250 g/L
- xvi. Adhesive Primer for Plastic - 550 g/L
- xvii. Contact Adhesive - 80 g/L
- xxiii. Special Purpose Contact Adhesive - 250 g/L
- xix. Structural Wood Member Adhesive - 140 g/L
- xx. Top and Trim Adhesive - 250 g/L
- xxi. Metal to Metal - 30 g/L
- xxii. Plastic Foams substrate specific - 50 g/L
- xxiii. Porous Material (except wood) substrate specific - 50 g/L
- xxiv. Wood substrate specific - 30 g/L
- xxv. Fiberglass substrate specific - 80 g/L
- xxvi. Architectural Sealant - 250 g/L
- xxvii. Roadway Sealant - 250 g/L
- xxviii. Other Sealant - 420 g/L
- xxix. Architectural, Non-Porous – Sealant Primer – 250 g/L
- xxx. Architectural, Non-Porous– Sealant Primer – 775 g/L
- xxxi. Other– Sealant Primer 750 g/L

- C. If the applicable regulation requires subtraction of exempt compounds, any content of intentionally added exempt compounds larger than 1% weight by mass (total exempt compounds) shall be disclosed.
- D. Methylene chloride and perchloroethylene shall not be intentionally added in paints, coatings, adhesives, or sealants.
- E. Composite Wood Evaluation. Product meets one of the following:
 - a. EPA TSCA Title VI or California Air Resources Board (CARB) ATCM for formaldehyde requirements for ultra-low-emitting formaldehyde (ULEF) resins or
 - b. EPA TSCA Title VI or CARB ATCM formaldehyde requirements for no added formaldehyde resins (NAF).
 - c. Tested per EN 717-1:2014 for formaldehyde emissions and complies with emissions class E1.
 - d. Structural composite wood product made with moisture resistant adhesives meeting ASTM 2559, no surface treatments with added urea-formaldehyde resins or coatings, and certified according to one of the following industry standards:
 - i. Plywood: compliant in accordance with Voluntary Product Standard - Structural Plywood (PS 1-09), Voluntary Product Standard – Performance Standard for Wood-Based Structural-Use Panels (PS 2-10), or one of the standards considered by CARB to be equivalent to PS 1 or PS 2: (AS/NZS 2269, EN 636 3S (including CE label), Canadian
 - ii. Standards Association CSA O121 for Douglas fir plywood, CSA O151 for Canadian softwood plywood, for CSA O153 Poplar plywood, or CSAO325 for Construction sheathing)
 - iii. Oriented strand board: specified with the Exposure 1 or Exterior bond classification in accordance with Voluntary Product Standard – Performance Standard for Wood-Based Structural-Use Panels (PS 2-10)
 - iv. Structural composite lumber: compliant in accordance with Standard Specification for Evaluation of Structural Composite Lumber Products (ASTM D 5456-13) or Glued laminated timber: compliant in accordance with Structural Glued Laminated Timber (ANSI A190.1-2012)

- v. -joists compliant in accordance with Standard Specification for Establishing and Monitoring Structural Capacities of Prefabricated Wood I-Joists (ASTM D 5055-13)
- vi. Cross-laminated timber: compliant in accordance with Standard for Performance-Rated Cross-Laminated Timber (PRG 320-15)
- vii. Finger-jointed lumber labeled "Heat Resistant Adhesive (HRA)" in accordance with the American Softwood Lumber Standard (DOC PS-20 2015)

2.3 INDOOR AIR QUALITY

- A. Air filters treating outdoor air installed in the air handling unit shall have a MERV rating of 13 or higher.

2.4 WATER EFFICIENCY

- A. Install only EPA WaterSense Labeled water closets, showerheads, and urinals. Refer to Section 220000 - Plumbing.
 - B. Install only ENERGY STAR clothes washers, dishwashers, and ice machines.
- No equipment or appliances that reject heat may use once through cooling with potable water.

PART 3 EXECUTION

3.1 CONSTRUCTION ACTIVITY POLLUTION PREVENTION

- A. SS prerequisite: Comply with Division 31 Section "Erosion and Sedimentation Control Plan"

3.2 CONSTRUCTION WASTE MANAGEMENT

- A. MR prerequisite and MR credit: Comply with Division 1 Section "Construction Waste Management." Divert at least 75% of construction and demolition waste from landfill from at least 4 material streams.

3.3 INDOOR AIR QUALITY CONSTRUCTION MANAGEMENT PLAN – DURING CONSTRUCTION

- A. LEED IEQ credit Construction IAQ Management Plan: Comply with Division 1 Section "Indoor Air Quality Management"
- B. During construction Trade Contractor shall meet or exceed the minimum requirements of the SMACNA IAQ Guideline for Occupied Buildings under Construction, 2nd Edition, 2007, ANSI/SMACNA 008-2008 (Chapter 3).
- C. Temporary Construction Ventilation: Prime Trade Contractor shall Maintain sufficient temporary ventilation of areas where materials are being used that emit VOC's, and maintain ventilation continuously during installation, and until emissions dissipate after installation. If continuous ventilation is not possible via the building's HVAC system(s) then ventilation shall be supplied via open windows and temporary fans, sufficient to provide no less than three air changes per hour. Prime Trade Contractor shall ensure that:
 - a. The period after installation shall be sufficient to dissipate odors and elevated concentrations of VOCs. Where no specific period is stated in these Specifications, a time period of 72 hours shall be used.
 - b. All areas shall be vented directly to outside. Areas shall not be vented to other enclosed areas.
- D. During dust producing activities (e.g. drywall installation and finishing) ventilation system shall be off, and openings in supply and return HVAC system shall be protected from dust infiltration. Provide temporary ventilation as required.
- E. Preconditioning: Prior to installation, Prime Trade Contractor shall allow products which have odors and VOC emissions to off-gas in dry, well-ventilated space outside of building for 14 calendar days, in order to allow for reasonable dissipation of odors and emissions.

- F. Prime Trade Contractor shall complete all interior finish material installation prior to Substantial Completion to allow time for building flush out as described below. Submit notification to Owner's Representative when all interior finish material installation is complete, highlighting the date of completion.

3.4 INDOOR AIR QUALITY CONSTRUCTION MANAGEMENT PLAN – POST CONSTRUCTION

- A. Building Flush Out: Select one of the following two options (prior to occupancy or during occupancy), to be implemented after construction ends and the building been completely cleaned. All interior finishes, such as millwork, doors, paint, carpet, acoustic tiles, and movable furnishing, must be installed, and major VOC punch list items must be finished.
- a. Prior to Building Occupancy: Prime Trade Contractor shall install new filtration media and perform a building flush-out by supplying a total air volume of 14,000 cubic feet of outdoor air per square foot of gross floor area while maintaining an internal temperature of at least 60°F (15°C) and no higher than 80°F (27°C) and relative humidity no higher than 60%. The duration of the flush-out must be calculated as follows:
$$\text{Cubic feet of outdoor air needed prior to occupancy} = \text{Area (ft}^2\text{)} \times 14,000 \text{ cfm}$$
$$\text{Duration (Days)} = \text{Cubic Feet needed}/(\text{air handler capacity}/1440 \text{ minutes/day})$$
 - i. Replace all outside air filtration media prior to occupancy. Filtration media shall have a MERV of 13 as determined by ASHRAE 52.2.
 - b. During Occupancy: if occupancy is desired before the flush-out is completed, the space may be occupied only after delivery of a minimum of 3,500 cubic feet of outdoor air per square foot of gross floor area while maintaining an internal temperature of at least 60°F (15°C) and no higher than 80°F (27°C) and relative humidity no higher than 60%.
Once the space is occupied, it must be ventilated at a minimum rate of 0.30 cubic foot per minute (CFM) per square foot of outdoor air or the design minimum outdoor air rate determined by the ASHRAE 62.1-2010 calculations determined in IEQ Prerequisite Minimum indoor Air Quality performance, whichever is greater. During each day of the flush-out period, ventilation must begin at least three hours before occupancy and continue during occupancy. These conditions must be maintained until a total of 14,000 cubic feet per square foot of outdoor air has been delivered to the space. The duration of the flush-out must be calculated as follows:
$$\text{Cubic feet of outdoor air needed prior to occupancy} = \text{Area (ft}^2\text{)} \times 3,500 \text{ cfm}$$
$$\text{Cubic feet of outdoor air needed during occupancy} = \text{Area (ft}^2\text{)} \times 10,500 \text{ cfm}$$
$$\text{Duration (Days)} = (\text{Area (ft}^2\text{)} \times 14,000 \text{ cfm})/(\text{air handler capacity}/1440 \text{ minutes/day})$$
- B. IAQ Testing: After construction ends and before occupancy, but under ventilation conditions typical for occupancy, conduct IAQ testing using protocols consistent with the methods in the table below for all occupied spaces.
- a. Use current versions of ASTM standard methods, EPA compendium methods, or ISO methods, as indicated.
 - b. Conduct all measurements before occupancy during normal occupied hours, with the building ventilation system started at the normal daily start time and operated at the minimum outdoor airflow rate for the occupied mode throughout the test.
 - c. For each sampling point where the concentrations exceed the limit, take corrective action and retest for the noncompliant contaminants at the same sample points. Repeat until all requirements are met.

Test for the particulate matter (PM) and inorganic gases listed in Table 1, using an allowed test method, and demonstrate the contaminants do not exceed the concentration limits listed in the table.

Table 1.

Contaminant (CAS#)	Concentration Limit (µg/m3)	Allowed Test Methods
Carbon monoxide (CO)	9 ppm; no more than 2 ppm above outdoor levels	ISO 4224 EPA Compendium Method IP-3 GB/T 18883-2002 for projects in China Direct calibrated electrochemical instrument with accuracy of (+/- 2% ppm <50 ppm minimum accuracy).
PM 10	ISO 14644-1:2015, cleanroom class of 8 or lower 50 µg/m3 Healthcare only: 20 µg/m3	Particulate monitoring device with accuracy greater of 5 micrograms/m3 or 20% of reading and resolution (5 min average data) +/- 5 µg/m3
PM 2.5	12 µg/m3 or 35 µg/m3**	
Ozone	0.07 ppm	Monitoring device with accuracy greater of 5 ppb or 20% of reading and resolution (5 min average data) +/- 5 ppb ISO 13964 ASTM D5149 -- 02 EPA designated methods for Ozone

Perform a screening test for Total Volatile Organic Compounds (TVOC). Use ISO 16000-6, EPA TO-17, or EPA TO-15 to collect and analyze the air sample. Calculate the TVOC value per EN 16516:2017, CDPH Standard Method v1.2 2017 section 3.9.4, or alternative calculation method as long as full method description is included in test report. If the TVOC levels exceed 500 µg/m3, investigate for potential issues by comparing the individual VOC levels from the GC/MS results to associated cognizant authority health-based limits. Correct any identified issues and re-test if necessary.

Additionally, test for the individual volatile organic compounds listed in Table 2 using an allowed test method and demonstrate the contaminants do not exceed the concentration limits listed in the table.

Table 2.

Contaminant (CAS#)	Concentration Limit (µg/m3)	Allowed Test Methods
Formaldehyde 50-00-0	20 µg/m3 (16 ppb)	ISO 16000-3, 4; EPA TO-11a, EPA comp. IP-6A ASTM D5197-16
Acetaldehyde 75-07-0	140 µg/m3	
Benzene 71-43-2	3 µg/m3	ISO 16000-6 EPA IP-1, EPA TO-17, EPA TO-15 ISO 16017-1, 2; ASTM D6196-15
Hexane (n-) 110-54-3	7000 µg/m3	
Naphthalene 91-20-3	9 µg/m3	
Phenol 108-95-2	200 µg/m3	
Styrene 100-42-5	900 µg/m3	
Tetrachloroethylene 127-18-4	35 µg/m3	
Toluene 108-88-3	300 µg/m3	
Vinyl acetate 108-05-4	200 µg/m3	
Dichlorobenzene (1,4-) 106-46-7	800 µg/m3	

Xylenes-total 108-38-3, 95-47-6, and 106-42-3	700 µg/m3	
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3.5 COMMISSIONING

- A. EA prerequisite and EA credit: Comply with Division 1 Section "General Commissioning Requirements"

LEED SCORECARD – Follows, Appendix A

LEED SUBMITTAL COVER SHEET – Follows, Appendix B

LEED MONTHLY CONSTRUCTION PROGRESS REPORT – Follows, Appendix C

LEED SPECIFICATION MATRIX – Follows, Appendix D

END OF SECTION

**SECTION 01 81 19
CONSTRUCTION INDOOR AIR QUALITY**

PART 1- GENERAL

1.1 RELATED DOCUMENTS

- A. Section 018113 Sustainable Design Requirements

1.2 REQUIREMENTS INCLUDED IN THIS SECTION

- A. Indoor Air Quality Management Goals
- B. Indoor Air Quality Management Plan
- C. Indoor Air Quality Management Plan Implementation

1.3 INDOOR AIR QUALITY MANAGEMENT GOALS

- A. The Owner has established that this Project shall prevent indoor air quality problems resulting from the construction process, to sustain long-term installer and occupant health and comfort.
- B. Protect the ventilation system components during construction and cleanup of contaminated components after construction is complete.
- C. Control sources of potential Indoor Air Quality (IAQ) pollutants by controlling selection of materials and processes used in project construction.
- D. With regard to these goals the Contractor shall develop, for Owner and Architect's review, an IAQ Management Plan for this Project

PART 2 – PRODUCTS

2.1 SUBMITTALS:

- A. Construction IAQ Management Plan highlighting the five requirements of the Sheet Metal and Air Conditioning National Contractors Association (SMACNA) IAQ Guidelines for Occupied Buildings under Construction, 2nd edition, 2007, ANSI/SMACNA 008–2008, Chapter 3, including a no-smoking policy.
- B. Photographs documenting construction IAQ management measures implemented during construction of each of the five SMACNA requirements.
- C. Cut sheets of filtration media used during construction and installed immediately prior to occupancy with MERV values highlighted.

- D. Submit a letter from the Contractor describing building flush-out procedures including actual dates of building flush-out, hours of ventilation, ventilation rates, and indoor temperature and humidity levels.

2.2 IAQ MANAGEMENT PLAN

- A. Develop a Draft Indoor Air Quality (IAQ) Management Plan for the construction and pre-occupancy phases of the building as follows: (1) during construction meet or exceed the minimum requirements of the Sheet Metal and Air Conditioning National Contractors Association (SMACNA) IAQ Guidelines for Occupied Buildings under Construction, 2nd edition, 2007, ANSI/SMACNA 008–2008, Chapter 3, (2) Protect stored on-site or installed absorptive materials from moisture damage, and (3) conduct a building flush-out after construction ends and prior to occupancy.
 - 1. The SMACNA IAQ Guidelines for Occupied Buildings under Construction provides an overview of air pollution associated with construction, control measures, construction process management, quality control, communicating with occupants, and case studies. These guidelines can be accessed at www.smacna.org. Chapter 3 of the SMACNA Guidelines recommends Control Measures in five areas: HVAC protection, source control, pathway interruption, housekeeping, and scheduling. Review the applicability of each Control Measure and include those that apply in the Draft IAQ Management Plan.
 - a. HVAC Protection: Shut down the return side of the HVAC system whenever possible during heavy construction. If the system must remain operational during construction include the following strategies that apply:
 - i. If conditioning is required during construction, use supplementary HVAC units instead of permanently installed equipment if possible.
 - ii. Seal all ductwork, registers, diffusers, and returns with plastic when stored on site or not in service. Seal unfinished runs of ductwork at the end of each day
 - iii. Fit the return side of the HVAC system with temporary filters.
 - iv. Isolate the return side of the HVAC system from the surrounding environment as much as possible (e.g., place all tiles for the ceiling plenum, repair all ducts and air handler leaks).
 - v. Damper off the return system in the heaviest work areas and seal the return system openings with plastic.
 - vi. Upgrade the filter efficiency where major loading is expected to affect operating HVAC system.
 - vii. Clean permanent return air ductwork per National Air Duct Cleaning Association standards upon completion of all construction and finish installation work.
 - viii. If permanently installed air handlers are used during construction, filtration media with a Minimum Efficiency Reporting Value (MERV) of 8 shall be used at each return air grille during construction, as determined by ASHRAE 52.2-2017.
 - ix. Install new clean media just prior to substantial completion and occupancy that has a Minimum Efficiency Reporting Value (MERV) of 13.
 - b. Source Control: Keep sources of contaminants out of the building and have a plan to eliminate any that are introduced:
 - i. Use low-toxicity and low-VOC materials to the greatest extent possible.

- ii. Develop protocols for the use of any high-toxicity materials. Isolate areas where high-toxicity materials are being installed and use temporary ventilation for that area.
 - iii. Prevent exhaust fumes (from idling vehicles, equipment, and fossil-fueled tools) from entering the building.
 - iv. **Enforce the no-smoking job site policy.**
 - v. Protect stored materials from moisture because absorbent materials exposed to moisture during construction can mold and degenerate long after installation. Store materials in dry conditions indoors, under cover, and off the ground or floor.
 - vi. If materials are improperly exposed to moisture, replace the material and consider testing air quality before occupancy to make sure no mold contamination has occurred.
- c. Pathway Interruption: Prevent contamination of clean spaces. Include the following strategies that apply:
- i. Use 100% outside air ventilation (when outside temperatures are between 55 degrees F and 85 degrees F and humidity is between 30% and 60%) with air exhausted directly to the outside during installation of finishes and other VOC emitting materials.
 - ii. Isolate areas of work to prevent contamination of other spaces, whether they are finished or not. Seal doorways, windows, or tent off areas as needed using temporary barriers, such as plastic separations. Provide walk-off mats at entryways to reduce introduced dirt and pollutants.
 - iii. Use dust guards and collectors on saws and other tools.
 - iv. Depressurize the work area to allow a differential between construction areas and clean areas. Exhaust to the outdoors using 100% outdoor air, if possible
- d. Housekeeping: Reduce construction contamination in the building prior to occupancy through HVAC and regular space cleaning activities.
- i. Maintain good job site housekeeping on a daily basis. Use vacuum cleaners with high-efficiency particulate filters and use sweeping compounds or wetting agents for dust control when sweeping
 - ii. Store building materials in a weather tight, clean area prior to unpacking for installation.
 - iii. Check for possible damage to the HVAC system and Building assemblies from high humidity.
 - iv. Clean all coils, air filters, and fans before testing and balancing procedures are performed.
- e. Scheduling: Specify construction sequencing to reduce absorption of VOC's by materials that act as sinks or contaminant sources. Complete application of wet and odor-emitting materials such as paints, sealants, and coatings before installing sink materials such as ceiling tiles, carpets, insulation, gypsum products, and fabric-covered furnishings are installed.
- i. Consider after-hours or weekend work if practical.
2. Protect stored on-site or installed absorptive materials from exposure to moisture through precipitation, plumbing leaks, or condensation from the HVAC system to prevent microbial contamination.

PART 3 – EXECUTION

3.1 FLUSH-OUT

As part of Indoor air quality management, the following requirements have to be met:

FLUSH OUT: Provide a summary data log sheet indicating outside air cfm provided on an hourly basis during flush out. Provide cut sheets of filters use during flush out and verify replacement air filters after flush out. Refer to Section 018113 for LEED requirements.

Or

AIR TESTING: Provide an IAQ Testing report that includes a narrative describing procedures and how locations were determined, and date/results of each test.

- A. Building Flush Out: Select one of the following two options (prior to occupancy or during occupancy), to be implemented after construction ends and the building been completely cleaned. All interior finishes, such as millwork, doors, paint, carpet, acoustic tiles, and movable furnishing, must be installed, and major VOC punch list items must be finished.
- a. Prior to Building Occupancy: Prime Trade Contractor shall install new filtration media and perform a building flush-out by supplying a total air volume of 14,000 cubic feet of outdoor air per square foot of gross floor area while maintaining an internal temperature of at least 60°F (15°C) and no higher than 80°F (27°C) and relative humidity no higher than 60%. The duration of the flush-out must be calculated as follows:
- Cubic feet of outdoor air needed prior to occupancy = Area (ft²) X 14,000 cfm
Duration (Days) = Cubic Feet needed/(air handler capacity/1440 minutes/day)
- i. Replace all outside air filtration media prior to occupancy. Filtration media shall have a MERV of 13 as determined by ASHRAE 52.2.
- b. During Occupancy: if occupancy is desired before the flush-out is completed, the space may be occupied only after delivery of a minimum of 3,500 cubic feet of outdoor air per square foot of gross floor area while maintaining an internal temperature of at least 60°F (15°C) and no higher than 80°F (27°C) and relative humidity no higher than 60%.

Once the space is occupied, it must be ventilated at a minimum rate of 0.30 cubic foot per minute (CFM) per square foot of outdoor air or the design minimum outdoor air rate determined by the ASHRAE 62.1-2010 calculations determined in IEQ Prerequisite Minimum indoor Air Quality performance, whichever is greater. During each day of the flush-out period, ventilation must begin at least three hours before occupancy and continue during occupancy. These conditions must be maintained until a total of 14,000 cubic feet per square foot of outdoor air has been delivered to the space. The duration of the flush-out must be calculated as follows:

Cubic feet of outdoor air needed prior to occupancy = Area (ft²) X 3,500 cfm
Cubic feet of outdoor air needed during occupancy = Area (ft²) X 10,500 cfm
Duration (Days) = (Area (ft²) X 14,00 cfm)/(air handler capacity/1440 minutes/day)

- B. IAQ Testing: After construction ends and before occupancy, but under ventilation conditions typical for occupancy, conduct baseline IAQ testing using protocols consistent with the methods in the table below for all occupied spaces. Use current versions of ASTM standard methods, EPA compendium methods, or ISO methods, as indicated. Labs that conduct the test for chemical analysis of formaldehyde and VOCs must be accredited under ISO/IEQ 17025 for the test methods they use. Conduct all measurements before occupancy during normal occupied hours, with the building

ventilation system started at the normal daily start time and operated at the minimum outdoor airflow rate for the occupied mode throughout the test. For each sampling point where the concentrations exceed the limit, take corrective action and retest for the noncompliant contaminants at the same sample points. Repeat until all requirements are met.

The following contaminants cannot exceed concentration levels listed below for Particulate Matter and inorganic gases :

Contaminant	Concentration Limit (µg/m ³)	Allowed Test Methods
Carbon Monoxide (CO)	9 ppm; no more than 2 ppm above outdoor levels	ISO 4224 EPA Compendium Method IP-3 GB/T 18883-2002 for projects in China Direct calibrated electrochemical instrument with accuracy of (+/- 2% ppm <50 ppm minimum accuracy).
PM 10	ISO 14644-1:2015, cleanroom class of 8 or lower	Particulate monitoring device with accuracy greater of 5 micrograms/m ³ or 20% of reading and resolution (5 min average data) +/- 5 µg/m ³ ASTM D5149-02
PM 2.5	12 µg/m ³ or 35 µg/m ³ **	
Ozone	0.07 ppm	Monitoring device with accuracy greater of 5 ppb or 20% of reading and resolution (5 min average data) +/- 5 ppb ISO 13964 ASTM D5149 — O ₂ EPA designated methods for Ozone

And/ Or the following contaminants cannot exceed concentration levels listed below for VOCs. Use ISO 16000-6, EPA TO17, or EPA TO-15 to collect and analyze the air sample. Calculate the TVOC value per EN 16516:2017, CDPH Standard Method v1.2 2017 section 3.9.4, or alternative calculation method as long as full method description is included in test report. If the TVOC levels exceed 500 µg/m³, investigate for potential issues by comparing the individual VOC levels from the GC/MS results to associated cognizant authority health based limits. Correct any identified issues and re-test if necessary.:

Contaminant	Maximum concentration	ASTM and US EPA methods
Formaldehyde	20 µg/m ³ (16 ppb)	ISO 16000-3, 4; EPA TO-11a, EPA comp. IP-6A ASTM D5197-16
Acetaldehyde	140 µg/m ³	
Benzene	3 µg/m ³	ISO 16000-6 EPA IP-1, EPA TO-17, EPA TO-15 ISO 16017-1, 2; ASTM D6196-15
Hexane	7000 µg/m ³	
Naphthalene	9 µg/m ³	
Phenol	200 µg/m ³	
Styrene	900 µg/m ³	
Tetrachloroethylene	35 µg/m ³	
Toluene	300 µg/m ³	

Vinyl acetate	200 µg/m ³	
Dichlorobenzene	800 µg/m ³	
Xylenes-total	700 µg/m ³	

- C. Draft IAQ Management Plan Review Meeting: Once the Owner and Architect have reviewed the Draft IAQ Management Plan and prior to construction at the site, schedule and conduct a meeting to review the Draft IAQ Management Plan and discuss procedures, schedules and specific requirements for IAQ during the construction and pre-construction phases of the building. Discuss coordination and interface between the Contractor and other construction activities. Identify and resolve problems with compliance to the requirements. Record minutes of the meeting, identify all conclusions reached and matters requiring further resolution.
1. Attendees: The Contractor and related Contractor personnel associated with the work of this section, including personnel to be in charge of the IAQ management program, Architect, Owner and such additional personnel as the Architect or Owner deems appropriate.
- D. Final IAQ Management Plan: Make any revisions to the Draft IAQ Management Plan agreed upon during the meeting identified in item (B) above and incorporate resolutions agreed to be made subsequent to the meeting. Submit the revised plan to the Owner and Architect for approval within 10 calendar days of the meeting.

3.2 IMPLEMENTATION OF IAQ MANAGEMENT PLAN

- A. Manager: The Contractor shall designate an on-site party (or parties) responsible for instructing workers and overseeing and the IAQ Management Plan for the Project.
- B. Progress Meetings: Construction related IAQ procedures shall be included in the pre-construction and construction progress meeting agendas.
- C. Distribution: The Contractor shall distribute copies of the IAQ Management Plan to the Job Site Foreman, each Subcontractor, the Owner, and the Architect.
- D. Instruction: The Contractor shall provide on-site instruction of the IAQ procedures and ensure that all participants in the construction process understand the importance of the goals of the IAQ Management Plan.

END OF SECTION

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Section 01 9113

COMMISSIONING REQUIREMENTS

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.
- B. OPR and BoD documentation are included by reference for information only.
- C. Commissioning pertains primarily to the work described in Divisions 22, 23, and 26 and shall be included for all systems to be commissioned as specified herein.
- D. Commissioning Plan – A Preliminary Commissioning Plan is provided as supplemental information and will guide the commissioning process.

1.2 SUMMARY

- A. Section includes general requirements that apply to implementation of commissioning without regard to specific systems, assemblies, or components.
- B. Related Divisions:
 - i. All sections relating to the Systems to be Commissioned are related to the commissioning requirements and process.
 - ii. This includes, but is not limited to all Sections of Divisions 1, 20, 21, 22, 23, 24, 25, 26 and 27.

1.3 DEFINITIONS

- A. Architect: Includes Architect identified in the Contract for Construction between Owner and Contractor.
- B. BoD: Basis of Design: A document, prepared by Architect, that records concepts, calculations, decisions, and product selections used to meet the OPR and to satisfy applicable regulatory requirements, standards, and guidelines.
- C. Commissioning Plan: A document that outlines the organization, schedule, allocation of resources, and documentation requirements of the commissioning process.
- D. Current Facility Requirements (CFR) and Operations and Maintenance Plan: A document that defines the Owner's current operational needs and requirements for a building. It typically includes items addressing temperature and humidity set points, operating hours, filtration, vibration, sound and/or specialty needs.

- E. Prefunctional Check-out Documents and Prefunctional Checklists – checklists developed by the CxA, completed by the contractor and verified by the CxA.
- F. Contractor: the prime contractor identified in the Contract for Construction between Owner and Contractor. This may be a General Contractor, a Construction Manager or some other entity.
- G. Corrective Action– documentation of an issue identified by the CxA in a Field Report that requires correction and response by the Contractor.
- H. CxA: Commissioning Authority.
- I. Engineering Professionals: Includes the Engineers identified in the Contract for Construction between Owner and Contractor, responsible for design of HVAC, electrical, communications, controls for HVAC systems, and other related systems.
- J. Functional Performance Testing – the rigorous, documented testing of systems. Tests are developed by the CxA and performed by the Contractor under the supervision of the CxA.
- K. CxAlloy® Commissioning Construction Issues – log of all CxA identified issues and their status.
- L. OPR: Owners Project Requirements: A written document, prepared by Owner that details the functional requirements of Project and expectations of how it will be used and operated. This document includes Project and design goals, measurable performance criteria, budgets, schedules, success criteria, and supporting information.
- M. Subcontractor: contractors responsible to the Contractor or Owner for installation of Systems to be Commissioned.
- N. Systems, Subsystems, and Equipment: Where these terms are used together or separately, they shall mean "as-built" systems, subsystems, and equipment.
- O. Systems to be Commissioned: includes all systems, subsystems and equipment and associated components to be commissioned.
- P. Systems Manual: a manual providing to the current and future operating staff the information needed to understand and optimally operate each system. The manual is in addition to the O&M Manuals submitted by the contractor.
- Q. TAB: Testing, Adjusting, and Balancing.

1.4 COMMISSIONING TEAM

- A. The Commissioning Team is organized and lead by the CxA with the support and coordination of the Contractor. Members include:
 - i. Representatives of the CxA.
 - ii. Representatives of the Owner including facility users and operation and maintenance personnel.

- iii. Architect and engineering design professionals.
- iv. The Contractor Project Manager, Superintendent and other appropriate parties responsible for coordination of other Division activities.
- v. Subcontractor representatives including the project manager and foreman responsible for installation of systems to be commissioned including, but not limited to:
 - a) Mechanical
 - b) Controls
 - c) Plumbing
 - d) Electrical
 - e) TAB

B. Subcontractor appointed training liaisons.

1.5 CONTRACTOR'S RESPONSIBILITIES

- A. Identify one member of the contractor's team who will act as the primary point of contact for the CxA.
- B. Provide utility services required for the commissioning process. This includes ensuring the equipment necessary to access the CxAlloy® commissioning website is available on the construction site. This access needs to be provided during construction activities to ensure on site completion of commissioning documentation.
- C. Access and utilize the CxAlloy® online commissioning software for documentation of commissioning activities.
- D. Coordinate subcontractor commissioning activities; ensuring all affected trades are provided with the documentation necessary for the completion of their commissioning scope.
- E. Provide the CxA with a detailed and accurate construction schedule updated monthly. Coordinate scheduling of commissioning activities with the CxA and include them in the construction schedule.
 - i. Provide schedule for equipment submittals, installation manual submittals, operation and maintenance data submittals, equipment startup, and testing to CxA for incorporation into the commissioning plan. Update schedule monthly throughout the construction period.
 - ii. Coordinate the regular submission of detailed Subcontractor Schedules to the CxA.
- F. Provide CxA with copies of all approved change-orders or other modifications impacting construction when approved.
- G. Process and respond to Commissioning Construction Issues, Field Reports and RFIs from the CxA. Evaluate performance deficiencies identified in test reports and, in collaboration with entity responsible for system and equipment installation, recommend corrective action.

- H. The Contractor has primary responsibility for ensuring commissioning activities are successfully completed by the subcontractors in a timely manner. In order to fulfill that responsibility the contractor shall assist the CxA in coordination and execution of all Construction Phase Commissioning Activities including, but not limited to:
- i. Planning and participation in construction-phase coordination meetings.
 - ii. Planning and participation in commissioning verifications.
 - iii. Coordination of submittal responses and resubmissions to ensure that resubmissions adequately address design team and CxA comments.
 - iv. Ensure accurate completion of Prefunctional Checklists for all Systems to be Commissioned **prior** to verification site visits by the CxA.
 - v. Certify readiness of Systems to be Commissioned and ensure accurate completion of Functional Performance Test documents **prior** to performance of Functional Performance Testing.
 - vi. Facilitate Functional Performance Testing of Systems to be Commissioned and participate in testing at the request of the CxA or responsible Subcontractor.
 - vii. Facilitate operation and maintenance training planning, verification of training, and development of associated documentation for operations and maintenance transition.
 - a) Ensure that the CxA-provided training documentation is completed for all training on systems to be commissioned.
 - viii. Manage the documentation of commissioning work by the subcontractors.
 - ix. Certify that Work is complete and systems are operational according to the Contract Documents, including calibration of instrumentation and controls.
 - x. Evaluate performance deficiencies identified in test reports and, in collaboration with entity responsible for system and equipment installation, recommend corrective action.
 - xi. Track and follow-up on outstanding corrective action items as follows:
 - a) All responses shall be made in the CxAlloy® Commissioning Construction Issues provided by Cx Associates via the online platform CxAlloy®.
 - b) Issues shall be addressed and responses provided within two weeks after they are identified.
 - c) Where an issue will take longer than two weeks to address, provide a completion date within two weeks of issue identification.
 - d) Resolve all issues within one month of substantial completion.

- I. Subcontractors shall assign representatives with expertise and authority to act on behalf of the entity responsible for installation of Systems to be Commissioned who shall participate in and perform commissioning team activities including, but not limited to, the following:
 - i. Provide schedules for equipment and system submittals including: submittal information for all Systems to be Commissioned, installation manuals, and operation and maintenance submittals; equipment startup, and testing to CxA for incorporation into the commissioning plan. Update schedule on a monthly basis throughout the construction period.
 - ii. Participate in construction-phase coordination meetings.
 - iii. Process and respond to Commissioning Construction Issues, Field Reports and RFIs from the CxA via the CxAlloy® commissioning website.
 - iv. Provide information to the CxA for developing construction-phase commissioning plan including, but not limited to: schedule as cited above, equipment submittals, installation manual submittals and operation and maintenance information submittals.
 - v. Complete Prefunctional Checklists for all Systems to be Commissioned in a progressive manner. This entails completing checksheets as the work proceeds – bi-weekly submittal of completed checksheets shall be provided to the CxA via CxAlloy® throughout MEP fit-up and equipment installation work.
 - vi. Participate with the CxA during field verification of contractor completed checklists.
 - vii. Schedule manufacturer start-up to include completion of commissioning documentation relative to equipment. Schedule manufacturer representative to be on site during the commissioning verification of start-up documentation and functional testing of equipment set up by Manufacturer representatives including but not limited to equipment specific controls, equipment specific VFDs, emergency generators, etc.
 - viii. Maintain updated Project Record Documents for periodic review of the CxA and submit final record documents at project completion.
 - ix. Certify readiness of Systems to be Commissioned for performance of Functional Performance Testing.
 - x. Complete Functional Performance Tests documents via the CxAlloy® commissioning website.
 - xi. Perform Functional Performance Testing of Systems to be Commissioned under the direction of the CxA.
 - a) Provide technicians who are familiar with the construction and operation of installed systems, are trained in the use of required testing instruments and procedures to participate in testing of installed systems, subsystems, and equipment.

- xii. Designate an Operations and Maintenance Liaison who will have direct responsibility for training planning and execution, the development of the Operations & Maintenance Manual, and providing necessary components of the Current Facilities Requirements/Operations & Maintenance Plan and Systems Manual per section 1.6.H and I.
 - a) Provide operation and maintenance planning, documentation and verification.
 - b) Provide training sessions for Owner's operation and maintenance personnel.
- J. Use of Online or Digital Platform:
 - i. Use of CxAlloy®
 - a) The contractor shall use CxAlloy®, an online commissioning platform, as directed by the CxA and as outlined in the Cx Plan. Any equipment necessary for accessing this online tool shall be provided by the contractor on the construction site. CxAlloy® will be used for Pre-functional checkout, functional performance testing, and responding to items in the Commissioning Construction Issues.
 - b) A Starting Guide for how to use CxAlloy® can be found here: https://s3.amazonaws.com/helpscout.net/docs/assets/58a201fddd8c8e56bfa7a917/attachments/58c04a012c7d3a576d35c9df/Getting_Started_Team_Member.pdf
- K. The ATC Contractor will be responsible for establishing any points and trending required for commissioning purposes, including but not limited to, functional performance testing, and ongoing commissioning. The ATC Contractor will:
 - i. Review the BAS and submeters to establish which systems will be monitored and trended.
 - ii. Identify acceptable ranges for data points and meter values.
 - iii. Identify any necessary action for excursions from the acceptable ranges.
 - iv. Verify that the BAS data storage capacity is capable of the determined points to be tracked and frequency and duration of monitoring.
 - v. Ensure that the monitored points and trending align with the commissioning schedule's systems.
 - vi. Ensure that monitoring and trending meet LEEDv4 recommendations:
 - a) Collect data at 15-minute or shorter intervals for at least a week.
 - b) Store the data in way that the information can be viewed via the BAS, a third-party energy management software, or a spreadsheet export program.
 - vii. Collaborate with the CxA to ensure that monitoring and trending are covering identified operational issues.

- viii. Develop a reporting method in collaboration with the CxA and Facility Operation and Management (FO&M) personnel.

1.6 COMMISSIONING SUBMITTALS BY CONTRACTOR

- A. Commissioning-specific submittals:
 - i. The contractor shall submit completed Prefunctional Checklists and Functional Performance Test Documents via the CxAlloy® commissioning website.
 - ii. The contractor shall submit completed training plans upon approval of submitted equipment.
 - iii. The contractor shall submit preventive maintenance plan upon approval of submitted equipment.
 - iv. The contractor shall submit control device calibration schedule upon approval of the controls submittal.
- B. Commissioning related requirements for submittals on Systems to be Commissioned: The following information shall be submitted with the product and system product literature and shop drawing submittals for review and approval by the Owner, Architect, Engineering Professionals and the CxA.
 - i. Manufacturer cut sheets and product literature and shop drawings in accordance with the requirements of other Divisions.
 - ii. Motor enclosure types and efficiencies designated as NEMA Nominal Efficiency and expressed as a percentage.
 - iii. Detailed product data for each piece of equipment including part load capacities (20, 40, 60, 80, 100%), electrical components and requirements, etc. (as appropriate).
 - iv. Manufacturer's certified test reports on each piece of equipment.
 - v. Performance curves for each piece of equipment being submitted (20, 40, 60, 80, 100% as appropriate).
 - vi. Controls submittals shall include:
 - a) Logic flow diagrams for control systems sequences of operation.
 - b) Diagrams indicating location of all sensors, actuators, safeties and other control devices for all Systems to be Commissioned.
 - c) Detailed Sequences of Operation for all Systems to be Commissioned.
 - d) Control diagram graphic panels for use with DDC PC monitor, in color.
 - e) Abbreviations and Symbols List.

- f) All initial setpoints, reset schedules, time delays, etc. using numerical values.
 - g) Calibration certificates for all required test instruments demonstrating compliance with Part 2 of this section and any additional requirements of Divisions 22, 23 and 26.
- vii. Submit Final Approved Shop Drawings for each piece of equipment to be Commissioned including all “as noted” comments in the final submittal.
- viii. TAB plan including equipment to be used as well as methods and strategies to accomplish TAB where system diversity is present.
- C. The CxA will provide a single review of the submittals. Failure to incorporate agreed upon CxA review comments in subsequent submittals will result in a charge back to the contractor for additional submittal review time.
- D. Approved submittals for all Systems to be Commissioned must be compiled and individually bookmarked in the navigation pane of a single PDF document, which shall be electronically transferred to the CxA via email or an online file transfer service.
- E. Progress submittals of completed prefunctional checksheets
 - i. Contractor shall be responsible for notifying CxA via email of when contractors will be completing or have completed a majority of the CxAlloy® prefunctional checklists for each equipment type.
 - ii. These email notifications shall be provided bi-weekly once fit-up and equipment installation for the affected subcontracts commences and the checksheets have been provided by the CxA.
 - iii. The contractor shall submit a schedule for checksheet completion, submittal and verification to assist the team in ensuring that the commissioning process is incorporated as construction progresses.
- F. Manufacturer Start-up Information
 - i. Manufacturer’s detailed installation and start-up requirements including equipment checklists (manufacturer’s installation, startup, etc.) for each piece of equipment shall be submitted to the CxA within two weeks of when equipment arrives on site.
 - ii. Submit manufacturer start-up information prior to starting equipment.
- G. Detailed Project Training Plans (see Section 3.5 for a complete list of requirements.).
- H. Operation and Maintenance Manual shall include the following:
 - i. Submit O&M Manual as a single PDF document for each division. Clearly identify the Client and Project Name and the specific contents of each PDF document.
 - a) Provide a Table of Contents in each PDF document clearly indicating where information is located.

- b) Bookmark each section and subsection in the PDF document's navigation pane.
 - c) Begin with a "Preventative Maintenance Plan" that includes maintenance instructions with timeframe/frequency for each task for all applicable equipment included in the O&M Manual.
 - d) Each subsequent section shall address individual pieces of equipment and be clearly labeled as such. Subsections shall be comprised of specific information for each piece of equipment as listed below.
 - e) Operations and Maintenance Manuals shall be fully customized to the project and shall include only product information which is specific and relevant to the project.
- ii. All submittal information indicated in part A.iii., A.iv., and B of this section (above) shall be included in the operations and maintenance manual, compiled as subsection per piece of equipment and bookmarked, in addition to the information required below.
- a) Manufacturer's break-in instructions.
 - b) Manufacturer's suggested service requirements.
 - c) Spare parts list edited for specific equipment used on the project.
 - d) Copy of all equipment specifications.
 - e) Troubleshooting guide.
 - f) Controls calibration checklist.
- I. Current Facilities Requirements and Operations and Maintenance Plan
- i. Contractors will supply the following information for inclusion in the CFR and O&M Plan:
- a) As-built sequences of operation for the building.
 - b) Building occupancy schedule.
 - c) Equipment run-time schedules.
 - d) Setpoints for all HVAC equipment including automated reset schedules.
 - e) Lighting levels throughout the building.
 - f) Minimum outside air requirements.
 - g) Changes in schedules or setpoints for different seasons, days of the week, and times of day.
 - h) Preventive maintenance plan for building equipment described in the systems narrative that includes maintenance instructions with timeframe/frequency for each task (shall be part of the O&M Manual).

J. Systems Manual

The Systems Manual contains all the information necessary to operate, maintain, and recommission all energy consuming systems within or serving the space. Information for the systems manual is generally collected during construction and after completion of a project. It is the responsibility of the Construction Manager to provide the following documentation to CxA as PDF file:

- a) Approved submittals, individually bookmarked in the navigation pane of a single PDF document.
 - 1) Submittals must be combined in an independent PDF file and electronically transferred to the CxA via email or an online file transfer service.
 - b) As-Built System single-line diagrams.
 - c) As-built drawings.
 - d) As-built sequence of operation.
 - e) Original setpoints for all systems commissioned.
 - f) Recommended schedule for sensor recalibration.
 - g) Equipment operations and maintenance manuals.
 - h) Equipment preventive maintenance schedules.
 - i) Confirmation of completed training. Completed Training Forms following the requirements outlined in section 3.5 Training for Operations and Maintenance for the owner and occupants.
- ii. The Construction Manager will electronically transfer the independent PDF(s) to the CxA via email or an online file transfer service.
 - iii. The CxA will add the following sections, finalize the Systems Manual and email the complete PDF file to the Owner:
 - a) Owner's project requirements.
 - b) Basis of design.
 - c) Recommended schedule for recommissioning.
 - d) Recommended schedule for sensor recalibration.
 - e) Ongoing system optimization procedures.
 - f) Final commissioning report.
- K. Provide all warranties for each division as a single PDF file, bookmarked by equipment name in the navigation panel. Equipment Warranties, contractor, manufacturer and owner obligations to maintain the warranty shall be specifically stated.
- L. Coordination and Record Drawings.

1.7 QUALITY ASSURANCE

- A. Calibration of Test Equipment: Comply with test equipment manufacturer's calibration procedures and intervals. Recalibrate test instruments immediately whenever instruments have been repaired following damage or dropping. Affix calibration tags to test instruments. Instruments shall have been calibrated by NIST traceable standards within six months prior to use.

1.8 SYSTEMS TO BE COMMISSIONED

- A. The following systems will be commissioned in this project.
 - i. HVAC
 - a) Air Handling and Energy Recovery Units
 - b) Exhaust Fans
 - c) Ductless Split AC Units
 - d) Humidifiers for ORs and CSR
 - e) Terminal Units (VAVs for Ventilation and Chilled beams)
 - 1) Serving critical spaces (ORs, isolation room, CSR)
 - 2) Serving non-critical spaces
 - f) Heating System (boilers and pumps)
 - g) HVAC Control System
 - h) Ductwork
 - i) Piping
 - ii. Plumbing
 - a) Domestic Hot Water Generation and Recirculation Equipment
 - iii. Electrical
 - a) Normal and Emergency Power Distribution
 - b) Electrical Panels
 - c) Generator
 - d) Lighting and Controls

PART 2 - PRODUCTS

2.1 TEST EQUIPMENT

- A. All testing equipment required to perform startup, checklist verification and functional performance testing shall be provided by the contractor responsible for the equipment being tested.
- B. All testing equipment shall be of sufficient quality and accuracy to test and/or measure system performance within the tolerances specified in this Section.

- C. All testing equipment calibration shall be:
 - i. NIST traceable standards.
 - ii. Maintained in good repair and operating condition throughout the duration of use on this project .
 - iii. Recalibrated/repared if dropped or damaged in any way since last calibration.
- D. Test instrumentation shall meet the following standards:
 - i. Immersion temperature measuring instruments, liquids:
 - a) Range, 0 F to 220 F
 - 1) Minimum accuracy, +/- .5 degree F
 - 2) Resolution, .1 degree F
 - ii. Air temperature measuring instruments:
 - a) Range, 0 F to 220 F
 - 1) Minimum accuracy, +/- .5 degree F
 - 2) Resolution, .1 degree F
 - iii. Air humidity measuring instruments:
 - iv. Range, 0 % RH to 80 % RH
 - a) Minimum accuracy, +/- 2 % RH
 - b) Resolution, .1 % RH
 - v. Range, 80 % RH to 97 % RH
 - a) Minimum accuracy, +/- 3 % RH
 - b) Resolution, .1 % RH
 - vi. Carbon Dioxide (CO₂) measuring instruments:
 - a) Range, 0 ppm to 2,000 ppm
 - 1) Minimum accuracy, +/- 50 ppm
 - 2) Resolution, 1.0 ppm
 - vii. Carbon Monoxide (CO) measuring instruments:
 - a) Range, 0 ppm to 500 ppm
 - 1) Minimum accuracy, +/- 2 ppm
 - 2) Resolution, .1 ppm
 - viii. Hydronic pressure measuring instruments:
 - a) Range, 0 PSI to 150 PSI
 - 1) Minimum accuracy, +/- .5 PSI
 - 2) Resolution, .1 PSI

- ix. Air differential pressure measuring instruments:
 - a) Range, 0 "w.c. to 10" w.c.
 - 1) Minimum accuracy, +/- .001 " w.c.
 - 2) Resolution, .001 " w.c.
 - x. Air velocity measuring instruments:
 - a) Range, 25 fpm to 2400 fpm
 - 1) Minimum accuracy, +/- 15 fpm
 - 2) Resolution, 1.1 fpm
 - b) Range, 2400 fpm to 5000 fpm
 - 1) Minimum accuracy, +/- 30 fpm
 - 2) Resolution, 1.0 fpm
 - xi. For instruments not covered above, the following minimum requirements apply:
 - a) Test instruments shall have an accuracy of + or - 2.0% of the value range being measured (not full range of meter) and have been calibrated within the previous six months to NIST traceable standards.
- E. Test Ports:
- i. Pressure / temperature test plugs to allow the use of insertion-type, hand held gauges and meters:
 - a) Housing: Brass
 - b) Core Material: EPDM (Nordel)
 - c) Provide cap retainer strap
 - d) Size: 1/4" NPT
 - e) Length: All pipes, insulated or not: maximum 1-1/2" overall
 - ii. Acceptable Manufacturers:
 - a) Texas Fairfax Company
 - b) Peterson Equipment Company
 - c) Alternate product with prior approval

PART 3 - EXECUTION

3.1 COMMISSIONING CONSTRUCTION ISSUES AND FIELD REPORTS

- A. CxA maintains Commissioning Construction Issues on the online platform CxAlloy® that describes design, installation, and performance issues that are at variance with the OPR, BoD, and Contract Documents.

- B. The CxA will document any deficiencies observed during construction, checkout and/or testing in a Field Report via the CxAlloy® commissioning website. Each Corrective Action will be summarized in the CxAlloy® Commissioning Construction Issues on CxAlloy®. Contractors remedy and document the correction to the CxA. The CxA will verify corrections depending on their scope and scale.
- C. The CxA will identify any design related issues in RFIs which will be submitted to the Contractor for processing and tracking.

3.2 PREFUNCTIONAL CHECKLISTS

- A. General. Each piece of equipment receives full prefunctional check-out by the responsible contractor. No sampling strategies are used. The prefunctional check-out protocol for a given system must be successfully completed prior to formal functional performance testing of equipment or subsystems of the given system.
- B. Prefunctional Checklists: The CxA provides Prefunctional Checklists for each System to be Commissioned via the online platform CxAlloy®. Prefunctional Checklists will be completed by the installing Subcontractor and verified by the Contractor and CxA in the company of the installing contractor. Each checklist will include, but not be limited to, the following:
 - i. Name and identification information of each item being checked.
 - ii. Verification of each item including verification of all required data and construction practices as listed in the Prefunctional Checklists.
 - iii. Notation of any equipment or installation that deviates from approved submittals or the Construction Documents.
 - iv. Name(s) of personnel involved with verification and dates on which verification activities and Prefunctional Checklists were completed. The activity's timestamp and the name of the logged-in user will be automatically recorded via the internal audit log of the CxAlloy® platform when items are completed.
- C. Checklists are provided for specific pieces of equipment and may require check-out and verification by multiple sub-contractors. (For instance, the electrical contractor is required to complete portions of the checklists for all powered mechanical equipment.) The documents will be assigned to the affected trades as appropriate. Each subcontractor shall be responsible for the checkout and verification of their work. The Contractor shall ensure each required subcontractor has completed their work.
 - i. Only individuals that have direct knowledge and witnessed that a line item task on the prefunctional checklist was actually performed shall initial or check that item off.
- D. Contractor shall provide a full start-up plan for each system to be commissioned including all subsystems, equipment and components which shall at a minimum include the following documentation:

- i. Manufacturer’s standard written start-up procedures copied from the installation manuals with check boxes by each procedure and a signature block added by hand at the end.
 - ii. Manufacturer’s normally used field checkout sheets.
 - iii. The subcontractors shall execute startup and provide the CxA with a signed and dated copy of the completed start-up checklists. Prefunctional checklists completion shall be monitored via the CxAlloy® commissioning website. Contractor to provide email notification to the CxA when startup is completed.
- E. Contractor shall verify 100% of all devices and equipment on the Prefunctional Checklists. Sampling is not acceptable.
- F. Completion of prefunctional checksheets via the CxAlloy® commissioning website shall occur as the installation progresses. Commissioning verification of checksheets shall be scheduled based on bi-weekly notification via email of completed or partially completed prefunctional checksheets by the subcontractors.
- G. Sensor Calibration
- i. Calibration of all sensors shall be included as part of the prefunctional checklists.
 - ii. Sensor Required Tolerances listed below shall be the criteria for acceptance. The following are default criteria, subject to revision based on accuracy of final approved and installed devices.

<u>Sensor</u>	<u>Required Tolerance (+/-)</u>	<u>Sensor</u>	<u>Required Tolerance (+/-)</u>
Cooling coil, chilled and condenser water temps	0.3F	Flow rates, water	4% of design
AHU wet bulb or dew point	1.0F	Lighting Illumination	3% of design
Hot water coil and boiler water temp	1.0F	Combustion flue temps	5.0F
Outside air, space air, coil air temps	0.5F	Oxygen or CO ₂ monitor	0.1 % pts
Watt-hour, voltage & amperage	1% of design	CO monitor	0.01 % pts
Pressures, air, water and gas	3% of design	Natural gas and oil flow rate	1% of design
Flow rates, air	10% of design	Steam flow rate	3% of design
		Barometric pressure	0.1 in. of Hg

- H. The CxA will verify prefunctional checklists for each piece of primary equipment in the company of the responsible subcontractors.
- I. For lower-level components of equipment, (e.g., VAV boxes, sensors, controllers), the CxA shall observe a sampling of the prefunctional check-out and start-up procedures.

3.3 FUNCTIONAL PERFORMANCE TESTING

- A. Prerequisites for Testing:
 - i. Systems to be Commissioned have been completed, calibrated, and started; are operating according to the OPR, BoD, and Contract Documents;
 - ii. Instrumentation and controls associated with the Systems to be Commissioned have been completed and calibrated; are operating according to the OPR, BoD, and Contract Documents; and that pretest set points have been recorded.
 - iii. TAB procedures have been completed, and that TAB reports have been submitted, discrepancies corrected, and corrective work approved.
 - iv. Prefunctional Checklists for systems, subsystems, and equipment are completed via the CxAlloy® commissioning website and verified.
 - v. Perform Pretest procedures including:
 - a) Set systems, subsystems, and equipment into operating mode to be tested (e.g., normal shut down, normal auto position, normal manual position, unoccupied cycle, emergency power, and alarm conditions).
 - b) Verify each operating cycle after it has been running for a specified period and is operating in a steady-state condition.
 - c) Inspect and verify the position of each device and interlock identified on checklists. Sign off each item as acceptable or failed. Repeat this test for each operating cycle that applies to system being tested.
 - d) Check safety cutouts, alarms, and interlocks with smoke control and life-safety systems during each mode of operation.
 - e) Annotate checklist or data sheet via the CxAlloy® commissioning website when a deficiency is observed.
 - vi. Verify equipment interface with monitoring and control system and TAB criteria; include the following:
 - a) Supply and return flow rates for variable flow and constant volume systems in each operational mode, including maximum and minimum flow/capacity.
 - b) Operation of terminal units in both heating and cooling cycles.

- c) Minimum outdoor-air intake in each operational mode and at minimum and maximum airflows.
 - d) Building pressurization.
 - e) Total exhaust airflow and total outdoor-air intake.
 - f) Operation of indoor-air-quality monitoring systems.
- vii. Verify proper responses of monitoring and control system controllers and sensors to include the following:
- a) For each controller or sensor, record the indicated monitoring and control system reading and the test instrument reading. If initial test indicates that the test reading is outside of the control range of the installed device, check calibration of the installed device and adjust as required. Retest malfunctioning devices and record results on checklist or data sheet.
 - b) Report deficiencies and prepare a construction issue entry on CxAlloy®.
- viii. Testing Instrumentation: Install measuring instruments and logging devices to record test data for the required test period. Instrumentation shall monitor and record full range of operating conditions and shall allow for calculation of total capacity of system for each mode of operation. For individual room cooling tests, provide temporary heaters to impose a cooling load indicated in BoD. Operational modes may include the following:
- a) Occupied and unoccupied.
 - b) Full load and minimum load.
 - c) Maximum flow and minimum flow.
 - d) Warm up and cool down.
 - e) Economizer cycle.
 - f) Emergency power supply.
 - g) Life-safety alarm modes.
 - h) Temporary upset of system operation.
 - i) Partial occupancy conditions.
 - j) Special cycles.

B. Objectives and Scope.

- i. The objective of functional performance testing is to demonstrate that each system is operating according to the documented design intent and Contract Documents. Functional testing facilitates bringing the systems from a state of substantial completion to full dynamic operation. Additionally, during the testing process, areas of deficient

performance are identified and corrected, improving the operation and function of the systems.

- ii. In general, each System to be Commissioned should be operated through all modes of operation where there is a specified system response. Verifying each sequence in the sequences of operation is required. Proper responses to such modes and conditions as power failure, freeze condition, low oil pressure, no flow, equipment failure, etc. shall also be tested.

C. Functional Performance Test Documents:

- i. The CxA will develop Functional Performance Test Documents through the web-based platform CxAlloy® for each System to be Commissioned including:
 - a) Name and identification code of each item being checked.
 - b) Test number.
 - c) Time and date of test.
 - d) Indication of whether the record is for a first test or retest following correction of a problem or issue.
 - e) Dated signatures of the person performing test and of the witness.
 - f) Individuals present for test.
 - g) Deficiencies.
 - h) Issue number, if any, generated as the result of test.
 - i) Calibration of sensors and sensor function.
 - j) Testing conditions under which test was conducted, including (as applicable) ambient conditions, set points, override conditions, and status and operating conditions that impact the results of test.
 - k) Control sequences for mechanical and electrical systems.
 - l) Responses to control signals at specified conditions.
 - m) Sequence of response(s) to control signals at specified conditions.
 - n) Electrical demand or power input at specified conditions.
 - o) Power quality and related measurements.
 - p) Expected performance of systems, subsystems, and equipment at each step of test. Narrative description of observed performance of systems, subsystems, and equipment. Notation to indicate whether the observed performance at each step meets the expected results.
 - q) Interaction of auxiliary equipment including interfaces and interlocks.

- r) Separate entries will be provided for each item to be tested.
 - s) Separate tests will be provided for each mode of operation.
 - ii. The CxA will witness and document the results of functional performance tests using the specific procedural forms, accessible via the CxAlloy® commissioning website, developed for that purpose on CxAlloy®.
 - iii. Reports will include measured data, data sheets, and a comprehensive summary describing the operation of systems at the time of testing.
 - iv. Data sheets for each controller verifying proper operation of the control system, the system it serves, the service it provides, and its location will be provided.
- D. Test Methods.
- i. Functional performance testing and verification may be achieved by manual testing (persons manipulate the equipment and observe performance) or by monitoring the performance and analyzing the results using the control system's graphic trend log capabilities.
 - ii. Simulated Conditions.
 - a) Simulating conditions (not by an overwritten value) shall be allowed, though timing the testing to experience actual conditions is encouraged wherever practical.
 - iii. Overwritten Values.
 - a) Overwriting sensor values to simulate a condition, such as overwriting the outside air temperature reading in a control system to be something other than it really is, shall be allowed, but shall be used with caution and avoided when possible.
 - iv. Simulated Signals.
 - a) Using a signal generator which creates a simulated signal to test and calibrate transducers and DDC constants is generally recommended over using the sensor to act as the signal generator via simulated conditions or overwritten values.
 - v. Altering Setpoints.
 - a) Rather than overwriting sensor values, and when simulating conditions is difficult, altering setpoints to test a sequence is acceptable.
 - vi. Indirect Indicators.
 - a) Relying on indirect indicators for responses or performance shall be allowed only after visually and directly verifying and documenting, over the range of the tested parameters, that the indirect readings through the control system represent actual conditions and responses.

vii. Perform tests using design conditions whenever possible and where required.

viii. Setup.

- a) Each function and test shall be performed under conditions that simulate actual conditions to the closest practical approximation.
- b) The Contractor executing the test shall provide all necessary materials, system modifications, etc. to produce the flows, pressures, temperatures, etc. necessary to execute the test under specified conditions.
- c) At completion of the test, the Contractor shall return all affected building equipment and systems to their pre-test condition.

ix. Sampling.

- a) Multiple identical pieces of non-life-safety or otherwise non-critical equipment may be functionally tested by the CxA using a sampling strategy.
- b) No sampling is allowed during execution of prefunctional check-out or in contractor provided testing.
- c) The following sampling technique will be applied: 20% Sampling—10% Failure Rule.
 - 1) Randomly test at least 20% of each group of identical equipment. In no case test less than three units in each group. This 20%, or three, constitute the “first sample.”
 - 2) If 10% of the units in the first sample fail the functional performance tests, test another 20% of the group (the second sample).
 - 3) If 10% of the units in the second sample fail, test all remaining units in the whole group.
 - 4) If at any point, frequent failures are occurring and testing is becoming more troubleshooting than verification, the CxA may stop the testing and require the responsible subcontractor to perform and document a checkout of the remaining units, prior to continuing with functionally testing the remaining units.

E. Coordination and Scheduling.

- i. The subcontractors shall provide sufficient notice to the CxA regarding their completion schedule for the prefunctional checklists and startup of all equipment and systems. The CxA shall direct, witness and document, via the CxAlloy® commissioning website, the functional testing of all equipment and systems.

- ii. Subcontractors are responsible for execution of all tests.
 - iii. Functional testing is conducted after prefunctional checklists and startups have been satisfactorily completed. The control system is sufficiently reviewed and approved by the CxA before it is used for TAB or to verify performance of other components or systems.
 - iv. The air balancing and water balancing is completed and debugged before functional testing of air-related or water-related equipment or systems.
 - v. Testing proceeds from components to subsystems to systems.
 - vi. When the proper performance of all interacting individual systems has been achieved, the interface or coordinated responses between systems is checked.
- F. Seasonal Testing & Post Occupancy Verification.
- i. Subcontractors shall perform seasonal test and opposite seasonal testing for major systems (heating/cooling) that cannot be tested under actual seasonal conditions during construction. Provide opposite season trend logs.
 - ii. The controls subcontractor shall participate in opposite season testing and also at least one post occupancy site visit with the CxA.
- G. Problem Solving
- i. The CxA will recommend solutions to problems found, however the burden of responsibility to solve, correct and retest problems rests with the Contractor, Subcontractors, Architect and Engineering Professionals.
- H. Trend Logs
- i. Upon completion of successful functional performance testing, contractor shall submit graphic trend logs to CxA.
 - ii. Submit color graphic trend log for each piece of controlled equipment for each controlled parameter.
 - iii. Trend logs shall demonstrate successful performance for a seven day period, unless the controlled process requires a longer timeline.
 - iv. Trend log color printouts shall be submitted demonstrating successful seasonal performance.
 - v. Provide opposite season trend graphs.
 - vi. Trend logs shall be color graphic, with legends, submitted to CxA in color printout form or electronically in .pdf format.
 - vii. CxA will recommend acceptance of a specific piece of equipment once the submitted trends are reviewed and approved by CxA.
- I. Test and Verification Field Reports: CxA will record test data, observations, and measurements within CxAlloy®. Photographs, forms, and other means appropriate for the application shall be included with test documentation.

CxA will compile test and verification reports and test and verification certificates and include them in the commissioning report.

3.4 NON-CONFORMANCE AND APPROVAL OF TESTS

- A. Every effort will be made to expedite the testing process and minimize unnecessary delays, while not compromising the integrity of the procedures. The CxA is responsible for verification of system installation and function. The CxA will not overlook deficient work or loosen acceptance criteria to satisfy scheduling or cost issues.
- B. Commissioning Issues
 - i. Cx Associates will document all commissioning issues in the Commissioning Construction Issues using the web-based platform CxAlloy®. These issues will be updated regularly and always available to the Contractor on CxAlloy®. The CxA will notify the applicable parties via email when there are updates to the Commissioning Construction Issues to be addressed.
 - ii. The responsible contractor shall remedy the issue and update the Commissioning Construction Issue on CxAlloy® within two weeks of when the issue is identified.
 - iii. All open issues shall be closed within one month of substantial completion.
 - iv. Time & materials required to verify completion of any open commissioning issues one month after the issue was identified and/or one month after substantial completion shall be back charged to the contractor through the Owner.
 - v. LEED requires that all commissioning issues be closed prior to the submission of the commissioning documentation.
- C. Non-Conformance.
 - i. Corrections of minor deficiencies identified may be made during the tests at the discretion of the CxA. In such cases the deficiency and resolution will be documented via the CxAlloy® commissioning website.
 - ii. Should a deficiency be identified during verification or testing, the CxA will discuss the issue with the responsible subcontractor.
 - a) When there is no dispute on the deficiency and the subcontractor accepts responsibility to correct it:
 - 1) The CxA documents the deficiency and the subcontractor's response and intentions and they go on to another test or sequence.
 - 2) After the day's work, the CxA submits the non-compliance reports to the Contractor.
 - b) If there is a dispute about a deficiency, regarding whether it is a deficiency or who is responsible:

- 1) The deficiency shall be documented with the subcontractor's response and a copy given to the Contractor.
 - 2) Resolutions are made at the lowest management level possible. Other parties are brought into the discussions as needed. Final interpretive authority is with the Owner.
- c) Once the interpretation and resolution have been decided, the appropriate party corrects the deficiency, provides a statement of correction and provides it to the CxA. The CxA reschedules the test and the test is repeated until satisfactory performance is achieved.
- iii. If it is determined that the system is constructed according to the Contract Documents, Owner will decide whether modifications required to bring the performance of the system to the OPR and BoD documents shall be implemented or if tests will be accepted as submitted. If corrective Work is performed, Owner will decide if tests shall be repeated and a revised report submitted.
- iv. Cost of Retesting.
- a) The cost for the subcontractor to re-perform a prefunctional check-out or functional test, if they are responsible for the deficiency, shall be theirs. If they are not responsible, any cost recovery for retesting costs shall be negotiated with the Owner.
 - b) The time for the CxA to direct any re-verification or retesting required due to failures or lack of completion at the initial verification and/or testing, will be back charged to the Contractor through the Owner at 1.5 times the rate for Cx services.
- v. Failure Due to Manufacturer Defect.
- a) If 10%, or three, whichever is greater, of identical pieces (size alone does not constitute a difference) of equipment fail to perform to the Contract Documents (mechanically or substantively) due to manufacturing defect, not allowing it to meet its submitted performance spec, all identical units may be considered unacceptable by the CxA. In such case, the subcontractor shall provide the Owner with the following:
 - 1) Within one week of notification from the Contractor, the subcontractor or manufacturer's representative shall examine all other identical units making a record of the findings.
 - 2) The findings shall be provided to the CxA within two weeks of the original notice.

- 3) Within two weeks of the original notification, the Contractor, subcontractor or manufacturer shall provide a signed and dated, written explanation of the problem, cause of failures, etc. and all proposed solutions which shall include full equipment submittals.

(a) The proposed solutions shall not significantly exceed the specification requirements of the original installation.

- 4) The Owner will determine whether a replacement of all identical units or a repair is acceptable.
- 5) Two examples of the proposed solution will be installed by the subcontractor and the subcontractor will be allowed to test the installations for up to one week, upon which the Owner will decide whether to accept the solution.
- 6) Upon acceptance, the Contractor and/or manufacturer shall replace or repair all identical items, at their expense and extend the warranty accordingly, if the original equipment warranty had begun. The replacement/repair work shall proceed with reasonable speed beginning within one week from when parts can be obtained.

vi. Approval.

- a) The CxA notes each satisfactorily observed checklist item or demonstrated test function on the test form via the CxAlloy® commissioning website. The CxA recommends acceptance of each test to the Owner using a standard form.

D. Deferred Testing:

- i. If tests cannot be completed because of a deficiency outside the scope of the subcontractor responsible for installation of the System to be Commissioned, the deficiency shall be documented and reported to Owner. Deficiencies shall be resolved and corrected by appropriate parties and test rescheduled.
- ii. Where seasonal testing is required, appropriate initial performance tests shall be completed, documented, and additional tests scheduled.

3.5 OPERATION AND MAINTENANCE TRAINING REQUIREMENTS

- A. Operations and Maintenance Training Instructor Qualifications: Equipment training shall be provided by factory-authorized technical representatives, experienced in training, operation, and maintenance procedures for installed systems, subsystems, and equipment. Training sessions shall not include any sales or promotional information.

- B. Training shall be delivered in a coordinated manner to provide building Operations and Maintenance Personnel with a comprehensive understanding of the building, systems, equipment and controls systems.
 - i. Each subcontractor shall designate a training liaison who is responsible for developing, scheduling, providing all required training submittals and documentation, and ensuring the quality of training provided under contract by each trade.
- C. Training Plans shall be prepared by the contractor and submitted to the CxA and the Owner for review and comment prior to finalizing training plans for each system to be commissioned. Training Plans shall be submitted within one month of submittal approval for major equipment and controls.
- D. The CxA will provide the contractor/owner with a standardized form to assist with the creation of the training plan. Supplemental documentation can be included with this form. Training Plans shall include:
 - i. Trainer qualifications and certifications.
 - ii. List of those who should receive operational training, by position or name.
 - iii. Level of instruction required for each system.
 - iv. Determination of whether the training provided by the equipment manufacturer is acceptable.
 - v. Tracking method to ensure that all required positions or persons receive training.
 - vi. Training content shall include field orientation during installation, classroom instruction and field training after the completion of installation and cover the following elements:
 - a) Equipment included in training.
 - b) Location of training.
 - c) Detailed Agenda including, but not limited to:
 - 1) Objectives.
 - 2) Subjects covered (description, duration of discussion, special methods, etc.).
 - 3) Description of training rigor.
 - 4) Duration of training on each subject.
 - d) Hand-outs.
 - e) Instructor for each subject.
 - f) Methods (classroom lecture, video, site walk-through, actual operational demonstrations, written handouts, etc.).
 - g) Instructor resumes.
 - vii. A robust training program will address the following:

- a) Emergency instructions and procedures.
 - b) Operation instructions and procedures.
 - c) Troubleshooting procedures.
 - d) Maintenance and inspection procedures.
 - e) Repair procedures.
 - f) Upkeep of the systems manual and associated maintenance documentation logs.
- viii. For primary equipment, the Controls subcontractor shall provide an overview of the system, and discussion of the associated control and other interfaces.
- ix. Contractor shall provide edited and clearly labeled videotapes of training sessions for future training use by the Owner.
- E. Complete O&M manuals and as-built documents shall be submitted for review prior to training and used to support the training sessions.
- F. The CxA will verify and approve the content and adequacy of the training of Owner personnel for Systems to be Commissioned.
- G. In addition to these general requirements, additional training requirements for Owner personnel are specified in other Divisions.
- H. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.
- I. Once training is complete, contractor will submit the date training was held and a list of attendees.

3.6 TEST PORTS

- A. Application: All points.
- i. The contractor shall provide test ports (Pete's Plugs) for handheld instrument readings near all piping system sensors in the primary system and for all air system devices.

END OF SECTION 01 9113

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Section 01 9119

BUILDING EXTERIOR ENCLOSURE COMMISSIONING REQUIREMENTS

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.
- B. OPR and BoD documentation are included by reference for information only.
- C. Commissioning Plan – A Preliminary Commissioning Plan is provided as supplemental information and will guide the commissioning process.

1.2 SUMMARY

- A. The purpose of Building Enclosure Commissioning (BECx) is to provide a process for independent, third-party verification that the installed performance of the building exterior enclosure meets or exceeds the minimum performance requirements set forth by the contract documents for this project. The air, thermal, vapor and water leakage control systems will be commissioned to verify functionality, quality of installation and durability of the air, vapor, and water barrier systems.
- B. This section includes general requirements that apply to requirements and implementation of non-structural commissioning of the building exterior enclosure, without regard to specific systems, assemblies, or components.
- C. Related Divisions & Documents:
 - i. All sections relating to the Systems to be Commissioned are related to the commissioning requirements and process.
 - ii. This includes, but is not limited to all Sections of Divisions 01, 07, and 08 and specific technical specifications found in division 03, 04, and 06 as it pertains to the air, thermal, drainage, and/or vapor barriers. Content in these specifications does not include content pertaining to structural performance and testing, fire-proofing, and interior assemblies
 - iii. Section 01 19 13 Commissioning Requirements
 - iv. The Building Envelope Commissioning Plan and Appendices

1.3 DEFINITIONS

- A. Architect: Includes Architect identified in the Contract for Construction between Owner and Contractor.
- B. BoD: Basis of Design: A document, prepared by Architect, that records concepts, calculations, decisions, and product selections used to meet the

- OPR and to satisfy applicable regulatory requirements, standards, and guidelines.
- C. Commissioning Plan: A document that outlines the organization, schedule, allocation of resources, and documentation requirements of the commissioning process.
 - D. Current Facility Requirements (CFR) and Operations and Maintenance Plan: A document that defines the Owner's current operational needs and requirements for a building. It typically includes items addressing temperature and humidity set points, operating hours, filtration, vibration, sound and/or specialty needs.
 - E. Construction Checklists – enclosure material/systems checklists, developed by the CxA, completed/recognized by the contractor, and verified by the CxA.
 - F. Contractor: the prime contractor identified in the Contract for Construction between Owner and Contractor. This may be a General Contractor, a Construction Manager or some other entity.
 - G. Corrective Action– documentation of an issue identified by the CxA in a Field Report that requires correction and response by the Contractor.
 - H. CxA: Commissioning Authority.
 - I. Engineering Professionals: Includes the Engineers identified in the Contract for Construction between Owner and Contractor, responsible for design of HVAC, electrical, communications, controls for HVAC systems, and other related systems.
 - J. Field Test Matrix – A detailed table found as an appendix in the Commissioning Plan that compiles all specified enclosure field testing at the time of document creation. This matrix is reviewed by the Architect for accuracy and, if necessary, approval of any added testing clarifications.
 - K. Functional Performance Testing – the rigorous, documented testing of enclosure systems. Tests are specified by the Architect and performed by a 3rd party testing agent engaged by either the owner or the contractor, depending on how each test is specified.
 - L. CxAlloy® Commissioning Construction Issues – log of all CxA identified issues and their status.
 - M. OPR: Owners Project Requirements: A written document, prepared by Owner that details the functional requirements of Project and expectations of how it will be used and operated. This document includes Project and design goals, measurable performance criteria, budgets, schedules, success criteria, and supporting information.
 - N. Subcontractor: contractors responsible to the Contractor or Owner for installation of Systems to be Commissioned.
 - O. Systems, Assemblies, and Materials: Where these terms are used together or separately, they shall mean "as-built" systems, assemblies, and materials.

- P. Systems to be Commissioned: includes all systems, assemblies, and associated materials to be commissioned.
- Q. Systems Manual: a manual providing to the current and future operating staff the information needed to understand and optimally operate each system. The manual is in addition to the O&M Manuals submitted by the contractor.

1.4 COMMISSIONING TEAM

- A. The Commissioning Team is organized and lead by the CxA with the support and coordination of the Contractor. Members include:
 - i. Representatives of the CxA.
 - ii. Representatives of the Owner including facility users and operation and maintenance personnel.
 - iii. Architect and engineering design professionals.
 - iv. The Contractor Project Manager, Superintendent and other appropriate parties responsible for coordination of other Division activities.
 - v. Subcontractor representatives including the project manager and foreman responsible for installation of systems to be commissioned including, but not limited to the following trades:
 - a) Waterproofing/Damp proofing Systems
 - b) Wall Air & Vapor Barriers
 - c) Wall Thermal Barriers
 - d) Wall Finishes
 - e) Roof Systems
 - f) Windows/Storefronts/Curtain Walls
 - g) Exterior Swing Doors and Overhead Doors

1.5 CONTRACTOR'S RESPONSIBILITIES

- A. Identify one member of the contractor's team who will act as the primary point of contact for the CxA and all activities performed by the CxA.
- B. Provide utility services required for the commissioning process. This includes ensuring the equipment necessary to access the CxAlloy® commissioning website is available on the construction site. This access needs to be provided during construction activities to ensure on site completion of commissioning documentation.
- C. Access and utilize the CxAlloy® online commissioning software for documentation of commissioning activities.
- D. Coordinate subcontractor commissioning activities; ensuring all affected trades are provided with the documentation necessary for the completion of their commissioning scope.

- E. Provide the CxA with a detailed and accurate construction schedule updated monthly. Coordinate scheduling of commissioning activities with the CxA and include them in the construction schedule.
 - i. Provide schedule for enclosure system submittals and shop drawings for incorporation into the commissioning plan. Update schedule monthly throughout the construction period.
 - ii. Coordinate the regular submission of detailed Subcontractor Schedules to the CxA.
- F. Provide CxA with copies of all approved drawings, specifications, submittals, shop drawings, manufacturer's literature, schedules, change-orders, ASIs, or other modifications impacting construction when approved.
- G. Process and respond to Commissioning Construction Issues, Field Reports and RFIs from the CxA. Evaluate performance deficiencies identified in test reports and, in collaboration with entity responsible for system/material installation, and recommend corrective actions.
- H. The Contractor has primary responsibility for ensuring commissioning activities are successfully completed in a timely manner. In order to fulfill that responsibility, the contractor shall assist the CxA in coordination and execution of all Construction Phase Commissioning Activities including, but not limited to:
 - i. Planning and participation in construction-phase coordination meetings, including the kick-off meeting.
 - ii. Planning and participation in commissioning verifications.
 - iii. Coordination of submittal responses and resubmissions to ensure that resubmissions adequately address design team and CxA comments.
 - iv. Complete and participate in the construction of on-site mock-ups and the assessment of detail constructability and performance. This includes elements of the building exterior enclosure, as identified in individual sections of the specifications in Divisions 1 through 9 - including but not limited to wall-to-window/storefront/curtain wall interfaces, roof-to-wall interfaces, wall to slab/foundation interfaces, and any penetrations. Provide personnel to be present and have a representative present from each trade and/or subcontractor associated with installing the system during mock-up performance testing and inspections. If a systemic problem is identified during testing, provide repair and remediation protocol for any systemic failures identified by the Commissioning Authority. Include a timeline for repair of all affected elements. Repaired elements shall not be covered up without review by the Commissioning Authority.
 - v. Ensure accurate completion of provided Construction Checklists at critical construction milestones.
 - vi. Certify readiness of Systems to be Commissioned and ensure accurate completion of Functional Performance Test documents **prior** to performance of Functional Performance Testing.

- vii. Facilitate Functional Performance Testing of Systems to be Commissioned and participate in testing at the request of the CxA or responsible Subcontractor.
 - a) Ensure subcontractors engage testing agencies, as necessary, in a timely manner in order to incorporate field testing at the appropriate time. Note: Subcontractors are responsible for all contractor-engaged 3rd party testing as indicated in the project specifications and the Commissioning Plan test matrix.
- viii. Provide necessary labor and equipment to facilitate Functional Performance Testing engaged by owner and by contractor. This includes, but is not limited to providing:
 - a) Clear access to test locations.
 - b) Boom lifts, scissor lifts, scaffolding, swing staging, and/or fork-trucks and operators, as needed, to access and test enclosure systems from the interior or exterior.
 - c) Temporary masking of HVAC penetrations and any unfinished openings for blower door tests.
 - d) Temporary heated enclosures on the exterior of the building in order to create suitable conditions for wintertime tests.
 - e) Temporary enclosures within the building to perform progress tests requiring pressurization of discrete areas.
 - f) Temporary control of HVAC systems controls for testing, as needed for late-stage testing.
 - g) Contractor witnesses during testing.
- ix. Manage the documentation of commissioning work by the sub-contractors.
- x. Evaluate performance deficiencies identified in test reports and, in collaboration with entity responsible for system and equipment installation, recommend corrective action.
- xi. Provide a Systems Manual for each major building exterior enclosure system as part of the project record closeout documentation. The CxA will provide an outline template for inclusion in the CxA O&M Plan. This should serve as a starting point for the contractor-provided systems manual which should include closeout requirements listed in relevant specifications, and more specifically:
 - a) As-built drawings, including a copy of all details and drawings that were installed as part of any addendums or change order directives. All deviations shall be clearly marked in red.

- b) Specifications for the project, including all accepted product substitutions and any additional specifications as part of any addendums or change order directives. All accepted product substitutions and all deviations shall be clearly marked in red.
 - c) A copy of all accepted change orders.
 - d) A copy of all final shop drawings for each product requiring shop drawings, with the A/E mark-ups and comments, showing final as-built conditions
 - e) A copy of all warranties, organized by product, and any and all product manufacturer letters indicating the product as appropriate to use for the application intended on the project as well as any installation guidance.
 - f) A master product list summarizing all products used on the project for construction of the building exterior enclosure, organized by tabs in a binder, including product name, manufacturer, manufacturer contact information, install, installer contact information, product installation and maintenance guides, etc.
- xii. Complete the CxA-provided Enclosure System Manufacturer, Installer, and Warranty Appendix outline for inclusion in the CxA's O&M Plan.
- xiii. Track and follow-up on outstanding corrective action items as follows:
- a) Document any and all corrective actions in detail with photo sequences.
 - b) Corrective actions requiring modification of construction documents shall be formally approved by the architect and documented.
 - c) All responses shall be made in the CxAlloy® Commissioning Construction Issues provided by Cx Associates via the online platform CxAlloy®.
 - d) Issues shall be addressed and responses provided within two weeks after they are identified. Issues at risk of concealment may require faster responses.
 - e) Where an issue will take longer than two weeks to address, provide a completion date within two weeks of issue identification.
 - f) Resolve all issues within one month of substantial completion.
- I. Subcontractors shall assign representatives with expertise and authority to act on behalf of the entity responsible for installation of Systems to be Commissioned who shall participate in and perform commissioning team activities including, but not limited to, the following:

- i. Provide schedules for system and material submittals including: submittal information for all Systems to be Commissioned, shop drawings, and warranty letters manuals for incorporation into the commissioning plan. Update schedule on a monthly basis throughout the construction period.
 - ii. Participation in mock-up construction and performance testing and inspections. Personnel from each trade that will be completing the work in the field are to be utilized to construct each required mock-up.
 - iii. Participate in construction-phase coordination meetings.
 - iv. Process and respond to Commissioning Construction Issues, Field Reports and RFIs from the CxA via the CxAlloy® commissioning website.
 - v. Complete Construction Checklists for all Systems to be Commissioned in a progressive manner. This entails completing/responding to checksheets as the work commences and at the critical progress milestones outlined on the checksheet. Completed checksheets shall be provided to the CxA via CxAlloy® throughout construction.
 - vi. Participate with the CxA during field inspections and functional performance testing.
 - vii. Document, through photographs, the sequence and overall installation of all major envelope transition details at their first instance, including first instance of each of the control layers (air, thermal, vapor, and drainage layers). Any repair work shall also be documented by the contractor.
 - viii. Maintain updated Project Record Documents for periodic review of the CxA and submit final record documents at project completion.
 - ix. Certify readiness of Systems to be Commissioned for performance of Functional Performance Testing.
 - x. Complete Functional Performance Tests documents via the CxAlloy® commissioning website.
 - xi. Provide all contractor-engaged 3rd party Functional Performance Testing as identified in the project specifications and the test matrix of the Building Enclosure Commissioning plan.
 - a) Installers should be present to witness testing and assess the nature of system failures, if any.
 - b) Provide copies of all 3rd party test and inspections reports to the rest of the Commissioning Team immediately upon receipt.
- J. Use of Online or Digital Platform:
- i. Use of CxAlloy®

- a) The contractor shall use CxAlloy®, an online commissioning platform, as directed by the CxA and as outlined in the Cx Plan. Any equipment necessary for accessing this online tool shall be provided by the contractor on the construction site. CxAlloy® will be used for Construction Checklists, Functional Performance Testing, and responding to items in the Commissioning Construction Issues.
- b) A Starting Guide for how to use CxAlloy® can be found here: https://s3.amazonaws.com/helpscout.net/docs/assets/58a201fddd8c8e56bfa7a917/attachments/58c04a012c7d3a576d35c9df/Getting_Started_Team_Member.pdf

1.6 COMMISSIONING SUBMITTALS BY CONTRACTOR

- A. Commissioning-specific submittals:
 - i. The contractor shall submit completed Construction Checklists and Functional Performance Test Documents via the CxAlloy® commissioning website.
- B. Commissioning related requirements for submittals on Systems to be Commissioned: The following information shall be submitted with the product and system literature and shop drawing submittals for review and approval by the Owner, Architect, Engineering Professionals and the CxA.
 - i. Manufacturer cut sheets, product literature, shop drawings, and warranties in accordance with the requirements of other Divisions' submittal articles.
 - ii. Qualifications Data: For fabricators, installers, and testing agencies, submit to the Commissioning Authority for review all qualifications required in Divisions 01 through 09 for review.
 - iii. Preconstruction Test Reports: All preconstruction test results, including but not limited to: air and water leakage fenestration testing, qualitative air barrier testing, sealant and membrane adhesion testing, etc.
 - iv. Source Quality Control (Laboratory Test Reports): Retain a copy for field review by the CxA and include in the closeout submittal a copy of all manufacturer QA/QC reports submitted for products supplied for the project.
 - a) For window/storefront/curtain wall systems independent test reports shall include air and water penetration testing pressure ratings and leakage tolerances.
 - v. Field Quality Control Reports: Provide a copy of the test reports for all enclosure field testing completed by the testing agency on behalf of the contractor and/or subcontractors.
 - vi. Special Inspections Reports: Provide a copy of all special inspections reports for inspections indicated by the Architect/Engineer-of-Record in the specifications.

- vii. Submit Final Approved Shop Drawings for each piece of equipment to be Commissioned including all “as noted” comments in the final submittal.
- C. The CxA will provide a single review of the submittals. Failure to incorporate agreed upon CxA review comments in subsequent submittals will result in a back charge to the contractor for additional submittal review time.
- D. Approved submittals for all Systems to be Commissioned must be compiled and individually bookmarked in the navigation pane of a single PDF document, which shall be electronically transferred to the CxA via email or an online file transfer service.
- E. Progress submittals of completed construction checklists.
 - i. Contractor shall be responsible for notifying CxA via email of when contractors will be completing or have completed a majority of the CxAlloy® construction checklists for each system/material type.
 - ii. These email notifications shall be provided bi-weekly once material installation of the affected subcontracts commences and the checksheets have been provided by the CxA.
 - iii. The contractor shall submit a schedule for checksheet completion and submission to assist the team in ensuring that the commissioning process is incorporated as construction progresses.
- F. Current Facilities Requirements and Operations and Maintenance Plan
 - i. Contractors will supply the following information as it relates to the building enclosure for inclusion in the CFR and O&M Plan:
 - a) Completion of the Appendix C outline, which will detail information regarding building systems products, the installation contractor, the manufacturer, and installer and manufacturer warranty information.
 - b) Preventive maintenance plan for building equipment described in the systems narrative that includes maintenance instructions with timeframe/frequency for each task (shall be part of the O&M Manual).
- G. Systems Manual

The Systems Manual for the building enclosure contains all the information necessary to identify the composition of all major envelope assemblies, the interface detailing, information regarding manufacturer and installer contact, and information regarding manufacturer and installer warranties. Information for the systems manual is generally collected during construction and after completion of a project. It is the responsibility of the Construction Manager to provide the following enclosure-specific documentation to CxA as PDF file, in addition to any requirements under section 01 91 13 regarding other systems to be commissioned:

- a) Approved submittals, individually bookmarked in the navigation pane of a single PDF document.
 - 1) Submittals must be combined in an independent PDF file and electronically transferred to the CxA via email or an online file transfer service.
- b) As-built drawings.
- c) Enclosure system preventive maintenance schedules.
- d) Product manufacturer and model information
- e) Product manufacturer and installer contact information
- f) Manufacturer and installer warranty letters
- ii. The Construction Manager will electronically transfer the independent PDF(s) to the CxA via email or an online file transfer service.
- iii. The CxA will add the following sections, finalize the Systems Manual and email the complete PDF file to the Owner:
 - a) Owner's project requirements.
 - b) Basis of design.
 - c) Recommended preventative maintenance schedule.
 - d) Ongoing system optimization procedures.
 - e) Final commissioning report.
- H. Provide all warranties for each division as a single PDF file, bookmarked by system name in the navigation panel. System Warranties, contractor, manufacturer and owner obligations to maintain the warranty shall be specifically stated.
- I. Coordination and Record Drawings.

1.7 QUALITY ASSURANCE

- A. Calibration of Test Equipment: Comply with test equipment manufacturer's calibration procedures and intervals. Recalibrate test instruments immediately whenever instruments have been repaired following damage or dropping. Affix calibration tags to test instruments. Instruments shall have been calibrated by NIST traceable standards within six months prior to use.

1.8 SYSTEMS TO BE COMMISSIONED

- A. The following systems will be commissioned in this project.
 - i. Air Barriers (for all major enclosure assemblies)
 - ii. Vapor Retarders (for all major enclosure assemblies)
 - iii. Thermal Barriers (for all major enclosure assemblies)
 - iv. Bulk Water Barriers/Drainage Planes (for all major enclosure assemblies)

- v. Integration of the above control layers at major system interfaces (ex. wall-to-roof)

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Preconstruction Testing of Mockups: See requirements in Section 01 43 39 Mock Ups, or similar and as applicable.
- B. Quality Assurance and Compliance Testing during construction: See the BECx Commissioning Plan, its appendices, and all Field Quality Control Requirements that may be found in:
 - i. Sections under Division 01 which relate to the field testing of exterior assemblies and/or mock ups.
 - ii. Technical sections under Division 07
 - iii. Technical sections under Division 08
- C. All testing equipment utilized by the independent testing agency shall be of sufficient quality and accuracy to test and/or measure system performance and shall be within their appropriate calibration period.

PART 3 - EXECUTION

3.1 COMMISSIONING CONSTRUCTION ISSUES AND FIELD REPORTS

- A. CxA maintains Commissioning Construction Issues on the online platform CxAlloy® that describes design, installation, and performance issues that are at variance with the OPR, BoD, and Contract Documents.
- B. The CxA will document any deficiencies observed during construction, checkout and/or testing in a Field Report via the CxAlloy® commissioning website. Each Corrective Action will be summarized in the CxAlloy® Commissioning Construction Issues on CxAlloy®. Contractors remedy and document the correction to the CxA. The CxA will verify corrections depending on their scope and scale.

3.2 CONSTRUCTION CHECKLISTS

- A. General. Each major system material receives full installation check-out by the responsible contractor. No sampling strategies are used. The installation checklists for a given material must be completed at commencement of material installation and again at the major milestones of material installation, as identified by the checklists. The intent of these checklists is to notify the CxA of installation commencement and to ensure the responsible contractor has acknowledged and adopted critical installation requirements throughout material installation, while it is still exposed.
- B. Construction Checklists: The CxA provides Construction Checklists for the performance materials of each System to be Commissioned via the online platform CxAlloy®. Construction Checklists will be completed by the Contractor or installing Subcontractor. The CxA will verify components on

the checklist through periodic inspections where materials/systems are accessible. Each checklist will include, but not be limited to, the following:

- i. Name and identification information of each critical installation requirement being checked.
 - ii. Contractor or Subcontractor verification of each item including verification of all required data and construction practices as listed in the Construction Checklists.
 - iii. Notation of any material/system or installation practice that deviates from approved submittals or the Construction Documents.
 - iv. Timely signature from the Contractor or installing Subcontractor at defined installation milestones acknowledging systems/materials are installed per Construction Checklist and Construction Document requirements.
 - v. Name(s) of personnel involved with verification and dates on which verification activities and Construction Checklists were completed. The activity's timestamp and the name of the logged-in user will be automatically recorded via the internal audit log of the CxAlloy® platform when items are completed.
- C. Checklists are provided for specific systems/materials. Depending on the design intent of a given material, checklists may or may not include items pertaining to integration of other systems/materials. Interpretation of scope extent/ownership is not always clear and scope sequencing can occasionally be interchangeable. Because of this, it is possible that CxA inspections will identify and document material continuity/integration issues beyond the extent of the checklists themselves. Such occurrences will generally be assigned to the general Contractor to delegate corrections appropriately and provide a unified response to the CxA. The Contractor shall ensure each required Subcontractor has completed their work.
- i. Only individuals that have direct knowledge and witnessed that a line item task on the construction checklist was actually performed shall initial or check that item off.
- D. Contractor shall verify 100% of all systems and materials on the Construction Checklists, to fully represent the entirety of the installation. Sampling is not acceptable.
- E. Completion of Construction Checklists via the CxAlloy® commissioning website shall occur as the installation progresses. Commissioning inspections shall be scheduled based on full or partial completion of checklists and/or general communications with the Contractor about installation progress.
- F. In conjunction with direct contractor engagement/communication, the CxA will utilize completed checklists to understand the progress of envelope construction and will verify Construction Checklists for each primary system/material, where accessible during site visitation, and in the company of the responsible subcontractors if possible.

3.3 FUNCTIONAL PERFORMANCE TESTING

A. Prerequisites for Testing:

- i. Functional Performance Testing readiness checksheets for specific test locations have been completed by the Contractor or installing Subcontractor.
 - a) Exceptions: 1st Instance Air Barrier Testing: Given this testing is qualitative, comes with significant flexibility in testing parameters, and is very schedule sensitive, general test visits are usually coordinated with the Contractor and specific test locations and details to be tested are defined on site the day of testing.
- ii. An independent testing agency has been engaged by the Owner and/or the Contractor for the field testing specified in the project specifications and the Commissioning Plan test matrix. Note: The responsibility for engaging enclosure specific testing is identified by the language in the project specifications and Commissioning Plan test matrix.
- iii. Schedule of testing and arrival of the testing agent has been communicated at least 1 week in advance of testing to allow other Commissioning Team members the opportunity to witness testing.

B. Objectives and Scope.

- i. Required Functional Performance Testing for the building enclosure is dictated by the field test standards defined by the owner or architect, with input from the CxA, in the project specifications and compiled in the Commissioning Cx Plan test matrix appendix. In the project specifications, these enclosure field tests standards typically fall under the "Field Quality Control" articles of sections within Divisions 01, 07, and 08. The objective of functional performance testing is to demonstrate that each system requiring testing is performing per the documented design intent and Contract Documents. During the testing process, areas of deficient performance are identified and documented for review and correction, as necessary. When scheduled in a timely fashion, testing can help identify areas of deficiency before systemic faults are implemented and costly or impossible to correct.

C. Functional Performance Test Documents:

- i. The CxA will develop Functional Performance Test Documents through the web-based platform CxAlloy® for each System to be Commissioned including:
 - a) Name and location of each test specimen.
 - b) Test standard utilized.
 - c) Test number.
 - d) Time and date of test.
 - e) Indication of whether the record is for a first test or retest following correction of a problem or issue.

- f) Individuals present for test.
 - g) Issue number, if any, generated as the result of test.
 - h) Testing conditions under which test was conducted, including (as applicable) ambient conditions, induced pressures, points, override conditions, and status and operating conditions that impact the results of test.
 - i) Pass/Fail tolerances for each test.
 - j) Test results and any observed deficiencies contributing to any failed tests.
 - k) Separate entries will be provided for each item to be tested.
- ii. The CxA documents the results of functional performance tests using the specific procedural forms, accessible via the CxAlloy® commissioning website, developed for that purpose on CxAlloy®.
 - iii. The CxA will witness testing in-person on an as-needed basis. Currently two visits to witness testing is anticipated.
- D. Test Methods.
- i. Required Functional Performance Testing for the building enclosure is dictated by the field test standards defined by the owner or architect, with input from the CxA, in the project specifications and compiled in the Commissioning Cx Plan test matrix appendix. These enclosure field tests standards typically fall under the “Field Quality Control” articles of sections within Divisions 01, 07, and 08.
 - ii. Where field testing is required, all performance requirements listed in the contract documents shall be cross-checked against the approved submittal product test data (when available). If the specified test requirements are deemed more stringent than that of the submitted and approved product test data, then the product test data shall govern as it relates to determining appropriate test pressures, tolerances, etc. Otherwise, the specified test requirements and/or the Commissioning Plan test matrix shall stand.
 - iii. Where this section, technical specifications and/or the Commissioning Plan test matrix omit test standards, quantities, performance requirements, criteria for satisfactory results, or protocol for non-satisfactory results, or where discrepancies exist between the specifications and the Commissioning Plan test matrix, the Architect-of-Record and CxA should be immediately notified to determine the proper course of action.
- E. Coordination and Scheduling.
- i. The Contractor and Subcontractors shall provide sufficient notice to the CxA regarding their completion schedule for the construction checklists and readiness of systems for Functional Performance Testing. The CxA shall direct, witness and document, via the CxAlloy® commissioning website, the functional testing of all systems.

- ii. Engaging an independent testing agent for field tests is the responsibility of the Owner and/or the Contractor/Subcontractor depending on how each field test is specified in the project specifications. It is common for specification language to default all testing responsibility to the contractor except where explicitly written as "Owner shall engage", or similar. The Owner and Contractor shall review project specifications to determine responsibility.
- F. Problem Solving
- i. When possible, the CxA will recommend solutions to problems found, however the burden of responsibility to solve, correct and retest problems rests with the Contractor, Subcontractors, Architect and Engineering Professionals.
- G. Test and Verification Field Reports: CxA will record test data, observations, and measurements within CxAlloy®. Photographs, forms, and other means appropriate for the application shall be included with test documentation. CxA will compile test and verification reports and include them in the commissioning report.
- i. 3rd party test reports shall include measured data, test protocol, test results, and a comprehensive summary describing the specific building exterior enclosure systems at the time of testing.

3.4 NON-CONFORMANCE AND APPROVAL OF TESTS AND INSPECTIONS

- A. Every effort will be made to expedite the testing process and minimize unnecessary delays, while not compromising the integrity of the procedures. The CxA is responsible for verification of system installation and function. The CxA will not overlook deficient work or loosen acceptance criteria to satisfy scheduling or cost issues.
- B. Test Outcome Protocol:
- i. Where building enclosure field tests yield results which do not satisfy the performance requirements of the Commissioning Plan test matrix, the product test data, the associated technical specification, and/or the test standard, standard protocol shall be to retest the failed area after corrections have been made and test one additional new area for each failed result – unless otherwise stated for specific tests in the project specifications.
 - ii. Where building enclosure field tests yield results which satisfy the performance requirements of the Commissioning Plan test matrix, the product test data, the associated technical specification, and/or the test standard, the results shall be considered acceptable for the project. The enclosure installation subjected to the field test shall be replicated in all similar and applicable locations throughout the building.
 - iii. If a deficiency is identified and it is determined that the system is constructed according to the Contract Documents, the Owner will decide whether modifications are required to bring the performance of

the system to a level where the failure or deficiency is eliminated and shall be implemented or if the test results will be accepted as submitted. If corrective work is performed, the Owner will decide if tests shall be repeated and a revised report is to be submitted.

C. Commissioning Issues

- i. Cx Associates will document all commissioning issues in the Commissioning Construction Issues using the web-based platform CxAlloy®. These issues will be updated regularly and always available to the Contractor on CxAlloy®. The CxA will notify the applicable parties via email when there are updates to the Commissioning Construction Issues to be addressed.
- ii. The responsible contractor shall remedy the issue and update the Commissioning Construction Issue on CxAlloy® within two weeks of when the issue is identified.
- iii. All open issues shall be closed within one month of substantial completion.
- iv. Time & materials required to verify completion of any open commissioning issues one month after the issue was identified and/or one month after substantial completion shall be back charged to the contractor through the Owner.
- v. LEED requires that all commissioning issues be closed prior to the submission of the commissioning documentation.

D. Non-Conformance.

- i. Corrections of minor deficiencies identified may be made during certain tests at the discretion of the CxA. In such cases the deficiency and resolution will be documented via the CxAlloy® commissioning website.
- ii. Should a deficiency be identified during verification or testing, the CxA will discuss the issue with the Contractor or responsible Subcontractor.
 - a) When there is no dispute on the deficiency and the Contractor/Subcontractor accepts responsibility to correct it:
 - 1) The CxA documents the deficiency and the subcontractor's response and intentions and testing and verification progresses.
 - b) If there is a dispute about a deficiency, regarding whether it is a deficiency or who is responsible:
 - 1) The deficiency shall be documented with the Contractor or Subcontractor's response and a copy given to the Contractor.
 - 2) Resolutions are made at the lowest management level possible. Other parties are brought into the discussions as needed. Final interpretive authority is with the Owner.

- c) Once the interpretation and resolution have been decided, the appropriate party corrects the deficiency, provides a statement of correction and/or clear photo documentation evidence of correction and provides it to the CxA. If necessary, the CxA reschedules the test and the test is repeated until satisfactory performance is achieved.
- iii. If it is determined that the system is constructed according to the Contract Documents, Owner will decide whether modifications required to bring the performance of the system to the OPR and BoD documents shall be implemented or if tests will be accepted as submitted. If corrective Work is performed, Owner will decide if tests shall be repeated and a revised report submitted.
- iv. Cost of Retesting.
 - a) The cost for the subcontractor to re-perform a functional test, if they are responsible for the deficiency and regardless of original ownership, shall be theirs. If they are not responsible, any cost recovery for retesting costs shall be negotiated with the Owner.
 - b) The time for the CxA to direct any retesting required due to failures or lack of completion at the initial verification and/or testing, will be back charged to the Contractor through the Owner at 1.5 times the rate for Cx services.
- v. Failure Due to Manufacturer Defect.
 - a) If 10%, or three, whichever is greater, of identical pieces (size alone does not constitute a difference) of equipment fail to perform to the Contract Documents (mechanically or substantively) due to manufacturing defect, not allowing it to meet its submitted performance spec, all identical units may be considered unacceptable by the CxA. In such case, the subcontractor shall provide the Owner with the following:
 - 1) Within one week of notification from the Contractor, the subcontractor or manufacturer's representative shall examine all other identical units making a record of the findings.
 - 2) The findings shall be provided to the CxA within two weeks of the original notice.
 - 3) Within two weeks of the original notification, the Contractor, subcontractor or manufacturer shall provide a signed and dated, written explanation of the problem, cause of failures, etc. and all proposed solutions which shall include full equipment submittals.

(a) The proposed solutions shall not significantly exceed the specification requirements of the original installation.

- 4) The Owner will determine whether a replacement of all identical units or a repair is acceptable.
- 5) Two examples of the proposed solution will be installed by the subcontractor and the subcontractor will be allowed to test the installations for up to one week, upon which the Owner will decide whether to accept the solution.
- 6) Upon acceptance, the Contractor and/or manufacturer shall replace or repair all identical items, at their expense and extend the warranty accordingly, if the original equipment warranty had begun. The replacement/repair work shall proceed with reasonable speed beginning within one week from when parts can be obtained.

E. Deferred Testing:

- i. If field tests cannot be completed because of a deficiency outside the scope of the subcontractor responsible for installation of the System to be Commissioned, the deficiency shall be documented and reported to the Owner and the Architect-of-Record. Deficiencies shall be resolved and corrected by appropriate parties and the test rescheduled.
- ii. If field tests cannot be completed because of inclement weather, the testing agency shall notify the commissioning team in advance and coordinate to reschedule testing at the next earliest availability to minimize disruption to project schedule.

END OF SECTION 01 9119

SECTION 024113
SELECTIVE CIVIL SITE DEMOLITION

PART 1 - GENERAL

1.0 SUMMARY

A. Section Includes:

1. Removing finishes, furnishings, equipment, civil structures, and constructions indicated by Civil Drawings. This section refers to Civil Site Engineering items only. This section refers to all civil site items outside building.
2. Chopping, cutting, leveling, removing, cleaning, and similar work to prepare the Project for new construction and finishes.
3. Protecting existing items and construction to remain in-place. Restoring damage caused by demolition.
4. Disposing of products of demolition.

B. Related Information:

1. Use of site, occupancy during work: Maintain full occupancy and fire department access to all surrounding buildings. Coordinate all temporary access with the Medical Center representative. Comply with Section 01 1417 Occupancy Requirements.
2. Dust and noise controls; temporary enclosures and barriers; cleaning during work.
3. Temporary bypass and/or relocation of live piping mechanical lines; disconnection of mechanical and electrical work to be abandoned.

1.1 SUBMITTALS

- A. Comply with submittal section requirements.
- B. Waste Reduction & Recycling Plan

1.2 QUALITY ASSURANCE

- A. Demolition shall be done by skilled workmen under competent supervision.

1.3 PROJECT CONDITIONS

- A. The Owner assumes no responsibility for the condition of items or structures to be demolished.
- B. As far as practical, the Owner will maintain conditions that exist on the contract date, but the Owner reserves the right to perform removal and salvage work before the start of demolition.

1.4 SEQUENCING AND SCHEDULING

- A. Demolition is not necessarily continuous or sequential with initial operations.
- B. Sequence and stage work per approved Construction Schedules.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.0 EXAMINATION

A. Before beginning demolition:

1. Verify that areas affected by demolition operations are unoccupied and use is discontinued.
2. Verify that mechanical and electrical services in or to demolition areas are disconnected and/or properly protected.
3. Verify that facilities and/or controls for the protection of workmen, other persons, and property are in-place and/or ready for installation.
4. Verify that temporary protection is in-place and/or ready for installation, where demolition exposes normally protected building components or interior spaces to the elements.

3.1 PREPARATION

- A. Protection: Comply with Construction Facilities and Temporary Controls requirements and the following:

1. Prevent settlement, collapse, or movement of existing construction. Stop work immediately if any part of the demolition appears to be unstable. Support the demolition and report the condition to the Engineer.
2. When operations are suspended, do not leave parts of the demolition in danger of collapse or toppling by wind, vibration, other causes.
3. Protect active mechanical and electrical services to occupied spaces. Protect active mechanical and electrical piping, ducts, conduits, and equipment that are to remain or are to be removed/reworked by other trades/Sections or are to be used for demolition operations.
4. Do not load any part of building or platforms with materials, equipment, or debris that endangers their safety.

3.2 DEMOLITION

- A. Dismantle and take down work in an orderly manner, in accordance with approved Procedures Outline. Do not topple or drop building elements.
- B. Lower and hoist loads at their centers of gravity. Use tag lines or guide ropes to prevent swinging.
 1. Cutting: Where not otherwise shown or specified, cut to straight, neat lines.
 2. New Openings in Masonry and Concrete: Cut openings by core-drilling corners and saw-cutting sides. Do not allow saw cuts to overrun core-drilled holes. Prevent chipping and fracturing of surrounding construction.
 3. Flame Cutting: Do no flame cutting without specific written approval of and under the conditions prescribed by the Engineer.
 4. Pavement: All bituminous pavement shall be saw cut prior to placing new pavement.
- C. Discoveries:
 1. If hazardous materials of unanticipated structural, mechanical, and/or electrical elements are encountered, suspend operations in affected areas and report discoveries immediately to the Engineer.
 2. If directed by the Engineer, perform operations necessary to investigate the nature and extent of discovered materials and elements. Do not resume demolition in affected areas until directed.

3.3 DISPOSAL

- A. The Contractor shall remove all products of demolition, except excess soil and items to be reused or relocated as specified by plans or specifications, from the premises and legally dispose of them.
- B. Perform cleaning periodically. Upon completion of each stage of demolition, clean affected areas and leave them ready for succeeding work.

PART 4 – REFERENCE

- A. All work relating to the proceeding specifications, unless otherwise noted, shall be accomplished in accordance with the State of Vermont Agency of Transportation “Standard Specifications for Construction”, dated 2018 and applicable State and Federal Laws.

END OF SECTION

SECTION 030510
CONCRETE WATERPROOFING ADMIXTURE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contractor, Subcontractors, and/or suppliers providing goods and services referenced in or related to this Section shall also be bound by the Related Documents identified in Division 01 Section "Summary."

1.2 SUMMARY

- A. Section includes:
1. High Performance integral liquid concrete waterproofing, shrinkage reducing, corrosion inhibiting and internal curing admixture for all new concrete, including below grade (parking structures, underground vaults, tunnels, elevator pits, manholes, cisterns, foundations walls and footings), bridge decks, support walls, pavement, sidewalks, steps, slab-on-grade, planters, fountains, elevated slabs, roof decks as indicated on drawings.
- B. Related Sections:
1. Division 03 Section "Cast-in-Place Concrete" and any required need for an ASTM 1745 certified vapor retarder. Special attention should also be given to Section 03 15 16 – Concrete Construction Joints.
 2. Division 07 Waterproofing Sections – Applications in which waterproofing epoxies, membranes or coatings are to be applied.
 3. Division 09 Flooring Sections for flooring materials installed over concrete slabs that already be specified or contain an integral moisture vapor reduction admixture and for all necessary / resultant industry or manufacturer preparation requirements.
 4. Division 09 Section "Water Vapor Emission Control System" for topical water vapor reduction system.

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 REFERENCES

- A. American Concrete Institute (ACI):
1. ACI 212.3R-16: Report on Chemical Admixtures for Concrete; Chapter 15, Permeability - reducing admixtures.
 2. ACI 224R-01: Control of Cracking in Concrete Structures (Reapproved 2008).
 3. ACI Spec 301-16: Specification for Structural Concrete.
 4. ACI PRC-305 -20: Guide to Hot Weather Concreting.
 5. ACI PRC-306-16: Guide to Cold Weather Concreting.
 6. ACI Spec-308.1-11: Specification for Curing Concrete.
 7. ACI PRC-309-05: Guide for Consolidation of Concrete.
- B. Society for Testing and Materials International (ASTM):
1. ASTM C666: Standard Test Method for resistance of Concrete to Rapid Freezing and Thawing.
 2. ASTM D 5084: Standard Test Methods for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter.
 3. ASTM E 1643: Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill under Concrete Slabs.
 4. ASTM G109: Standard Test Method for Determining Effects of Chemical Admixtures on Corrosion of Embedded Steel Reinforcement in Concrete Exposed to Chloride Environments.
 5. ASTM C672: Scaling Resistance of Concrete Surface Exposed to De-Icing Chemicals.

6. ASTM C1202: Resistance to Chloride Ion Penetration.
 7. ASTM C 94 / C94M: Standard Specification for Ready Mix Concrete.
 8. ASTM C143 / C 143 M 15a – Standard Test Method for Slump of Hydraulic- Cement Concrete.
 9. ASTM C231 / C231M-14 – Standard Test Method for Air Content of Freshly Mix Concrete by the Pressure Method.
 10. ASTM C309-11 Standard Specification for Liquid Membrane -Forming Compounds for Curing Concrete.
 11. ASTM E 1745: Standard Specification for Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs.
 12. ASTM C 39: Standard Test Method for Compressive Strength of Cylindrical Concrete Specimen.
 13. ASTM C157: Standard Test Method for Length Change of Hardened Hydraulic Cement Mortar and Concrete.
 14. ASTM C1260 -Standard Test Method for Potential Alkali Reactivity of Aggregates, Mortar Bar Method.
 15. ASTM C 494/C 494M-08a: Standard Specification for Chemical Admixtures for Concrete Type S.
- C. US Army Corp of Engineers Cement and Concrete Handbook (CRD-C):
1. CRD- C48-92: Standard Test Method for Water Permeability of Concrete.
- 1.5 SUBMITTALS (UNDER PROVISIONS OF SECTION 013000 – ADMINISTRATIVE REQUIREMENTS)
- A. Product Data: Manufacturer’s printed technical data on waterproofing admixture.
 - B. Product comprehensive & certified test reports performed by a qualified independent testing agency evidencing compliance of product with specified waterproofing admixture requirements.
 - C. Manufacturer’s product certificate certifying admixture provided was actually produced within said manufacturer’s standard plant capacity and meets or exceeds specified performance characteristic as well as criteria and physical requirements.
 - D. Sample Standard Limited warranty with epoxy or membrane bond consideration.
 - E. HPD Health Product Declaration.
 - F. Material Safety Data Sheet.
- 1.6 QUALITY ASSURANCE
- A. Admixture Manufacturer Qualifications: A manufacturer with not less than 15 years experience manufacturing Moisture Mitigating admixtures. Selected product manufacturer must have certification of compliance with ASTM C494 /C494M testing protocols from an independent AASHTO / Corps of Engineers approved laboratory. The actual waterproofing admixture manufacturer should be capable of providing test reports indicating compliance with specified performance requirements, and able to provide on-site technical representation should the need arise. A manufacturer is defined as an entity that singularly sources separate base components to produce a unique product through internal means. Distributors that purchase finished product or repackage such product from another entity unrelated to their own distinct manufacturing capacity – if any will not be considered to be the producer or sourced manufacturing entity. Manufacturer must have a legitimate USA manufacturing presence to assure legitimate warranty enforcement.
 - B. Pre-installation Conference.
 1. Verify all are familiar with waterproofing admixture manufacturer’s quality control procedures and that the manufacturer reviews the concrete mix designs and examines procedures for ensuring quality of concrete materials. Project should minimally be registered with waterproofing admixture manufacturer and GC responsibilities enumerated. Each entity directly concerned with the waterproofing admixture dosed

concrete must attend in person, conference call, or provide electronic review of documents, mix designs and procedures. Those required to participate or to review include but are not limited to:

- a. General Contractor / Construction Manager.
 - b. Independent testing agency responsible for concrete design mixtures, sampling and site specific testing.
 - c. Ready-mix concrete manufacturer.
 - d. Concrete subcontractor
 - e. Waterproofing Admixture manufacturer.
- C. Ready Mixed Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- D. Manufacturer's Representative / Collection Agent Qualifications
1. Personnel conducting field sampling on behalf of the "Owner" shall be qualified as an ACI Concrete Field-Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
- E. Testing and Evaluation: Personnel performing laboratory tests shall be certified in the conduct of ASTM D5084 or CRD C-48 under the supervision of a licensed geotechnical engineer and acceptable to the manufacturer.
- F. Source Limitations: Obtain and use concrete waterproofing admixture from only one manufacturer.
- G. ACI Publications: For slabs to receive moisture sensitive coatings or material, comply with the following unless modified by manufacturer installation requirements in the Contract Documents:
1. ACI 302.2R-06, "Guide for Concrete Slabs that Receive Moisture-Sensitive Coatings".
 2. ACI 308-16 "Guide to External Curing of Concrete" Section 4.1.4 Re: "Moisture Sensitive Coatings"

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver admixture in manufacturer's original, undamaged containers.
- B. Store admixture protected from exposure to harmful weather conditions and in a temperature-controlled area above 36 degrees.
- C. Do not allow product to freeze. Should product freeze, immediately contact the admixture manufacturer for further instructions.
- D. Concrete Performance Enhancing Admixture on hand or in inventory of the same manufacturer is acceptable so long as the product has not reached its expiration date or ever frozen. Confirm with the manufacturer that the product is registered and within its ideal shelf-life.

1.8 WARRANTY

- A. Concrete Performance Enhancing Admixture:
 1. Admixture must be installed according to, and in compliance with, the manufacturer's published data sheet to include, but not limited to:
 - a. Dosing instructions.
 - b. Compliance with all ACI concrete placement and curing guidelines listed and those otherwise relevant to the projects intended application and planned use requirements.
 - c. Use of an ASTM E 1745 vapor retarder installed when required following ASTM E 1643 guidelines.
 - d. The design and specifications for unwarranted roof deck assemblies, to include but not limited to, the use of air barriers and/or vapor retarders is the sole responsibility of

the design professional and is excluded from warranty as are any costs incurred due to roofing overburden.

2. Manufacturer's Warranty: To include:
 - a. Term: Standard Limited Warranty.
 - b. Adhesion Bond Consideration: Admixture manufacturer may provide an adhesion bond consideration as part of its warranty to match the term of the epoxy or coating manufacturer's material defect warranty upon admixture manufacturer's acceptance of field bond test.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design: Barrier One's CSXtreme – waterproofing admixture, Manufactured By Barrier One Concrete Admixtures.; 640 Garden Commerce Parkway, Winter Garden, Florida 34787. Phone: 800-562-9986 Email: contactus@barrierone.com.
- B. Subject to compliance with the requirements of this section, under provisions of Section 01 60 00, substitutions not be considered.
- C. Crystalline Class comparable products with adjusted and modified consideration may be adequate if they can demonstrate independently and verify specific performance requirements as forementioned and set forth in terms of field process, independent cylinder testing, actual manufacturing capacity and full warranty consideration to be equal or exceed. Products with revision may include:
 1. Xpex.
 2. KIM.
 3. Penetron.

2.2 MATERIALS

- A. Concrete performance enhancing admixtures for all exterior concrete (below grade, on ground and elevated) and structural deck construction shall be a non-toxic, sodium silicate-free, liquid admixture that is free of all volatile organic compounds (VOC). It shall be specifically designed to have a natural chemical reaction with pre-existing elements inside the concrete to eliminate the route of water emission through the slab by restricting the integral capillary system of the concrete. This chemical reaction shall form a permanent barrier (capillary break) that is integral to the concrete, insoluble, and irremovable.
 1. Hydraulic conductivity: Project specific maximum of 6.0 E-9 cm/s per ASTM D5084.
 2. Toxicity: None.
 3. Flammability: None
 4. VOC levels: Zero.
 5. Solvent: Water.
 6. Freeze Temp: 32 degrees Fahrenheit (00 C)(store above 360 F (2.30 C)).
 7. Hazardous vapors: None.
 8. Installation: All concrete U.O.N.
 9. Capillary break: Calcium Silicate Hydrate.
 10. Specific Gravity: 1.22.
 11. Weight: 9.6 lbs./gal (net).

2.3 RELATED MATERIALS NOTE TO SPECIFIER: (DELETE ANY SECTIONS NOT RELEVANT TO THIS PROJECT)

- A. Sheet Vapor Retarder (when applicable): ASTM E 1745 Class A or B compliant material, with a maximum permeance of 0.1 US Perms and a minimum thickness of 0.01". Include manufacturer's recommended adhesive or pressure-sensitive tape along with all detailing means and methods.
 1. Products: Subject to compliance with requirements, [available products that may be incorporated into the Work may be manufactured by, but are not limited to, the following]:
 - a. Insulation Solutions, Inc.

- b. Meadows, W. R., Inc.
 - c. Raven Industries Inc.
 - d. Reef Industries, Inc.
 - e. Stego.
2. It is the responsibility of the vapor retarder manufacturer to show compliance with the most current version of ASTM E1745 Table 1.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with the requirements of Division 03 Cast-in-Place Concrete, or other appropriate industry standards and their related sections, for concrete mixing, placing and curing.
- B. Sheet Vapor Retarders (when applicable): Place, protect, and repair ASTM 1745 sheet vapor retarder according to ASTM E 1643, ASTM F710, ACI 302.2R-06, ACI 308-16 and manufacturer's written instructions. Note To Specifier: (Delete any sections not relevant to this project).
- C. Add CSXtreme in accordance with manufacturer's printed data sheet instructions: For mix designs ranging from 0.31 to 0.53 w/cm, dose at 14 ounces per 100 pounds (414ml/45kg) of total cementitious materials. Ideally, so as not to effect W/Cm ratios; remove an equal amount of water from the mix. Add separately from other admixtures at the tail end of the load. Mix designs below forementioned benchmarks described may require adjustment and consultation with manufacturer and such consultation is necessitated and required prior to products use.
 1. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete with waterproofing admixture according to ASTM C 94/C 94M; furnish batch and delivery ticket information showing dosage of waterproofing admixture and W/Cm ratio to GC file.
 2. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Add the waterproofing admixture to where it makes direct contact with the ready mix concrete and then rotate drum of batch truck on high for at least seven minutes prior to discharge.
- D. Freshening onsite with held back mix water is acceptable so long as the practice is in accordance with published ACI guidelines and does not exceed the original water to cementitious material ratio or instructions of the structural engineer.
- E. Use of water reducing admixtures is recommended to achieve slumps greater than 4" (102mm).
- F. Use of other admixtures in the same batch as the CSXtreme admixture is acceptable so long as each admixture is added separately. The addition of crystalline and Shrinkage Reduction admixtures is unproductive and should not be done.
- G. Typical National Ready Mix delivered pricing for CSXtreme is in the range of \$35 - \$55 per cubic yard dependent upon the mix design approved and utilized. Anticipated Bid prices should be reflective of these national averages from 2018- 2020.
- H. The inclusion of a shrink reducing admixture (SRA) or crystalline product is not acceptable.
- I. Cold-Weather Placement: Comply with ACI 306.1.
- J. Hot-Weather Placement: Comply with ACI 305.

3.2 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 305 for hot-weather protection during curing. Also consult ACI 308-16 Section 4.1.4 regarding acceptable curing protocol.
- B. Cure concrete to receive epoxies or coatings according to ACI 302.2R-06, by one or a combination of the following methods:

1. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive. Cure concrete containing CSXtreme waterproofing for not less than 24 hours, longer if ambient conditions are hot, windy, and sunny or subject to periods of very low humidity. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
2. 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: If curing compounds were utilized; after curing period has elapsed, it is likely that the epoxy or coating manufacturer will likely require that the curing compound be mechanically removed prior to the installation of final epoxy or coating material.
 - b. Do not chemically remove.

3.3 FIELD QUALITY CONTROL

- A. Testing and Inspecting: The manufacturer of the waterproofing admixture may, at their sole discretion agree to engage qualified agencies to obtain project specific sample cylinders for the purpose of independent certified laboratory testing for the purposes of internal QC. test reports.
- B. Prior Agreed to Testing of Slabs Containing CSXtreme Waterproofing:
 1. The waterproofing manufacturer may perform internal moisture testing in accordance with this specification and may issue a project specific limited warranty with bond consideration only upon prior payment and receipt of the waterproofing material invoiced payment in advance of any warranty consideration when requested. Field moisture nor pH testing shall be required by the waterproofing manufacturer for its own and separate warranty consideration.
 - a. Failure to provide products that meet or exceed the forementioned and referenced industry requirements stated above will result in all subsequent testing and slab remediation costs being borne by the general contractor.
 2. A qualified representative or agent of the waterproofing admixture manufacturer may be present at the jobsite during placement of all CSXtreme waterproofing treated concrete at the sole discretion of the waterproofing manufacturer.
 - a. Do not proceed without this qualified representative being present if agreed to or communicated by the manufacturer.
 - b. A minimum of one business day notification would be required in such instances.
 3. Field testing technician may upon request & approval of the waterproofing manufacturer and Owner, at the expense of the waterproofing manufacturer, procure at least one 4x8 inch (102 mm) cylinder from a random project placement of waterproofing dosed concrete for the purpose of subsequent permeability testing at their sole discretion.
 4. Such cylinders may be independently lab tested in accordance with and at the sole discretion and approved expense of the waterproofing admixture manufacturer.
 5. Internal QC Test results must conform to the manufacturer's acceptable limits.
 - a. Should any cylinder agreed to be taken from any day of placement deliver results deemed by the waterproofing manufacturer to not be acceptable; the concrete waterproofing admixture manufacturer may procure, at the GC's expense, an additional core (or cores) from any placement. This core (cores) shall be sent to an independent laboratory for further testing deemed appropriate or necessary by the waterproofing manufacturer. All costs for this testing would be borne by the GC.
 6. Proceeding with placement of concrete dosed with the waterproofing admixture and without registration of the project will not be offered any warranty consideration whatsoever.

3.4 REPAIRS

- A. Make repairs to slab in accordance with Division 03 Section "Cast-in-Place Concrete" ,ICRI repair and remediation guideline criteria in addition to those means and methods recommended by concrete waterproofing admixture manufacturer.

END OF SECTION

SECTION 030513
CONCRETE SEALERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Furnish and install concrete sealers/coatings on exposed-to-view concrete floors where shown and as scheduled on the Drawings

1.2 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract and Division 01 Specification Sections apply to this Section.
- B. Section 016000 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- C. Section 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements for construction and demolition recycling.

1.3 REFERENCES

- A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 014200 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. AASHTO M233 - Boiled Linseed Oil Mixture for Treatment of Portland Cement Concrete.
 - 2. ASTM C156 - Water Retention by Liquid Membrane-Forming Curing Compounds for Concrete.
 - 3. ASTM C309 - Liquid Membrane-Forming Compounds for Curing Concrete.
 - 4. ASTM C1315 - Liquid Membrane-Forming Compounds, having Special Properties for Curing and Sealing Concrete

1.4 SUBMITTALS

- A. Submit the following:
 - 1. Literature: Manufacturer's product data sheets, specifications, performance data, physical properties, material compositions, and application instructions for all finishing products to be applied hereunder
 - a. Include certification of data indicating Volatile Organic Compound (VOC) content of all coatings.
 - 2. Samples of each level of slip resistance, aggregate, and pattern available in the specified products from the proposed manufacturer.

1.5 QUALITY ASSURANCE

- A. Use an applicator approved by the manufacturer, experienced in the approved materials, and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1.6 ENVIRONMENTAL CONDITIONS

- A. Work shall be done only under optimum conditions as recommended by manufacturer. Surfaces over which sealer is to be applied shall be completely dry (minimum 30 days since concrete placement) and thoroughly clean. Maximum moisture content is 8 percent. Substrate and ambient temperature shall be between 60 and 90 degrees Fahrenheit (15 to 32 degrees Celsius).

1.7 PRODUCT HANDLING

- A. Deliver materials to the job site and store in their original unopened containers with all labels intact and legible at time of use. Store in strict accordance with the manufacturer's recommendations.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Concrete Sealer, (**CS**): Transparent single component water-based acrylic sealer and dustproofer having a minimum of 15 percent non-yellowing styrene-acrylic copolymer solids, complying with ASTM C309, type 1.
 - 1. Dayton-Superior, Miamisburg OH, product "Safe Cure & Seal (J-18)".
 - 2. Nox-Crete Inc., Omaha NE, product "Cure & Seal 150E".
 - 3. L&M Construction Chemicals Inc., Omaha NE, product "Dress & Seal WB".
 - 4. BASF Construction Chemicals, LLC. (Sonneborne), Shakopee MN, product "Kure-N-Seal WB".
 - 5. Symons Corporation, Des Plaines, IL, product "Cure & Seal 309WB".
- B. Primer/bonding agent: As recommended by sealer manufacturer.

PART 3 - EXECUTION

3.1 SURFACE PREPARATION

- A. Upon acceptance of completed existing surfaces, thoroughly remove all dust and debris by sweeping or vacuum cleaning.
- B. Remove laitance, curing sealers, existing adhesives and other foreign matter from concrete surfaces with necessary techniques such as shot blasting, Muriatic acid etching, surface freezing and power scarification.
- C. Surface preparation required if a curing compound has been applied to substrate surfaces.
 - 1. Thoroughly etch concrete surfaces using well mixed solution consisting of two parts by volume water diluted with one part by volume 30 percent commercial grade hydrochloric acid at a rate of one quart per ten square feet. Apply evenly to thoroughly saturated areas and scrub into surfaces using stiff-bristled broom. Allow solution to activate undisturbed for not less than five minutes or for duration of boiling effect.
 - 2. Thoroughly remove etching solution by washing down surfaces with clean water; flooded at least three separate times at a rate of two gallons per ten square feet; thoroughly remove all contaminates that may be engrained or latent in surfaces.
 - 3. Perform a test application of a square foot in three locations, such as beneath casework. Allow to set for 72 hours, and test adhesion as recommended by the manufacturer.

3.2 APPLICATION

- A. Apply sealer with manufacturer's recommended sprayer, at recommended rate of 400 square feet per gallon. Apply second coat when sealer is dry to touch. Allow sealer to cure undisturbed for a minimum period of 6 hours. Maintain temperature at 60 degrees Fahrenheit minimum until floor surfacing has completely dry.

3.3 TOLERANCES

- A. Installation Tolerances: The following allowable installed tolerances are allowable variations from locations and dimensions indicated by the Contract Document and shall not be added to allowable tolerances indicated for other work.
 - 1. Allowable Variation from True Level: 1/8" in 10'-0" when measured with a 10 foot long straight edge in all directions.

END OF SECTION

SECTION 033000
CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.
- B. For exposed concrete elements, including portions of elements (such as the top, exterior face of concrete foundation walls) use SF-3.0 finishes and Class A formwork tolerances, unless noted otherwise
- C. Related Sections:
 - 1. See Landscape Architecture drawings for exposed site walls site feature surfaces.
 - 2. Division 31 Section "Earth Moving for Building Foundations and Slabs" for building slab on grade; and building and retaining and foundation wall work.
 - 3. Division 3 Section "Concrete Sealers" for curing, finish and coating information at exposed concrete floor surfaces .
 - 4. Flooring Warranty Admixture Section
 - 5. Provision of waste management: Section 017419, Construction Waste Management Plan.
 - 6. Provision of general LEED requirements and forms: Section 018113, Sustainable Design Requirements.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated on drawings and specifications.
- B. Design Mixtures: For each concrete mixture. See Drawing S-001 in the Contract Documents for Concrete Mixtures matrix.
- C. Steel Reinforcement Shop Drawings:
 - 1. 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 or hoop spacing, and supports for concrete reinforcement.
 - 2. Draw all walls and grade beams in elevation; coordinate and show MEP/FP and Architectural penetrations. Coordinate formwork requirements for exposed site walls
 - 3. Draw all slabs on-metal deck and on-grade in plan.
 - 4. Show control and construction joints in walls and slabs with joint details or assemblies.
- D. LEED Submittals for all Products in Part 2:
 - 1. Provide manufacturers' product documentation for each product with an Environmental Product Declaration (EPD).
 - a. Documentation should confirm EPD conforms with ISO 14205 EN 15804 or ISO 21930
 - b. EPD shall have at least Cradle to Gate scope,
 - 2. Complete "LEED Materials Documentation Sheet" with MRc2 information for each product having an EPD.
 - 3. Include product post-consumer recycled content.
 - a. Provide manufacturers' product documentation that includes recycled content claims for the products contributing towards compliance. Claims must conform to the definition in ISO 14021-1999, Environmental Labels and Declarations, Self-Declared Environmental Claims.

- b. Complete "LEED Materials Documentation Sheet" with MRc3 Option 2 information for products with recycled content installed in the building.
- E. Welding certificates.
- F. Formwork: Panel layout and ties at all wall sides exposed to view.
- G. Material certificates.
 - 1. Cementitious materials.
 - 2. Admixtures. (See Specification Section for Flooring Warranty Admixture as a separate submittal)
 - 3. Form materials.
 - 4. Steel reinforcement and accessories.
- H. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements:
 - 1. Aggregates. Include service record data indicating absence of deleterious expansion of concrete due to alkali aggregate reactivity.

1.3 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
 - 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
 - 2. Comply with Volumetric Mixer Standards VBBM-01 for concrete produced on site or nearby at non-permanent facility.
- B. Testing Agency Qualifications: An independent agency qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
- C. Welding Qualifications: Qualify procedures and personnel according to AWS D1.4/D 1.4M, "Structural Welding Code - Reinforcing Steel."
- D. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
 - 1. ACI 301, "Specifications for Structural Concrete," Sections 1 through 5.
 - 2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
- E. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.
- F. Preinstallation Conference: Conduct conference at Project site.

PART 2 - PRODUCTS

2.1 LEED REQUIREMENTS:

- A. Provide products with Third Party Environmental Product Declaration (EPD) for all Products.

2.2 FORM-FACING MATERIALS (excluding exposed site retaining walls for forms)

- 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.
- 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. Form Release Agent: Water-based; low VOC
- D. 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 ½ inch to the plane of exposed concrete surface.

2.3 STEEL REINFORCEMENT

- A. Recycled Content of Steel Products: Provide products with an average recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than 70 percent.
- B. Reinforcing Bars:
 1. ASTM A 615, Grade 60; deformed
 2. ASTM A 706 , Grade 60 for welded; deformed.
 3. ASTM A 934 Standard Specification for Epoxy-Coated Prefabricated Steel Reinforcing Bars
- C. 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.

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, gray.
 2. Fly Ash: ASTM C 618, Class F.
 3. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.
- B. Normal-Weight Aggregates: ASTM C 33, graded.
 1. Maximum Coarse-Aggregate Size: In accordance with ACI 301 and 318.
 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- C. Water: ASTM C 94. Non-potable.

2.5 ADMIXTURES

- A. Air-Entraining Admixture: ASTM C 260.
- 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.
- C. See other Specification Sections for Special Concrete Slab, Floor Adhesive, and Flooring Warranty Admixture System for additional product. Include placement, finishing and testing requirements of this and 03 and 09 Sections

2.6 CURING MATERIALS

- A. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- B. Water: Non-potable meeting ASTM C 94.

2.7 CONCRETE MIXTURES

- 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.
- B. Cementitious Materials:
 1. Use fly ash pozzolan or ground granulated blast-furnace slag as needed to reduce the total amount of portland cement, which would otherwise be used by portland cement. See Drawings for Schedule.
- C. 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 pavements and slabs on grade with a water-cementitious materials ratio below 0.50.
- D. Proportion normal-weight concrete mixture as follows:
1. Minimum Compressive Strengths: See Drawings as follows:
 - a. For Landscape Architecture concrete adjacent to buildings (on or adjacent to insulated fill) apply as shown on Drawings
 - b. For Landscape Architecture concrete not adjacent to buildings (on or adjacent to insulated fill) apply mix meeting ACI 318, Ch.4 Durability criteria for F2 and C2 Categories
 2. Maximum Concrete Strengths: Do not exceed the listed concrete strengths by more than 1000 psi at 28, 56 or 90 days mix design strength basis. Coordinate 56 or 90 day strengths to meet this requirement in coordination with Construction forces for mixes with Fly Ash.
 3. Maximum Water-Cementitious Materials Ratio: In accordance with ACI 318 & 211 and:
 - a. Maximum for columns and piers is 0.45
 - b. Maximum for slabs on grade, slabs on metal deck, walls and foundations is 0.50
 4. Slump Limit: 5 inches before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch.
 5. Air Content: See Drawings and meet ACI Durability requirements for Entrained Air with percent based on aggregate size as required. Test at point of delivery for all concrete exposed to exterior conditions; including pits, walls, slabs and pavements in delivery areas

2.8 FABRICATING REINFORCEMENT

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

2.9 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to VBBN and ASTM C 94/C 94M with furnished 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.

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. At all wall sides and faces exposed to view, including exposed site retaining walls, apply SF-2.0 Finish (ACI 347). Seal all form joints. Use removable ties, remove, patch and fill locations after form removal. See Landscape Architecture drawings for site walls formwork for requirements.
- C. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117. Class C Surface (ACI 347) for surfaces not exposed to view that are not exposed site retaining walls.

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.

3.3 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.

3.4 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 for exposed concrete elements.
 - 1. Submit locations on reinforcing submittal elevations; see Drawings for information

3.5 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. 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. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
- C. Cold-Weather Placement: Comply with ACI 306.1.
- D. Hot-Weather Placement: Comply with ACI 301.

3.6 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. At all foundation
- 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. At all wall sides exposed to view.
- C. Rubbed Finish: Apply the following to smooth-formed finished as-cast concrete at all interior columns.
 - 1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process. At all wall sides exposed to view
- D. 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.
- E. See Landscape Architecture drawings for site structure surfaces exposed to view.

3.7 FINISHING FLOORS AND SLABS

- A. Do not hard-trowel or power trowel slabs with entrained air.
- B. General: See Division 09 Sections and Architectural drawings for Epoxy and Exposed Concrete Floors. Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- C. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 1/4 inch in one direction.
 - 1. Apply scratch finish to surfaces to receive concrete floor toppings or to receive mortar setting beds for bonded cementitious floor finishes.

- D. 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 and to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing, or sand-bed terrazzo.
 - E. 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. Slabs-on-grade: Ff=25; FI=25
 - F. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces where ceramic or quarry tile is to be installed by either thickset or thin-set method. While concrete is still plastic, slightly scarify surface with a fine broom.
 - 1. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.
 - G. Broom Finish: Apply a broom finish to exterior concrete pavements, platforms, steps, ramps, and elsewhere as indicated.
- 3.8 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. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
 - 1. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
 - 2. Do not use spray-applied curing compound or spray applied curing-sealing compounds. If spray applied compounds are specified in Division 9 sections; use only as exposed floor finish.
- 3.9 CONCRETE COATINGS:
- A. See Division 03 Sections and Architectural drawings for exposed Concrete Floors. Do not coat other concrete slabs shown on the Architectural drawings to receive surfacing unless specifically indicated.
 - B. See Division 09 Sections and Architectural drawings for Epoxy and covered Concrete Floors. Do not coat other concrete slabs shown on the Architectural drawings to receive surfacing unless specifically indicated.
 - C.
- 3.10 COLD-WEATHER PLACEMENT
- A. 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.

3.11 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.

3.12 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

END OF SECTION

SECTION 042000
UNIT MASONRY

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Face brick assemblies for:
 - 1. Brick masonry veneer construction for exterior walls.
 - 2. Cold-Formed metal framing for backup at exterior walls.
 - a. Size(s) as indicated on the drawings.

1.2 RELATED REQUIREMENTS

- A. Section 05400 - COLD-FORMED METAL FRAMING: Structural framed backup at exterior walls.
- B. Section 079200 - JOINT SEALANTS: Sealants, sealant installation and backing materials.

1.3 APPLICABLE PUBLICATIONS

- A. Comply with references to extent specified in this section.
- B. ASTM International (ASTM):
 - 1. A951/A951M-14 - Steel Wire for Masonry Joint Reinforcement.
 - 2. C34-13 - Structural Clay Load-Bearing Wall tile.
 - 3. C56-13 - Structural Clay Nonloadbearing Tile.
 - 4. C62-13a - Building Brick (Solid Masonry Units Made from Clay or Shale).
 - 5. C67-14 - Sampling and Testing Brick and Structural Clay Tile.
 - 6. C126-15 - Ceramic Glazed Structural Clay Facing Tile, Facing Brick, and Solid Masonry Units.
 - 7. C216-15 - Facing Brick (Solid Masonry Units Made From Clay or Shale).
 - 8. C612-14 - Mineral Fiber Block and Board Thermal Insulation.
 - 9. C744-14 - Prefaced Concrete and Calcium Silicate Masonry Units.
 - 10. D1056-14 - Flexible Cellular Materials - Sponge or Expanded Rubber.
 - 11. D2240-05(2010) - Rubber Property-Durometer Hardness.
 - 12. F1667-15 - Driven Fasteners: Nails, Spikes, and Staples.
 - 13. ASTM C 90 - Load-Bearing Concrete Masonry Units.
 - 14. ASTM C 140 - Method of Sampling and Testing Concrete Masonry Units.
 - 15. ASTM C 1093 - Standard Practice for Accreditation of Testing Agencies for Masonry.
 - 16. PCA, "Concrete Masonry Handbook".
 - 17. NCMA applicable TEK Bulletins.
 - 18. NCMA TEK Bulletin N^o. 45 - Removal of Stains from Concrete Masonry Walls.
- C. American Welding Society (AWS):
 - 1. D1.4/D1.4M-11 - Structural Welding Code - Reinforcing Steel.
- D. Brick Industry Association (BIA):
 - 1. TN 11B-88 - Guide Specifications for Brick Masonry, Part 3.
- E. Federal Specifications (Fed. Spec.):
 - 1. FF-S-107C(2) - Screws, Tapping and Drive.

1.4 SUBMITTALS

- A. Submittal Drawings:
 - 1. Fabrication, bending, and placement of reinforcing bars. Comply with ACI 315. Show bar schedules, diagrams of bent bars, stirrup spacing, lateral ties and other arrangements and assemblies.
 - 2. Special masonry shapes, profiles, and placement.
 - 3. Masonry units for typical window and door openings, and, for special conditions as affected by structural conditions.

- B. Manufacturer's Literature and Data:
 - 1. Description of each product.
 - 2. Installation instructions.
- C. Samples:
 - 1. Face brick: Sample panel, 200 mm by 400 mm (8 inches by 16 inches,) showing full color range and texture of bricks, bond, and proposed mortar joints.
 - 2. Precast Architectural Concrete Units.
 - 3. Anchors and Ties: Each type.
 - 4. Joint Reinforcing: 1200 mm (48 inches) long each type.
- D. Sustainable Construction Submittals:
 - 1. Recycled Content: Identify post-consumer and pre-consumer recycled content percentage by weight.
- E. Test reports: Certify products comply with specifications.
 - 1. Ceramic glazed facing brick.
- F. Certificates: Certify products comply with specifications.
 - 1. Face brick.
- G. Delegated Design Drawings and Calculations: Signed and sealed by responsible design professional registered in the State of Vermont.

1.5 QUALITY ASSURANCE

- A. Welders and Welding Procedures Qualifications: AWS D1.4/D1.4M.
- B. Mockups:
 - 1. Before starting masonry, build a mockup panel minimum 1800 mm by 1800 mm (6 feet by 6 feet) with 600 mm (24 inch) 90 degree return for outside corner.
 - a. Use masonry units from random cubes of units delivered on site.
 - b. Include structural backup, reinforcing, ties, and anchors.
 - c. Mockup panel approved by Architect that sets workmanship and aesthetic quality for masonry work.
 - d. Clean sample panel to test cleaning methods.
 - e. Remove mockup panel when directed by Architect.

1.6 DELIVERY

- A. Deliver products in manufacturer's original sealed packaging.
- B. Before installation, return or dispose of products within distorted, damaged, or opened packaging.

1.7 STORAGE AND HANDLING

- A. Store products above grade, protected from contamination.
- B. Protect products from damage during handling and construction operations.

1.8 FIELD CONDITIONS

- A. Hot and Cold Weather Requirements: Comply with ACI 530.1/ASCE 6/TMS 602.

PART 2 PRODUCTS

2.1 SYSTEM PERFORMANCE

- A. Delegated Design: Prepare submittal documents including design calculations and drawings signed and sealed by registered design professional, licensed in state where work is located.

2.2 BRICK UNITS

- A. General: Provide each product from one manufacturer.
- B. Acceptable manufacturers, as selected by the Architect.
 - 1. Substitutions: See section 016200 - Product Substitutions.

- C. Facing brick: ASTM C 216, Type FBS Grade SW, in size, texture and color to match existing brick.
 - 1. Brick size: "Modular", 3-1/2 to 3-5/8 inches thick by 2-1/4 inches high by 7-1/2 to 7-5/8 inches long.
 - 2. Brick shall be color blended as directed by Architect.
 - a. Contractor shall furnish blend of brick for review and approval by Architect.
 - 3. Provide corners with two faces to match general brick wall finish.
 - 4. Provide special shapes as indicated on Drawings and for applications where forms, size or finish cannot be produced from standard shapes.

2.3 ANCHORS, TIES, AND REINFORCEMENT

- A. Steel Reinforcing Bars: ASTM A615/A615M; Grade 60, deformed bars.
- B. Joint Reinforcement:
 - 1. Form from wire complying with ASTM A951/A951M.
 - 2. Hot dipped galvanized after fabrication.
 - 3. Width of joint reinforcement 40 mm (1.6 inches) less than nominal thickness of masonry wall or partition.
 - 4. Cross wires welded to longitudinal wires.
 - 5. Joint reinforcement minimum 3000 mm (10 feet) long, factory cut.
 - 6. Joint reinforcement with crimp formed drip is not acceptable.
 - 7. Maximum spacing of cross wires 400 mm (16 inch) to longitudinal wires.
 - 8. Ladder Design:
 - a. Longitudinal wires deformed 5 mm (0.20 inch) diameter wire/.
 - b. Cross wires 4 mm (0.16 inch) diameter.
 - c. Trussed Design:
 - 1) Longitudinal and cross wires minimum 4 mm (0.16 inch nominal) diameter.
 - 2) Longitudinal wires deformed.
- C. Wall Ties, (Wire):
 - 1. Heckmann "Pos-I-Tie - Triangular Wire Tie.
- D. Adjustable Steel Column Anchor:
 - 1. Two piece anchor consisting of a 6 mm (1/4 inch) diameter steel rod to be welded to steel with offset ends, rod to permit 100 mm (4 inch) vertical adjustment of wire anchor.
 - 2. Triangular shaped wire anchor 100 mm (4 inches) wide formed from 5 (3/16 inch) diameter galvanized wire, to extend minimum 75 mm (3 inches) into joints of masonry.
- E. Adjustable Steel Beam Anchor:
 - 1. Z or C type steel strap, 30 mm (1 1/4 inches) wide, 3 mm (1/8 inch) thick.
 - 2. Flange hook minimum 38 mm (1 1/2 inches) long.
 - 3. Length to embed in masonry minimum 50 mm (2 inches) in 100 mm (4 inch) nominal thick masonry and 100 mm (4 inches) in thicker masonry.
 - 4. Bend masonry end minimum 40 mm (1 1/2 inches).

2.4 MORTAR MATERIALS FOR SITE MIXED MORTAR:

- A. Portland cement for masonry conforming to ASTM C 150, Type I, non-staining, without air entrainment. Use Type III as necessary for laying masonry in cold weather.
 - 1. For brick masonry, use white color portland cement.
 - 2. For concrete masonry, use gray color portland cement
- B. Aggregates for brick mortar: Clean sand, washed uniformly well graded, conforming to ASTM C 144, except for joints 1/4 inch and down use aggregate with 100 percent passing a No. 16 sieve.
- C. Aggregates for grout: Conforming to ASTM C 144 for fine aggregate and ASTM C 404, Size 8 or 89.

- D. Aggregate for concrete masonry mortar: Clean, washed uniformly well graded sand conforming to ASTM C 144, with the following gradation, and having a fineness modulus between 2.15 and 2.35.

2.5 ACCESSORIES

A. Weeps:

1. Type: Polyester mesh, insect resistant.
 2. Color(s): As selected by Architect from manufacturer's full range of available options.
 3. Manufacturers:
 - a. Advanced Building Products, Inc.; www.advancedbuildingproducts.com
 - b. Blok-Lok Limited; www.blok-lok.com
 - c. CavClear/Archovations, Inc: www.cavclear.com
 - d. Hohmann & Barnard, Inc; www.h-b.com
 - e. Mortar Net Solutions; WeepVent: www.mortarnet.com
 - f. Wire-Bond; www.wirebond.com
- 1) Substitutions: See Section 016200 - Product Substitutions.

- B. Cavity Drain Material: Open mesh polyester sheets or strips to prevent mortar droppings from clogging the cavity.

C. Preformed Compressible Joint Filler:

1. Thickness and depth to fill joint.
2. Closed Cell Neoprene: ASTM D1056, Type 2, Class A, Grade 1, B2F1.
3. Non-Combustible Type: ASTM C612, Type 5, Max. Temp.1800 degrees F.

D. Box Board:

1. Mineral Fiber Board: ASTM C612, Type 1.
2. 25 mm (1 inch) thickness.
3. Other spacing material having similar characteristics is acceptable subject to Architect's approval.

E. Masonry Cleaner:

1. Detergent type cleaner selected for each type masonry.
2. Acid cleaners are not acceptable.
3. Use soapless type specially prepared for cleaning brick masonry as appropriate.

F. Fasteners:

1. Masonry Nails: ASTM F1667, Type I, Style 17, 19 mm (3/4 inch) minimum length.
2. Screws: FS-FF-S-107, Type A, AB, SF thread forming or cutting.

G. Welding Materials: AWS D1.4/D1.4M, type to suit application.

H. Counterflashing for Masonry Through-Wall Flashing: One of the following and as acceptable to the spray polyurethane foam air barrier manufacturer:

1. CCW-705 TWF by Carlisle Coatings and Waterproofing.
2. Perm-A-Barrier Flashing by Grace Construction Products.
3. Blueskin TWF by Henry.
4. Poly-Wall Crack Guard by Protective Coatings Technology, Inc.
5. ExoAir TWF by Tremco, Inc.
6. Detail Strip by W. R. Meadows, Inc.

PART 3 EXECUTION

3.1 INSTALLATION - GENERAL

- A. Install products according to manufacturer's instructions and approved submittal drawings.
1. When manufacturer's instructions deviate from specifications, submit proposed resolution for Architect's consideration.
- B. Keep finish work free from mortar smears or spatters, and leave neat and clean.

- C. Wall Openings:
 - 1. Fill hollow metal frames built into masonry walls and partitions solid with mortar as laying of masonry progresses.
 - 2. When items are not available when walls are built, prepare openings for subsequent installation.
 - D. Tooling Joints:
 - 1. Do not tool until mortar has stiffened enough to retain thumb print when thumb is pressed against mortar.
 - 2. Tool while mortar is soft enough to be compressed into joints and not raked out.
 - 3. Finish joints in exterior face masonry work with jointing tool, and provide smooth, water-tight concave joint unless specified otherwise.
 - 4. Tool Exposed interior joints in finish work concave unless specified otherwise.
 - E. Lintels:
 - 1. Lintels are not required for openings less than 1000 mm (40 inches) wide that have hollow metal frames.
 - 2. Use steel lintels, for openings greater than 1600 mm (63 inches) wide, brick masonry openings, and elevator openings unless shown otherwise.
 - 3. Doors having overhead concealed door closers require steel lintel, and pocket for closer box.
 - 4. Lintel Bearing Length: Minimum 100 mm (4 inches) at both ends.
 - 5. Build masonry openings or arches over wood or metal centering and supports when steel lintels are not used.
 - F. Use minimum 100 mm (4 inches) nominal thick masonry for fireproofing steel columns unless indicated otherwise.
 - G. Before connecting new masonry with previously laid masonry, remove loosened masonry or mortar, and clean and wet work in place as specified under wetting.
 - H. Structural Steel Encased in Masonry:
 - 1. Where structural steel is encased in masonry and voids between steel and masonry are filled with mortar, provide minimum 25 mm (1 inch) mortar free expansion space between masonry and steel by applying box board material to steel before masonry is laid.
 - 2. Do not install spacing material where steel is bearing on masonry or masonry is bearing on steel.
 - I. Wetting and Wetting Test:
 - 1. Test and wet brick and clay tile according to BIA TN 11B.
 - J. Temporary Formwork: Provide formwork and shores as required for temporary support of reinforced masonry elements.
 - K. Construct formwork to conform to shape, line and dimensions indicated on drawings. Make sufficiently tight to prevent mortar, grout, or concrete leakage. Brace, tie and support formwork as required to maintain position and shape during construction and curing of reinforced masonry.
 - L. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other reasonable temporary construction loads.
 - M. Minimum Curing Times Before Removing Shores and Forms:
 - 1. Girders and Beams: 10 days.
 - 2. Slabs: 7 days.
 - 3. Reinforced Masonry Soffits: 7 days.
- 3.2 INSTALLATION - ANCHORAGE
- A. Veneer to Framed Walls:
 - 1. Install adjustable veneer anchors.

2. Fasten anchor to stud through sheathing with self-drilling and tapping screw, one at both ends of loop type anchor.
3. Space anchors maximum 400 mm (16 inches) on center vertically at each stud.

B. Anchorage to Steel Beams or Columns:

1. Use adjustable beam anchors on each flange.
2. At columns weld steel rod to steel columns at 300 mm (12 inch) intervals, and place wire ties in masonry courses at 400 mm (16 inches) maximum vertically.

3.3 INSTALLATION - REINFORCEMENT

A. Joint Reinforcement:

1. Locate joint reinforcement in mortar joints at 400 mm (16 inch) maximum vertical intervals.
2. Additional joint reinforcement is required in mortar joints at both 200 mm (8 inches) and 400 (16 inches) above and below windows, doors, louvers and similar openings in masonry.

B. Steel Reinforcing Bars:

1. Install reinforcing bars in cells of hollow masonry units where required for vertical reinforcement and in bond beam units for horizontal reinforcement. Install in wall cavities of reinforced masonry walls where indicated on drawings.
2. Stack Bond:
 - a. Locate additional joint reinforcement in vertical and horizontal joints as indicated on drawings.
 - b. Anchor vertical reinforcement into foundation or wall or bond beam below.
 - c. Provide temporary bracing for walls over 8 feet tall until permanent horizontal bracing is completed.

3.4 INSTALLATION - BRICK EXPANSION JOINTS

- A. Provide brick expansion joint (EJ) where indicated on drawings.
- B. Keep joint free of mortar and other debris.
- C. Joints Occur In Masonry Walls:
 1. Install preformed compressible joint filler in brick wythe.
- D. Interrupt joint reinforcement at expansion joints.
- E. Fill opening in exposed face of expansion joints with sealant as specified in Section 079200, JOINT SEALANTS.

3.5 INSTALLATION - BUILDING EXPANSION AND SEISMIC JOINTS

- A. Keep expansion and seismic joints open and free of mortar. Remove mortar and other debris.
- B. Install non-combustible, compressible type joint filler to fill space completely except where sealant is shown on joints in exposed finish work.
- C. Fill opening in exposed face of expansion and seismic joints with sealant as specified in Section 079200, JOINT SEALANTS.

3.6 INSTALLATION - ISOLATION JOINT

- A. Where full height walls and partitions lie parallel or perpendicular to and under structural beams and shelf angles, provide minimum 9 mm (3/8 inch) separation between walls and partitions and bottom of beams and shelf angles.
- B. Insert continuous full width strip of non-combustible type compressible joint filler.
- C. Fill opening in exposed face of isolation joints with sealant as specified in Section 079200, JOINT SEALANTS.

3.7 INSTALLATION - BRICKWORK

- A. Lay clay brick according to BIA TN 11B.
- B. Laying:

1. Match bond of existing building on alterations and additions.
 2. Maintain bond pattern throughout.
 3. Do not use brick smaller than half-brick at any angle, corner, break, and jamb.
 4. Where length of cut brick is greater than one half length, maintain vertical joint location.
 5. Lay exposed brickwork joints symmetrical about center lines of openings.
 6. Do not structurally bond multi-wythe brick walls, unless indicated on drawings.
 7. Before starting work, lay facing brick on foundation wall and adjust bond to openings, angles, and corners.
 8. Lay brick for sills with wash and drip.
 9. Build solid brickwork as required for anchorage of items.
- C. Joints:
1. Exterior And Interior Joint Widths: Lay for three equal joints in 200 mm (8 inches) vertically, unless shown otherwise.
 2. Rake joints for pointing with colored mortar when colored mortar is not full depth.
 3. Arches:
 - a. Flat arches (jack arches) lay with camber of 1 in 200 (1/16 inch per foot) of span.
 - b. Face radial arches with radial brick with center line of joints on radial lines.
 - c. Form Radial joints of equal width.
 - d. Bond arches into backing with metal ties in every other joint.
- D. Weep Holes:
1. Install weep holes at 600 mm (24 inches) on center in bottom of vertical joints of exterior masonry veneer or cavity wall facing over foundations, bond beams, and other water stops in wall.
 2. Form weep holes using wicks made of mineral fiber insulation strips turned up 200 mm (8 inches) in cavity. Anchor top of strip to backup to securely hold in place.
 3. Install sand or pea gravel in cavity approximately 75 mm (3 inches) high between weep holes.
- E. Cavity Walls:
1. Keep air space clean of mortar accumulations and debris.
 2. Lay the interior wythe of the masonry wall full height where air barrier is required on cavity face. Coordinate to install air barrier before laying outer wythe.
 3. Veneer Framed Walls:
 - a. Build with 100 mm (4 inches) of face brick over sheathed stud wall with air space.
 - b. Keep air space clean of mortar accumulations and debris.
- 3.8 POINTING
- A. Fill joints with pointing mortar using rubber float trowel to apply mortar solidly into raked joints.
 - B. Wipe off excess mortar from joints of glazed masonry units with dry cloth.
 - C. Tool exposed joints to smooth concave joint.
 - D. At joints with existing work, match existing joints.
- 3.9 GROUTING
- A. Preparation:
1. Clean grout space of mortar droppings before placing grout.
 2. Close cleanouts.
 3. Install vertical solid masonry dams across grout space for full height of wall at intervals of maximum 9000 mm (30 feet). Do not bond dam units into wythes as masonry headers.
 4. Verify reinforcing bars are installed as indicated on drawings.
- B. Placing:
1. Place grout in grout space in lifts as specified.
 2. Consolidate each grout lift after free water has disappeared but before plasticity is lost.

3. Do not slush with mortar or use mortar with grout.
4. Interruptions:
 - a. When grouting must be stopped for more than an hour, top off grout 40 mm (1-1/2 inches) below top of last masonry course.
 - b. Grout from dam to dam on high lift method.
 - c. Longitudinal run of masonry may be stopped off only by raking back one-half masonry unit length in each course and stopping grout 100 mm (4 inches) back of rake on low lift method.

C. Low Lift Method:

1. Construct masonry to 1.5 m (5 feet) maximum height before grouting.
2. Grout in one continuous operation and consolidate grout by mechanical vibration and reconsolidate after initial water loss and settlement has occurred.

3.10 PLACING REINFORCEMENT

- A. General: Clean reinforcement of loose rust, mill scale, earth, ice or other materials which will reduce bond to mortar or grout. Do not use reinforcement bars with kinks or bends not shown on drawings or approved submittal drawings, or bars with reduced cross-section due to excessive rusting or other causes.
- B. Position reinforcement accurately at spacing indicated on drawings. Support and secure vertical bars against displacement. Install horizontal reinforcement as masonry work progresses. Where vertical bars are shown in close proximity, provide clear distance between bars of minimum one bar diameter or 25 mm (1 inch), whichever is greater.
- C. For columns, piers and pilasters, maintain clear distance between vertical bars as indicated on drawings, minimum 1.5 bar diameters or 38 mm (1-1/2 inches), whichever is greater. Provide lateral ties as indicated on drawings.
- D. Splice reinforcement bars only where indicated on drawings, unless approved by Architect. Provide lapped splices. In splicing vertical bars or attaching to dowels, lap ends, place in contact and wire tie.
- E. Provide minimum lap as indicated on approved submittal drawings, or if not indicated, minimum 48 bar diameters.
- F. Embed metal ties in mortar joints as work progresses, with minimum mortar cover of 15 mm (5/8 inch) on exterior face of walls and 13 mm (1/2 inch) at other locations.
- G. Embed prefabricated horizontal joint reinforcement as work progresses, with minimum cover of 15 mm (5/8 inch) on exterior face of walls and 13 mm (1/2 inch) at other locations. Lap joint reinforcement minimum 150 mm (6 inches) at ends. Use prefabricated "L" and "T" sections to provide continuity at corners and intersections. Cut and bend joint reinforcement for continuity at returns, offsets, column fireproofing, pipe enclosures and other special conditions.
- H. Anchoring: Anchor reinforced masonry work to supporting structure as indicated on drawings.
- I. Anchor reinforced masonry walls at intersections with non-reinforced masonry.

3.11 CONSTRUCTION TOLERANCES

- A. Maximum variation from true surface level for exposed to view walls and partitions:
 1. Unit-to-unit tolerance: 1/16 inch.
 2. Surface, overall tolerance: 1/4 inch in 10 feet in any direction and 1/2 inch in 20 feet or more.
 3. Where both faces of single wythe wall or partition will be exposed to view, request and obtain decision from the Architect/Engineer as to which face will be required to conform to the specified surface level tolerance.
- B. Maximum variation from plumb: For lines and surfaces of walls do not exceed 1/4 inch in 10 feet, 3/8 inch in any story up to 20 feet maximum. At expansion joints and other conspicuous lines, do not exceed 1/4 inch in 20 feet.

- C. Maximum variation from level: For lines of sills, tops of walls and other conspicuous lines, do not exceed 1/8 inch in 3 feet, or 1/4 inch in 10 feet and 1/2 inch in 30 feet.
- D. Maximum variation of linear building line: For position shown in plan relating to columns, walls and partitions, do not exceed 1/2 inch in 20 feet or 3/4 inch in 40 feet.
- E. Maximum variation in specified height: 1/2 inch per story.
- F. Maximum variation of joint thickness: 1/8 inch in 3 feet.

3.12 CLEANING AND REPAIR

- A. General:
 - 1. Clean exposed masonry surfaces on completion.
 - 2. Protect adjoining construction materials and landscaping during cleaning operations.
 - 3. Cut out defective exposed new joints to depth of approximately 19 mm (3/4 inch) and repoint.
 - 4. Remove mortar droppings and other foreign substances from wall surfaces.
- B. Brickwork:
 - 1. First wet surfaces with clean water, then wash down with detergent solution. Do not use muriatic acid.
 - 2. Brush with stiff fiber brushes while washing, and immediately wash with clean water.
 - 3. Remove traces of detergent, foreign streaks, or stains of any nature.

3.13 FIELD QUALITY CONTROL

- A. Water Penetration Testing:
 - 1. Seven days before plastering or painting, in presence of Owner's Representative, test solid exterior masonry walls for water penetration.
 - 2. Direct water on masonry for a period of one hour when wind velocity is less than five miles per hour.
 - 3. Should moisture appear on inside of walls tested, make additional tests at other areas as directed by the Architect.
 - 4. Correct areas showing moisture on inside of walls, and repeat test at repaired areas, to ensure moisture penetration has been stopped.

END OF SECTION

SECTION 051200
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.
- B. Submittals from other related Specification sections are required to coordinate locations and sizing of Structural Steel for Structural Steel submittals. Note that the steel submittals require coordination by the Construction forces with the submittal for all noted items prior to the submission of the steel shop drawings or related requests for information.

1.2 SUMMARY

A. Section Includes:

- 1. Structural steel.
- 2. Grout.

B. Related Sections:

- 1. Division 01 Section "Quality Requirements" for independent testing agency procedures and administrative requirements.
- 2. Provision of waste management: Section 017419, Construction Waste Management Plan.
- 3. Provision of general LEED requirements and forms: Section 018113, Sustainable Design Requirements.
- 4. Division 05 Section "Architecturally Exposed Structural Steel Framing" for additional requirements for architecturally exposed structural steel.
- 5. Division 05 Section "Steel Decking" for field installation of shear connectors through deck.
- 6. Division 05 Sections for metal fabrications (such as lintels, door frames, tec.), bollards, stairs, edge angles, ladders, railings, gratings, coves, miscellaneous steel fabrications and other metal items not explicitly defined as structural steel. This includes Steel shown or designated on other design disciplines drawings.
- 7. Division 09 painting Sections for surface-preparation and priming requirements.
- 8. Division 07 and 08 Sections for exterior walls systems and elements attaching to structural steel.
- 9. Division 14 Section for "Passenger Elevators"
- 10. MEP/FP Division for equipment support framing location.

C. References

- 1. Except as otherwise specified herein, perform work in accordance with specifications noted below, including code (IBC) referenced editions of applicable specifications, codes, and standards cited therein, and latest applicable addenda and supplements.
 - a. "International Building Code 2015" (IBC-2015) and "Vermont Fire and Building Safety Code 2015"
 - b. "Specification for Structural Steel Buildings" (AISC 360)

- c. "Seismic Provisions for Structural Steel Buildings", (AISC 341), including Supplements
- d. "Code of Standard Practice for Steel Buildings and Bridges", (AISC 303)
except as modified herein by the provision of the contract documents and including but not limited to:
 - 1. Deletion of the following sentence: Paragraph 4.4 "These drawings shall be returned to the Fabricator within fourteen (14)calendar days."
 - 2. Amending "...structural Design Drawings..." to "...Design Drawings..." at all instances, including in Paragraphs 2.1, 2.2, 3.1 (all sub-parts) and 3.2
- e. "Structural Welding Code – Steel" (AWS D1.1)",
- f. "Specification for Structural Joints Using ASTM A325 or A490 Bolts", (RCSC)
- g. American Society for Testing Materials (ASTM) Steel Structures Painting Council. Standards (SSPC) referenced in this Section.

- D. Any material or operation specified by reference to published specifications of manufacturer or published standard shall comply with said specification or standard. In case of conflict between referenced specifications, most stringent requirement shall govern. In case of conflict between referenced specifications and Project Specifications, Project Specifications shall govern.

1.3 DEFINITIONS

- A. Structural Steel: Elements of structural-steel frame, as classified by AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."
- B. Seismic-Load-Resisting System: Elements of structural-steel frame on the New Office Buildings having moment connected ends along grid lines on Drawings, including columns, beams, and girders and their connections.
- C. Heavy Sections: Rolled and built-up sections as follows:
 - 1. Shapes included in ASTM A 6/A 6M with flanges thicker than 1-1/2 inches (38 mm).
 - 2. Welded built-up members with plates thicker than 2 inches (50 mm).
 - 3. Column base plates thicker than 2 inches (50 mm).
- D. 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.
- E. 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 PERFORMANCE REQUIREMENTS

- A. Connections: Provide details of all connections required by the Contract Documents to be selected or completed by structural-steel fabricator, including comprehensive engineering design by a qualified professional engineer for connections beam connections with axial loads, bracing connections, beams/column connection at braced bays, column splices, and details which to not conform with schematic details shown on the drawings 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 ASD; data are given at service-load level.

- B. Moment Connections: Type FR, fully restrained.
- C. Construction: See Drawings

1.5 SUBMITTALS

- A. Product Data: For each type of product indicated.
- 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. Identify demand critical welds.
 - 7. For structural-steel connections indicated to comply with design loads, include structural design data signed and sealed by the qualified professional engineer responsible for their preparation.
 - 8. Indicate elements requiring information from submittals of Related Sections.
- 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. LEED Submittals for all Products in Part 2:
 - 1. Provide manufacturers' product documentation for each product with an Environmental Product Declaration (EPD).
 - a. Documentation should confirm EPD conforms with ISO 14205 EN 15804 or ISO 21930
 - b. EPD shall have at least Cradle to Gate scope,
 - 2. Complete "LEED Materials Documentation Sheet" with MRc2 information for each product having an EPD.
 - 3. Include product post-consumer recycled content.
 - a. Provide manufacturers' product documentation that includes recycled content claims for the products contributing towards compliance. Claims must conform to the definition in ISO 14021-1999, Environmental Labels and Declarations, Self-Declared Environmental Claims.
 - b. Complete "LEED Materials Documentation Sheet" with MRc3 Option 2 information for products with recycled content installed in the building.
- E. Qualification Data: For qualified testing agency.
- F. Welding certificates.
- G. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.
- H. Mill test reports for structural steel, including chemical and physical properties.

- I. 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.
 - 6. Nonshrink grout.
- J. Source quality-control reports.

1.6 QUALITY ASSURANCE

- A. Fabricator Qualifications: A Steel fabricator specializing in the work indicated by the drawings and specifications with a minimum of five years of qualified and verifiable experience on similar buildings.
- B. Installer Qualifications: A Steel erector specializing in the work indicated by the drawings and specifications with a minimum of five years of qualified and verifiable experience on similar buildings.
- C. Shop-Painting Applicators: Qualified according to AISC's Sophisticated Paint Endorsement or 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. 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 360.
 - 3. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- F. Preinstallation Conference: Conduct conference at Project site.

1.7 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.

1.8 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' 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.

PART 2 - PRODUCTS

2.1 LEED Requirements:

- A. Provide products with Third Party Environmental Product Declaration (EPD) for all Products.

2.2 STRUCTURAL-STEEL MATERIALS

- A. Recycled Content of Steel Products: Provide products with an average recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than 85 percent.
- B. W-Shapes: ASTM A 992/A 992M or ASTM A 572/A 572M, Grade 50
- C. Channels, Angles Shapes: ASTM A 36
- D. Plate and Bar: ASTM A 572/A 572M, Grade 50 uno.
- E. Cold-Formed Hollow Structural Sections: ASTM A 500, Grade B, structural tubing.
- F. Steel Pipe: ASTM A 500, Grade B, structural tubing.
- G. Welding Electrodes: Comply with AWS requirements.
- H. Stainless Steel Pipe and Plate: Grade 316 (Fy = 30 ksi min.)

2.3 BOLTS, CONNECTORS, AND ANCHORS

- A. High-Strength Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M), Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade C, (ASTM A 563M, Class 8S) heavy-hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M), Type 1, hardened carbon-steel washers; all with plain finish.
 - 1. Direct-Tension Indicators: ASTM F 959, Type 325 (ASTM F 959M, Type 8.8), compressible-washer type with plain finish.
- B. High-Strength Bolts, Nuts, and Washers: At connections in Braced bays for beams and bracing: ASTM A 490 (ASTM A 490M), Type 1, heavy-hex steel structural bolts or tension-control, bolt-nut-washer assemblies with splined ends; ASTM A 563, Grade DH, (ASTM A 563M, Class 10S) heavy-hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M), Type 1, hardened carbon-steel washers with plain finish.
 - 1. Direct-Tension Indicators: ASTM F 959, Type 490 (ASTM F 959M, Type 10.9), compressible-washer type with plain finish.
- C. Zinc-Coated High-Strength Bolts, Nuts, and Washers: At exterior connections, ASTM A 325 (ASTM A 325M), Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade DH (ASTM A 563M, Class 10S) heavy-hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M), Type 1, hardened carbon-steel washers.
 - 1. Finish: Hot-dip zinc coating.

2. Direct-Tension Indicators: ASTM F 959, Type 325 (ASTM F 959M, Type 8.8), compressible-washer type with mechanically deposited zinc coating finish.
 - D. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F 1852, Type 1, heavy-hex head assemblies consisting of steel structural bolts with splined ends, heavy-hex carbon-steel nuts, and hardened carbon-steel washers.
 1. Finish: Plain at interior and mechanically deposited zinc coating at exterior connections.
 - E. Shear Connectors: ASTM A 108, Grades 1015 through 1020, headed-stud type, cold-finished carbon steel; AWS D1.1/D1.1M, Type B.
 - F. Unheaded Anchor Rods: ASTM F 1554, Grade 55 (unless noted otherwise), weldable
 1. Configuration: Straight.
 2. Nuts: ASTM A 563 heavy-hex carbon steel.
 3. Plate Washers: ASTM A 36/ carbon steel.
 4. Washers: ASTM F 436 Type 1, hardened carbon steel.
 5. Finish: Plain for interior and Hot-dip zinc coating, ASTM A 153, Class C for exterior columns.
 - G. Stainless Steel Bolts: ASTM 193, Class 2 (B8) with A194 Grade 8 nuts and SS316 washers.
- 2.4 PRIMER
- A. Primer: Comply with Division 09 painting Sections; Primers or Coating, if any, f
 1. For framing to receive Fireproofing to be coordinated with Division 7 Specification Section requirements.
 - B. Galvanizing Repair Paint: ASTM A 780.
- 2.5 GROUT
- A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, 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
- A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and AISC 360.
 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/D1.1M.
 - C. Bolt Holes: Cut, drill, mechanically thermal cut, 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. Steel Wall-Opening Framing: Select true and straight members for fabricating steel wall-opening framing to be attached to structural steel. Straighten as required to provide uniform, square, and true members in completed wall framing.
- H. Welded Door Frames: Build up welded door frames attached to structural steel. 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 (250 mm) o.c. unless otherwise indicated.
- I. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel framing 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. 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 will maintain true alignment of axes without exceeding tolerances in AISC 303 for mill material.

2.8 SHOP PRIMING

- A. Shop prime steel surfaces, as outlined and compatible with Division 9 coatings, except the following:
 - 1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches (50 mm).
 - 2. Surfaces to be field welded.
 - 3. Surfaces to be high-strength bolted with slip-critical connections.
 - 4. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
 - 5. Galvanized surfaces.
- B. Surface Preparation: Clean surfaces to be painted, primed coated or galvanized. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the manufacturer's specifications and standards.
- C. Priming: See Division 09 Coatings for requirements. See also Fireproofing sections for coatings if required for framing to receive fireproofing.
- D. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.
- E. Painting and Coating: See Division 09 requirements.

2.9 GALVANIZING (See Division 9 Sections for additional requirements.)

- A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A 123/A 123M. to all steel surfaces outside of the building envelope, including those not exposed to view.
 - 1. Fill vent and drain holes that will be exposed in the finished Work unless they will function as weep holes, by plugging with zinc solder and filing off smooth.
 - 2. Galvanize roof equipments framings and welded door frames attached to structural-steel frame and located in exterior walls.

2.10 SOURCE QUALITY CONTROL

- A. Testing Agency: Owner will engage an independent testing and inspecting agency to perform shop tests and inspections and prepare test reports.
 - 1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.
- B. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.
- C. Bolted Connections: Shop-bolted connections will be inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- D. Welded Connections: In addition to visual inspection, shop-welded connections will be tested and inspected according to AWS D1.1/D1.1M 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 will not be accepted.
 - 3. Ultrasonic Inspection: ASTM E 164.
 - 4. Radiographic Inspection: ASTM E 94.
- E. In addition to visual inspection, shop-welded shear connectors will be tested and inspected according to requirements in AWS D1.1/D1.1M for stud welding and as follows:
 - 1. Bend tests will be performed if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
 - 2. Tests will be conducted on additional shear connectors if weld fracture occurs on shear connectors already tested, according to requirements in AWS D1.1/D1.1M.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify, with 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 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.
- B. Base Bearing and Leveling Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.
 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 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's "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 will be 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 unless approved by the Architect
- 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/D1.1M 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:
 - a. Snug tightened at shear connections
 - b. Slip critical at splices and connections with axial loads
- 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. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances in AISC's "Code of Standard Practice for Steel Buildings and Bridges" for mill material.

3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to inspect field welds and high-strength bolted connections.
- B. Bolted Connections: Bolted connections will be inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- C. Welded Connections: Field welds will be visually inspected according to AWS D1.1/D1.1M.
 1. In addition to visual inspection, field welds will be tested and inspected according to AWS D1.1/D1.1M 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 will not be accepted.
 - c. Ultrasonic Inspection: ASTM E 164.
 - d. Radiographic Inspection: ASTM E 94.
- D. In addition to visual inspection, test and inspect field-welded shear connectors according to requirements in AWS D1.1/D1.1M 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 on additional shear connectors if weld fracture occurs on shear connectors already tested, according to requirements in AWS D1.1/D1.1M.
- E. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

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: Cleaning and touchup painting are specified in Division 09 painting Sections.

END OF SECTION

SECTION 051213

ARCHITECTURALLY EXPOSED STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes architecturally exposed structural-steel framing.
 - 1. Requirements in Division 05 Section "Structural Steel Framing" also apply to AESS framing.

1.2 DEFINITIONS

- A. Architecturally Exposed Structural Steel: Structural steel and components:
 - 1. exposed to view in the interior or exterior, for appearance and tolerances, including stainless columns and all connections.
 - 2. designated as "architecturally exposed structural steel" or "AESS" in the Contract Documents.
- B. "Category #" shall apply the requirements listed in the AESS provision of AISC 303
 - 1. Exposed Horizontal Framing and their immediate attachments are Category 1
 - 2. Exposed Column Framing and exposed steel edge framing are Category 2
 - 3. Edge framing at stair and elevators for tolerances only are Category 3

1.3 SUBMITTALS

- A. Shop Drawings: Show fabrication of AESS components.
 - 1. Indicate welds by standard AWS symbols. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain. Indicate grinding, finish, and profile of welds.
 - 2. Indicate type, size, and length of bolts. Indicate orientation of bolt heads.

1.5 QUALITY ASSURANCE

- B. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category STD.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Use special care in handling to prevent twisting, warping, nicking, and other damage. 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.
 - 1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures.

1.7 PROJECT CONDITIONS

- A. Field Measurements: Where AESS is indicated to fit against other construction, verify actual dimensions by field measurements before fabrication.
- B. Provide as-built survey of all roof edges prior to finishes or roofing installation (after full erection)

PART 2 - PRODUCTS

2.1 BOLTS, CONNECTORS, AND ANCHORS

- A. None exposed

2.2 PRIMER

- 1. Primer: Comply with Division 05 for exposed steel where a primer is not otherwise specified as part of a Coating system.
- B. Etching Cleaner for Galvanized Metal: Complying with MPI#25.

- C. Galvanizing Repair Paint: ASTM A 780.

2.3 FABRICATION

- A. In addition to special care used to handle and fabricate AESS, comply with the following:
1. Fabricate with exposed surfaces smooth, square, and free of surface blemishes.
 2. Grind sheared, punched, and flame-cut edges smooth.
 3. Fabricate with exposed surfaces free of mill marks.
 4. Fabricate with piece marks fully hidden in the completed structure or made with media that permits full removal after erection.
 5. Fabricate to the tolerances specified in AISC 303 for steel that is designated AESS.
 6. Seal-weld open ends of hollow structural sections with 3/8-inch closure plates.
- B. Coping, Blocking, and Joint Gaps: Maintain uniform gaps of 1/8 inch with a tolerance of 1/32 inch.
- C. Bolt Holes: Cut, drill, mechanically thermal cut, or punch standard bolt holes perpendicular to metal surfaces.
- D. Cleaning Corrosion-Resisting Structural Steel: Clean and prepare steel surfaces that are to remain unpainted according to SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
- E. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel framing members.
1. Cut, drill, or punch holes perpendicular to steel surfaces.
 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.
- F. 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: Slip critical.
- G. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work, and comply with the following:
1. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding specified tolerances.
 2. Use weld sizes, fabrication sequence, and equipment that limit distortions to allowable tolerances.
 3. Provide continuous, sealed welds at angle to gusset-plate connections and similar locations where AESS is exposed to weather.
 4. Provide continuous welds of uniform size and profile where AESS is welded.
 5. Grind butt and groove welds flush to adjacent surfaces within tolerance of plus 1/16 inch, minus 0 inch.
 6. Remove backing bars or runoff tabs; back-gouge and grind steel smooth.
 7. At locations where welding on the far side of an exposed connection of AESS occurs, grind distortions and marking of the steel to a smooth profile aligned with adjacent material.
 8. Make fillet welds oversize and grind to uniform profile with smooth face and transition.

9. Make fillet welds of uniform size and profile with exposed face smooth and slightly concave. Do not grind unless directed to correct unacceptable work.

PART 3 - EXECUTION

3.1. EXAMINATION

- A. Verify, with 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 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. ERECTION

- A. Provide temporary shores, guys, braces, and other supports during erection to keep AESS secure, plumb, and in alignment.
 1. Locate welded tabs for attaching temporary bracing and safety cabling where they will be concealed from view in the completed Work.
- B. Set AESS accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.
 1. Erect AESS to the tolerances specified in AISC 303 for steel that is designated AESS.
- C. Do not use thermal cutting during erection unless approved by Architect. Finish thermally cut sections within smoothness limits in AWS D1.1.

3.3. 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: Slip critical.
 2. Orient bolt heads in same direction for each connection and to maximum extent possible in same direction for similar connections.
- B. Weld Connections: Comply with requirements in "Weld Connections" Paragraph in "Shop Connections" Article.
 1. Remove backing bars or runoff tabs; back-gouge and grind steel smooth.
 2. Remove erection bolts, fill holes, and grind smooth.
 3. Fill weld access holes and grind smooth.

3.4. FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to inspect AESS as specified in Division 05 Section "Structural Steel Framing." The testing agency will not be responsible for enforcing requirements relating to aesthetic effect.
- B. Architect will observe AESS in place to determine acceptability relating to aesthetic effect.

3.5. REPAIRS AND PROTECTION

- A. Remove welded tabs that were used for attaching temporary bracing and safety cabling and that are exposed to view in the completed Work. Grind steel smooth.
- B. Stainless Surfaces: Match specification and reviewed samples

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E4H Environments for Health Architecture
Project No. 2021073
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END OF SECTION

SECTION 053100
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. This Section includes the following:

1. Roof deck. Note that Roof Deck is specified to be fastened to supports and edges with puddle welds. Mechanical fasteners are not permissible at those locations.
2. Composite floor deck.

- B. Related Sections include the following:

1. Division 03 Section "Cast-in-Place Concrete" for concrete fill.
2. Division 05 Section "Structural Steel Framing" for shop- and field-welded shear connectors.
3. Division 05 Section "Metal Fabrications" for framing deck openings with miscellaneous steel shapes.
4. Specification 07 Sections for Fireproofing coatings.
5. Specification 09 Sections for Coatings and Paint where deck is shown painted on Architectural drawings.
6. Provision of waste management: Section 017419, Construction Waste Management Plan.
7. Provision of general LEED requirements and forms: Section 018113, Sustainable Design Requirements.

1.3 SUBMITTALS

- A. Product Data: For each type of deck, accessory, and product indicated.

- B. Shop Drawings: Show layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction. Show all MEP and Architectural openings on submittal. Different fastener types, based on deck design requirements and substrate thicknesses shown on the drawings, will be shown on submittal plans in individual and specific locations

- C. Product Certificates: For each type of steel deck, signed by product manufacturer.

- D. LEED Submittals for all Products in Part 2:

1. Provide manufacturers' product documentation for each product with an Environmental Product Declaration (EPD).
 - a. Documentation should confirm EPD conforms with ISO 14205 EN 15804 or ISO 21930
 - b. EPD shall have at least Cradle to Gate scope,
2. Complete "LEED Materials Documentation Sheet" with MRc2 information for each product having an EPD.
3. Include product post-consumer recycled content.
 - a. Provide manufacturers' product documentation that includes recycled content claims for the products contributing towards compliance. Claims must conform to

the definition in ISO 14021-1999, Environmental Labels and Declarations, Self-Declared Environmental Claims.

- b. Complete "LEED Materials Documentation Sheet" with MRc3 Option 2 information for products with recycled content installed in the building.

E. Welding certificates.

F. Field quality-control test and inspection reports.

G. 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 and screw mechanical fasteners.

H. Research/Evaluation Reports: For steel deck and fasteners.

1.4 QUALITY ASSURANCE

A. Testing Agency Qualifications: An independent agency qualified according to ASTM E 329 for testing indicated.

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

C. 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."

D. Recycled Content of Steel Products: Provide products with an average recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than 85 percent.

1.5 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.

1.6 CLEANING AND COATINGS

A. Coordinate deck surfaces and deck coatings or coverings with Division 09 Painting and Coating requirements.

PART 2 - PRODUCTS

2.1 LEED Requirements:

A. Provide products with Third Party Environmental Product Declaration (EPD) for all Products

2.2 ROOF DECK

A. Steel Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 30, and with the following:

- 1. Galvanized Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 33 (230), G60 (Z180) zinc coating.
- 2. Deck Profile: As indicated on the drawings.
- 3. Profile Depth: As indicated on the drawings
- 4. Design Uncoated-Steel Thickness: 0.0479 inch (0.91 mm) or as indicated on the drawings

5. Span Condition: Triple span or more.
6. Side Laps: Overlapped

2.3 COMPOSITE FLOOR DECK

- A. Composite Steel 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. 30, with the minimum section properties indicated, and with the following:
 1. Galvanized Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 33 (230), G60 (Z180) zinc coating; G90 for decking at exterior bridge
 2. Profile Depth: See Drawings; 2" unless noted otherwise
 3. Design Uncoated-Steel Thickness: See Drawings, 20 gauge unless noted otherwise.
 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 (4.8-mm) 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 (230 MPa), not less than 0.0359-inch (0.91-mm) 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 (230 MPa), of same material and finish as deck, and of thickness and profile recommended by SDI Publication No. 30 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. Recessed Sump Pans: Single-piece steel sheet, 0.0747 inch (1.90 mm) thick, of same material and finish as deck, with 3-inch- (76-mm-) wide flanges and sloped recessed pans of 1-1/2-inch (38-mm) minimum depth. For drains, cut holes in the field.
- I. Galvanizing Repair Paint: ASTM A 780.
- J. Repair Paint: Manufacturer's standard rust-inhibitive primer of same color as primer.
- K. Coatings; Coordinate with Fireproofing systems requirements.

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.

3.2 INSTALLATION, GENERAL

- A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 30, 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.
- 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 (span supports and side supports) 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:
 - 1. Weld Diameter: 5/8-inch nominal.
 - 2. Weld Spacing: Weld edge and interior ribs of deck units with a minimum of two welds per deck unit at each support on all braced frame column lines; and one weld otherwise. Space welds as shown on the drawings and as a minimum, meeting the following Fastener Spacing:
 - a. Fasten edge and interior ribs of deck units at each support. Space fasteners as shown on the drawings and at 12 inches maximum apart in the field of roof and 6 inches maximum apart in roof corners and perimeter, based on roof-area definitions in FMG Loss Prevention Data Sheet 1-28.
- B. Fasten roof-deck panels to wood supporting members with screw fasteners shown on the drawings, no less than 6" oc at edges and 2 per support at beam flutes. Pre-drill holes through steel deck.
- C. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, as shown on the drawings. If not shown then not exceeding 6 inches maximum and as follows:
 - 1. Mechanically fasten with self-drilling, No. 10 (4.8-mm-) diameter or larger, carbon-steel screws.
- D. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches (38 mm), with end joints as follows:
 - 1. End Joints: Lapped 2 inches (51 mm) minimum or butted at Contractor's option.
- E. 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 (305 mm) apart with at least one fastener at each corner.
 - 1. Install reinforcing channels or zees in ribs to span between supports and mechanically fasten.

- F. Miscellaneous Roof-Deck Accessories: Install ridge and valley plates, finish strips, end closures, and reinforcing channels according to deck manufacturer's written instructions. 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.
- G. Flexible Closure Strips: Install flexible closure strips over beams and joists 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:
 - 1. As indicated on the drawings.
 - 2. Where not indicated the following apply:
 - a. Weld Diameter: 5/8 inch nominal.
 - b. Weld Spacing: Weld edge ribs of panels at each support. Space additional welds an average of 12 inches (305 mm) apart, but not more than 18 inches (457 mm) apart.
 - c. Weld Spacing: Space and locate welds as indicated.
- B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding 18 inches and as follows:
 - 1. Mechanically fasten with self-drilling, No. 10 (4.8-mm-) diameter or larger, carbon-steel screws.
- C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches (38 mm) with end joints as follows:
 - 1. End Joints: Lapped or butted at Contractor's option.
- 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: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
- 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 REPAIRS AND PROTECTION

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
- B. Provide final protection and maintain conditions to ensure that steel deck is without damage or deterioration at time of Substantial Completion.

END OF SECTION

SECTION 054000
COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Curtain wall formed steel stud for exterior walls, parapets, fascia, and ceilings/soffits.
- B. Framing accessories, including bent metal strips and clips as shown on the drawings

1.2 RELATED SECTIONS

- A. Division 01 Section "Quality Requirements" for independent testing agency procedures and administrative requirements.
- B. Division 05 Section "Structural Steel" for connection configuration
- C. Division 07 Sections for all façade and fenestration systems and elements connected to and requiring support.
- D. Division 09 section for exterior wall and ceiling panels and assemblies
- E. Provision of waste management: Section 017419, Construction Waste Management Plan.
- F. Provision of general LEED requirements and forms: Section 018113, Sustainable Design Requirements.

1.3 REFERENCES

- A. AISI – American Iron and Steel Institute – Cold-Formed Steel Design Manual.
- B. ASTM A123 – Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- C. ASTM A446 – Steel Sheet, Zinc-Coated (Galvanized) by Hot Dip Process, Physical (Structural) Quality.
- D. ASTM A525 – Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.
- E. ASTM A570 – Hot-Rolled Carbon Steel Sheet and Strip. Structural Quality.
- F. ASTM A611 – Steel, Cold-Rolled Sheet, Carbon, Structural.
- G. ASTM A645 – Steel Sheet, Pressure Vessel Plates, Five Percent Nickel Alloy Steel, Specialty Heat Treated.
- H. ASTM C955 – Load-Bearing (Transverse and Axial) Steel Studs, Runners (Track), and Bracing or Bridging, for Screw Application of Gypsum Board and Metal Plaster Bases.
- I. AWC (Association of Wall and Ceiling Industries) – Specifications Guide for Cold Formed Steel Structural Members.
- J. AWS D1.1 – Structural Welding Code; AWS D1.3 – Light Steel Welding Code.
- K. SSPC (Steel Structures Painting Council) – Steel Structures Painting Manual.

1.4 SYSTEM DESCRIPTION

- A. Except where members or connections are sized and spaced on the drawings, provided design and size components to codes and standards.
- B. In addition, design and provide all necessary accessories in accordance with applicable codes, manuals, specifications, and industry standards.
- C. Maximum Allowable Deflections:

1. Exterior studs 1/600 of span for 10 year wind; 1/480 for 50 year wind basis
 - D. Design wall system to provide for movement of components without damage or overstressing, failure of joint seals, sheathing failure, undue stress on fasteners, or other detrimental effects when subject to seasonal or cyclic day/night temperature ranges and deflection of structural system.
 - E. Design:
 1. Exterior non-load-bearing curtain wall framing to accommodate lateral deflection without regard to contribution of sheathing materials. Design for load and eccentricity of storefront system dead and wind loads.
 2. Provide gage thickness and framing locations required by façade and fenestration systems connections. Coordinate loadings for design at applied locations.
 - F. Design system to accommodate construction tolerances, deflection of building structural members, and clearances of intended openings. Allow for 3/4-inch minimum of vertical movement unless noted otherwise. Design for complete connection to base structure including design of attachment at connection zone.
 - G. See Drawings for wind load criteria.
- 1.5 SUBMITTALS
- A. Submit under provisions of Division 1.
 - B. Shop drawings showing layout, spacing, sizes, thicknesses, and types of cold-formed metal framing, fabrication, fastening and anchorage details, including mechanical fasteners. Show reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachments to other units of Work. Coordinate framing locations with all wall panel, façade material, and sheathing panel submittal requirements.
 1. For elements not detailed on the drawings or for proposed alterations of cold-formed metal framing; comply with IBC 2015 design loadings, include structural analysis data sealed and signed by the qualified professional engineer who was responsible for its preparation. Drawings and calculation designs shall bear the Stamp of a Registered Engineer in the State of Vermont.
 - C. Describe method for securing studs to tracks and for bolted and welded framing connections.
 - D. LEED Submittals for all Products in Part 2:
 1. Provide manufacturers' product documentation for each product with an Environmental Product Declaration (EPD).
 - a. Documentation should confirm EPD conforms with ISO 14205 EN 15804 or ISO 21930
 - b. EPD shall have at least Cradle to Gate scope,
 2. Complete "LEED Materials Documentation Sheet" with MRc2 information for each product having an EPD.
 3. Include product post-consumer recycled content.
 - a. Provide manufacturers' product documentation that includes recycled content claims for the products contributing towards compliance. Claims must conform to the definition in ISO 14021-1999, Environmental Labels and Declarations, Self-Declared Environmental Claims.
 - b. Complete "LEED Materials Documentation Sheet" with MRc3 Option 2 information for products with recycled content installed in the building.
 - E. Product Data: Provide data on standard framing members; describe materials and finish, product criteria, and limitations.

- F. Manufacturer's Installation Instructions: Indicate special procedures, perimeter conditions requiring special attention.
- G. ICC-ES Reports for all fasteners, framing and accessories.

1.6 QUALITY ASSURANCE

- A. Calculate structural properties of framing members in accordance with AWCI, MFMA, and AWS D1.3 requirements.
- B. Maintain one copy of document on site.
- C. Pre-submittal Conference: Conduct conference at Project site to comply with requirements in Division 01 and with Exterior Ceiling, Window, Louver, Door and Panel Submittals.

1.7 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum five years documented experience.
- B. Installer: Company specializing in performing the work of this section with minimum five years documented experience.
- C. For elements not detailed on the drawings or for proposed alterations to the drawings, design structural elements under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed in the State of Vermont. Design calculations and drawings shall bear the seal of the Professional Engineer supervising the work.

1.8 MOCKUP

- A. Provide mockup of no less than 4 feet square of exterior framed walls including insulation, sheathing, and interior and exterior finish specified in other sections, under provisions of Division 1.
- B. Mockup may remain as part of the Work.

1.9 FIELD MEASUREMENTS

- A. Verify that field measurements are as indicated on shop drawings.

1.10 COORDINATION

- A. Coordinate work under provisions of Division 1.
- B. Coordinate with the placement of components within the stud framing system.

1.11 DELIVERY, STORAGE, AND HANDLING

- A. Protect cold-formed metal framing from corrosion, deformation, and other damage during delivery, storage, and handling.
- B. Store cold-formed metal framing, protect with a waterproof covering, and ventilate to avoid condensation.

PART 2 - PRODUCTS

2.1 LEED REQUIRMENTS:

- A. Provide products with Third Party Environmental Product Declaration (EPD) for all Products.

2.2 MANUFACTURERS

- A. Subject to compliance with requirements, manufacturers offering cold-formed metal framing may be incorporated into the Work.

2.3 FRAMING MATERIALS

- A. Materials shall conform to:
1. ASTM A446 Grade D – 50,000 psi. Minimum 60% post-consumer recycled content.
 2. ASTM A446 Grade A – 33,000 psi. Minimum 60% post-consumer recycled content.
 3. All materials to be galvanized in accordance with ASTM A525.

2.4 WALL FRAMING

- A. Steel Studs: Manufacturer's standard C-shaped steel studs of web depths indicated, with lipped flanges and complying with the following.
1. Design Uncoated Steel Thickness: As required by design.
 2. Flange Width: As required by design.
 3. Web: Punched
- B. Steel Track: Manufacturer's standard U-shaped steel track, un-punched, of web depths indicated, with straight flanges and complying with the following.
1. Design Uncoated Steel Thickness: As required by design.
 2. Flange Width: Manufacturers standard deep flange where indicated, standard flange elsewhere.
- C. Minimum Gage: Where walls provide lateral support for masonry veneer, provide a minimum thickness of 0.043 inches or 43mils for all studs, track, and blocking unless noted otherwise on drawings.

2.5 FRAMING ACCESSORIES

- A. Fabricate steel-framing accessories of the same material and finish used for framing members, with a minimum yield strength of 33,000 psi.
- 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. Deflection track and vertical slide clips.
 4. Stud kickers and girts.

2.6 ACCESSORIES, ANCHORS, CLIPS, AND FASTENERS

- A. Steel Shapes and Clips: ASTM A36 (ASTM A 36M), zinc coated by the hot-dip process according to ASTM A 123.
- B. Cast-in-Place Anchor Bolts and Studs: ASTM A 307, Grade A (ASTM F 568, Property Class 4.6); carbon-steel hex-head bolts and studs; carbon-steel nuts; and flat, unhardened-steel washers. Zinc coated by the hot-dip process according to ASTM A153.
- C. Expansion Anchors: Fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 5 times the design load, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.
- D. Powder-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion resistant materials, with capability to sustain, without failure, a load equal to 10 times the design load, as determined by testing per ASTM E 1190 conducted by a qualified independent testing agency.

- E. Mechanical Fasteners: Corrosion-resistant coated, self-drilling, self-threading steel drill screws.
 - 1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.
- F. Welding Electrodes: Comply with AWS standards.
- G. Touch-Up Primer for Galvanized Surfaces: SSPC – Paint 20 Type I Inorganic zinc rich.
- H. Provide all accessories recommended by the manufacturer and as required by AISI Specifications.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify site conditions under provisions of Division 1.
- B. Examine supporting substrates and abutting structural framing for compliance with requirements, including installation tolerances and other conditions affecting performance of cold-formed metal framing. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 ERECTION OF STUDDING

- A. Cold-formed metal framing may be shop or field fabricated for installation, or it may be field assembled.
- B. Install cold-formed metal framing and accessories plumb, square, true to line, and with connections securely fastened, according to manufacturer's recommendations and the requirements of this Section.
- C. Align floor and ceiling tracks; locate to wall and partition layout. Secure in place. Provide a double bead of sealant under all runners and tracks.
- D. Place studs at 16 inches on center maximum spacing; not more than 2 inches from abutting walls and at each side of openings. Connect studs to tracks.
- E. Construct corners using minimum three studs. Double stud at wall openings, door and window jambs.
- F. Erect load bearing studs one piece full length. Splicing of studs is not permitted. Erect load bearing studs, brace, and reinforce to develop full strength, to achieve design requirements.
- G. Cut framing members by sawing or shearing; do not torch cut.
- H. Fasten cold-formed metal framing members by welding or screw fastening, as standard with fabricator. Wire tying of framing members is not permitted. Comply with AWS requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
- I. Locate mechanical fasteners and install according to cold-framed metal framing manufacturer's instructions with screw penetrating joined members by not less than 3 exposed screw threads.
- J. Install intermediate studs above and below openings to align with wall stud spacing.
- K. Provide deflection allowance in stud track, directly below horizontal building framing at non-load bearing framing.
- L. Attach cross studs or furring channels to studs for attachment of fixtures anchored to walls.
- M. Install framing between studs for attachment of mechanical and electrical items, and to prevent stud rotation.
- N. Do not bridge building expansion and control joints with cold-formed metal framing. Independently frame both sides of joints.

- O. Install insulation in built-up exterior framing members, such as headers, sills, boxed joists, and double studs, inaccessible upon completion of framing work.
- P. Fasten reinforcement plate over web penetrations that exceed size of manufacturer's standard punched openings.
- Q. Complete framing ready to receive finishes.

3.3 ERECTION OF CEILING JOISTS, SOFFITS, FASCIA, AND OVERHANGS

- A. Install framing components in accordance with manufacturer's instructions.
- B. Make provisions for erection stresses. Provide temporary alignment and bracing.
- C. Set members parallel and level, with lateral bracing and bridging.
- D. Locate joist end bearing directly over load bearing studs or provide load distributing member to top of stud track.
- E. Provide web stiffeners at reaction points.
- F. Touch-up field welds and damaged surfaces with primer
- G. Complete framing ready to receive finishes.

3.4 NON-LOAD BEARING CURTAINWALL INSTALLATION

- A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure as indicated.
- B. Squarely seat studs against webs of top and bottom tracks. Fasten both flanges of studs to top and bottom track, unless otherwise indicated. Space studs as follows:
 - 1. Stud Spacing: 16 inches
 - 2. Set studs plumb, except as needed for diagonal bracing or required for non-plumb walls or warped surfaces and similar requirements.
- C. Isolate steel framing from building structure at locations indicated to prevent transfer of vertical loads while providing lateral support.
- D. Install deflection track and anchor to building structure.
- E. Install horizontal bridging in curtain wall studs, spaced in rows not more than 48 inches apart. Fasten at each stud intersection.
 - 1. Install additional row of horizontal bridging in curtain wall stud beneath deflection track when curtain wall studs are not fastened to an additional top track.
 - 2. Bridging: Combination of flat, steel-sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness matching studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
- F. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, fasteners, and stud girts, to provide a complete and stable curtain wall-framing system.

3.5 REPAIRS

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed metal framing with galvanizing repair paint according to ASTM A 780 and the manufacturer's instructions.

3.6 ERECTION TOLERANCES

- A. Erection tolerances will be within the standards of the industry.

- B. Install cold-formed metal framing to a maximum allowable tolerance variation from plumb, level, and true to line of 1/8 inch in 10 feet (1:960).
- C. 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.

END OF SECTION

SECTION 054523
HEALTHCARE METAL SUPPORTS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Metal support systems for surgical lights, x-ray equipment, bariatric lifts, and other medical equipment as required.

1.2 SYSTEM DESCRIPTION

- A. Requirements: Drawings are diagrammatic and are intended to establish basic dimension of units, sight lines, and profiles of units.
- B. Interface with Adjacent Systems: Integrate design and connections with adjacent construction.
 - 1. Accommodate allowable tolerances and deflections for structural members in installation.
 - 2. Coordinate with reflected ceiling plan and other items indicated to be placed in or above ceiling to ensure medical support system does not interfere with or dislocate other items.

1.3 PERFORMANCE REQUIREMENTS

- A. Manufacturer: Responsible for designing system, including anchorage to structural system and necessary modifications to meet specified requirements and maintain visual design concepts.
- B. Employ registered professional engineer, licensed to practice structural engineering in jurisdiction where Project is located, to engineer each component of medical support system.
- C. Attachment Considerations: Account for site peculiarities and expansion and contraction movements so there is no possibility of loosening, weakening and fracturing connection between units and building structure or between components themselves.
- D. Make modifications only to meet field conditioned and ensure fitting of system components.
 - 1. Obtain Architect's approval of modifications and for connections to building elements at locations other than indicated on Drawings.
- E. Support Structure: Locate support members at ceiling plane as indicated on Drawings. Make possible attachment of equipment support rails at any point along support system without drilling or welding into system.
- F. Ceiling Anchorage: Attach to ceiling by means of embedded concrete inserts, through-bolts, or direct attachment to structural framing.
- G. Rigidly fix and brace support structure against sway.
- H. Loading: Design support structure to support vertical load, maximum eccentricity of vertical load from support point, transverse force acting on longitudinal rail, longitudinal force acting on longitudinal rail, and deflection criteria established for each piece of supported equipment.
 - 1. If loads are not defined for piece of supported equipment assume concentrated load of 1500 pounds at any point along equipment rails. Concentrated load is maximum encountered by positioning of equipment at extremities of its travel (maximum load configuration).
- I. Safety Factor: Design support structure for minimum safety factor of three based on ultimate strength under static loading conditions. Structure shall not deflect more than 1/720 span vertically or horizontally when maximum loading conditions of equipment operation are applied on either rail.

1.4 ACTION SUBMITTALS

- A. General: Submit following items in accordance with Section 013300.
- B. Product Data: For each type of product indicated.
- C. Shop Drawings: Indicate plan layout, typical elevations, details and anchoring methods.

1.5 INFORMATIONAL SUBMITTALS

- A. Delegated Design Data: For installed dimension support systems indicated to comply with certain design loads and deflection limits, include structural analysis data signed and sealed by the qualified professional structural engineer responsible for their preparation.
- B. Certificates verifying AWS qualifications within previous 12 months for each welder employed for Work.
- C. Certifications specified in Quality Assurance article.
- D. Qualification Data: For professional Engineer.

1.6 QUALITY ASSURANCE

- A. Engineer Qualifications: Registered professional engineer licensed to practice structural engineering in jurisdiction where Project is located, with minimum of five years experience in design of medical support systems.
- B. Manufacturer Qualifications: Company specializing in manufacturing, fabricating, and installing Products specified in this Section with minimum five years experience.
- C. Welder Qualifications: AWS certified within past 12 months for each type of weld required.
- D. Certifications: Submit following:
 - 1. Manufacturer's certification that products furnished for Project meet or exceed specified requirements.
 - 2. Engineering certifications.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Comply with Section 016100.
- B. Deliver components of system required to be installed by other trades in sufficient time not to delay work of project.

PART 2 - PRODUCTS

2.1 MANUFACTURER

- A. Medical Support Systems:
 - 1. Cooper B-Line Strut Systems, Inc., Highland, IL.
 - 2. Flex-Strut, Inc. Metal Framing Products, Warren, OH.
 - 3. GS Metals Corporation, "Globe Strut."
 - 4. Hilti, Inc., "Hilti Strut MQ."
 - 5. Tyco "Unistrut" Metal Framing, Wayne MI.
- B. Substitutions: Under provisions of Section 012500.

2.2 METALS, GENERAL

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.
- B. Recycled Content of Steel Products: Provide products with average recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 percent.

2.3 MEDICAL SUPPORT SYSTEMS

- A. Slotted Channel Framing: Cold-formed metal channels with flange edges returned toward web with 9/16 inch wide slotted holes in webs at 2 inches on center.
 - 1. Width, Depth, Thickness: As required by design to meet structural performance.
- B. Materials:
 - 1. Steel Sheet Structural Quality: ASTM A 570, Grade 33.
 - 2. Zinc-Coated Steel Sheet: ASTM A 653, Quality SQ, Grade 33, G90.

3. Hot-Rolled Steel Bar: ASTM A 575.
4. Hot-Rolled Steel Sheet and Strip: ASTM A 569.
5. Fasteners and Anchors: Concrete inserts, bolts or direct attachment to structural framing.

C. Finish: System components; corrosion resistant. Hardware; electro-galvanized.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions and proceed with Work in accordance with Section 017200.

3.2 INSTALLATION

A. Medical Support Systems: Install in accordance with approved Shop Drawings and manufacturer's installation instructions.

B. Structural Assembly: Install supporting framework plumb and true.

C. Installation Tolerances:

1. Mount surfaces of support structure horizontal within tolerance of 1/32 inch in 24 inches and within 1/16 inch in 18 foot length.
2. Elevation of one rail mounting surface to other shall be within 1/16 inch in any 24 inches length of rails.

3.3 PROTECTION

A. Protect finished installation under provisions of Section 017000 - EXECUTION AND CLOSEOUT REQUIREMENTS.

END OF SECTION

SECTION 055000
METAL FABRICATIONS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. The work of this Section consists of miscellaneous metals, and ornamental iron where shown on the Drawings, as specified herein, and as required for a complete and proper installation. Work includes, but is not limited to the following:
- B. Furnish and Install:
 - 1. Unistrut
 - 2. Above ceiling steel supports for toilet compartments and other similar products furnished under other sections.
 - 3. Requirements for metal fasteners and accessories.
 - 4. All other non-specified metal work generally performed by the miscellaneous metals trade, and which are not otherwise provided under the structural documents.
- C. Perform application of liquid zinc touch-up to all welds of galvanized steel items furnished hereunder.

1.2 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract and Division 01 Specification Sections apply to this Section.
- B. Section 016000 - Product Requirements: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- C. Section 017419 - Construction Waste Management and Disposal: Procedural and administrative requirements for construction and demolition recycling.
- D. Section 092216 - Non-Structural Metal Framing: Non-loadbearing metal framing systems for interior partitions and ceilings.
- E. Section 061000 - Rough Carpentry: Wood blocking.
- F. Section 099100 - Painting: Applied finish coatings other than those specified herein.

1.3 REFERENCES

- A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 014200 - REFERENCES. The standards referenced herein are included to establish recognized minimum quality only. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern. Equivalent quality and testing standards will be acceptable, subject to their timely submission, review and acceptance by the Architect.
 - 1. ASME B18.2.1 - Square, Hex, Heavy Hex, and Askew Head Bolts and Hex, Heavy Hex, Hex Flange, Lobed Head, and Lag Screws (Inch Series).
 - 2. ASME B18.6.3 - Machine Screws, Tapping Screws, and Metallic Drive Screws (Inch Series).
 - 3. ASME B18.21.1 - Washers: Helical Spring-Lock, Tooth Lock, and Plain Washers (Inch Series).
 - 4. ASTM A36 - Standard Specification for Carbon Structural Steel.
 - 5. ASTM A53 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
 - 6. ASTM A108 - Standard Specification for Steel Bar, Carbon and Alloy, Cold Finished.
 - 7. ASTM A153 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - 8. ASTM A283 - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates.

9. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60,000 PSI Tensile Strength.
10. ASTM A312/A312M - Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes.
11. ASTM A489 - Standard Specification for Carbon Steel Lifting Eyes.
12. ASTM A500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
13. ASTM A501 - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
14. ASTM A526 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Commercial Quality.
15. ASTM A554 - Standard Specification for Welded Stainless Steel Mechanical Tubing.
16. ASTM A575 - Standard Specification for Steel Bars, Carbon, Merchant Quality, M-Grades.
17. ASTM A576 - Standard Specification for Steel Bars, Carbon, Hot-Wrought, Special Quality.
18. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
19. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel.
20. ASTM C881 - Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete.
21. ASTM C882 - Standard Test Method for Bond Strength of Epoxy-Resin Systems Used with Concrete by Slant Shear.
22. ASTM C1107 - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).
23. ASTM D520 - Standard Specification for Zinc Dust Pigment.
24. ASTM D570 - Standard Test Method for Water Absorption of Plastics.
25. ASTM D638 - Standard Test Method for Tensile Properties of Plastics.
26. ASTM D695 - Standard Test Method for Compressive Properties of Rigid Plastics.
27. ASTM D732 - Standard Test Method for Shear Strength of Plastics by Punch Tool.
28. ASTM D790 - Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
29. ASTM F593 - Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
30. ASTM F594 - Standard Specification for Stainless Steel Nuts.
31. ASTM F1554 - Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength.
32. ASTM F3125 - Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi (830 MPa) and 150 ksi (1040 MPa) Minimum Tensile Strength.
33. AWS - Standard Code for Arc and Gas Welding in Building Construction.
34. ICC Evaluation Services.
35. MIL-P-21035B - Paint High Zinc Dust Content, Galvanizing Repair (Metric) (superseding DOD-P-21035A)
36. SSPC Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic").
37. SSPC Paint 29 - Zinc Dust Sacrificial Primer, Performance-Based.
38. SSPC SP 1 - Solvent Cleaning.
39. SSPC SP 2 - Hand Tool Cleaning.
40. SSPC SP 3 - Power Tool Cleaning.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate work of this Subcontract with that of other trades affecting or affected by this work, and cooperate with the other trades as necessary to assure the steady progress of work.
 - a. Make arrangements for delivery, receipt and installation of inserts and anchorages with the respective trades responsible for installing inserts and anchorages furnished by this Section to prevent delay of the Work.
 2. Be responsible for establishing locations and levels for all work of this Section, except such parts as may be delivered to others and set by them. In such cases assist them in properly locating said parts.
- B. Sequencing:
1. Field Measurements:
 - a. Take field measurements before preparation of shop drawings and fabrication, where possible, to ensure proper fitting of Work.
 - b. Allow for adjustments within specified tolerances wherever taking of field measurements before fabrication might delay Work.

1.5 SUBMITTALS

- A. Information and Review Submittals: Submit the following under provisions of Section 013000 - Administrative Requirements:
1. Product Data: Manufacturer's complete product data and specifications for all prefabricated items, shop primer paints, liquid zinc coating, and hydraulic cements, to be furnished hereunder.
 - a. For epoxy anchoring systems: Furnish ICC-ES Code approvals and performance data that includes recommended loading for each application.
- B. Shop Drawings:
1. Shop Drawings, bearing registration stamp of a Professional Structural Engineer registered in the state in which the project is located.
 - a. General Requirements:
 - 1) Include large scale details of items of all metal fabrications to be furnished hereunder, showing proposed methods of anchorage to surrounding structure and conditions.
 - 2) Indicate on the shop drawings all erection marks for various places of miscellaneous metals, and ensure that the actual field pieces bear corresponding marks.
 - 3) Indicate shop built components, and field-built components.
 - 4) Indicate and detail all field installation connections.
 - 5) Indicate weld types and length.
 - 6) Indicate blocking locations..
 - 7) Indicate seam locations in high-strength steel members
 2. Include large scale details of metal fabrications supporting work of other trades.
 3. Include layout, spacings, sizes, thicknesses, and types of cold-formed steel framing; fabrication; and fastening and anchorage details, including mechanical fasteners.
 4. Indicate reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.
 5. Selection Samples:
 - a. Sample card indicating Manufacturer's full range of colors of shop applied finishes available for selection by the Architect.
- C. Certificates:
1. Certificate of Compliance from Galvanizer: Submit notarized Certificate of Compliance with application for payment for galvanizing, signed by galvanizer, indicating compliance with requirements of specifications. Include scope of services provided, and quantity and itemized description of items processed.
 2. Welders certificates as specified under Article entitled "QUALITY ASSURANCE".

- D. Delegated Design Submittals: Provide calculations for loading and stresses for the work of this section, bearing the Professional Structural Engineer's seal, registered in the State of Vermont. Show how design load requirements and other performance requirements have been satisfied as required by the applicable building codes.
 - 1. Work scope requiring loading and stress calculations includes, but is not limited to the following:
 - a. Metal fabrications supporting work of other trades.
 - b. Overhead supports.
- E. Closeout Submittals: Submit the following under provisions of Section 017800 - CLOSEOUT SUBMITTALS.

1.6 QUALITY ASSURANCE

- A. General: Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.
 - 1. Galvanizer's Tagging: The galvanizer shall mark all lots of material with a clearly visible stamp or tag indicating the name of the galvanizer, the weight of the zinc coating, and the applicable ASTM Specification Numbers.
- B. Qualifications:
 - 1. Fabricator/Installer: Minimum of 5 years documented experience demonstrating previously successful work of the type specified herein, and approved by product manufacturer.
 - 2. Welders: Utilize only qualified welders employed on the Work. Submit verification that Welder's are AWS D1.1 and D1.4 qualified within the previous 12 months.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Delivery and Acceptance Requirements:
 - 1. Do not order or deliver any materials until all submittals, required in the listed Specification Sections included as part of this Subcontract, have been received and approved by the Architect.
- B. Storage and Handling Requirements:
 - 1. Handle and store materials under cover in a manner to prevent defacement, deformation, or other damage to the materials and to shop finishes, and to prevent the accumulation of foreign matter on the metal work. All such work shall be repaired and cleaned prior to erection.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: All materials shall be new stock, free from defects impairing strength, durability or appearance, and of best commercial quality for each intended purpose. Unless specifically called for otherwise, work shall be fabricated from the following:
 - 1. Steel Shapes, Plates and Bars: ASTM Designation A36.
 - 2. Steel Pipe: ASTM A53, grade A, seamless pipe, black finish unless otherwise noted.
 - 3. Stainless Steel Pipe: ASTM A312/A312M, Grade TP304.
 - 4. Structural Steel Tubing: Square and rectangular shapes, ASTM A500, Grade B.
 - 5. Stainless Steel Tubing: ASTM A554, Grade MT304.
 - 6. Steel Tubular Shapes: ASTM A501.
 - 7. Steel Plates: To be bent or cold-formed, ASTM A283, grade C.
 - 8. Steel Bars and Bar-Size Shapes: ASTM A36.
 - 9. Cold-Finished Steel Bars: ASTM A108.
 - 10. Galvanized Carbon Steel Sheets: ASTM A526, with G90 zinc coating in accordance with ASTM A653/A653M.
 - 11. Stainless Steel Plate and Sheet: ASTM A666, Type 304.
 - 12. Gray Iron Castings: ASTM A48, class 30.
 - 13. Malleable Iron Castings: ASTM A47,

14. Stainless Steel Castings: ASTM A743, Grade CF 8 or CF 20.
- B. Recycled Content of Ferrous Metals: Use maximum available percentage of recycled steel. Steel incorporated into the work shall contain not less than 25 percent of recycled steel.
- C. Steel Materials to be Hot Dip-Galvanized: Provide steel chemically suitable for metal coatings complying with the following requirements: Carbon below 0.25 percent, silicon below 0.24 percent, phosphorous below 0.05 percent, and manganese below 1.35 percent. Notify galvanizer if steel does not comply with these requirements to determine suitability for processing.
- D. Metal Surfaces, General: For metal fabrications exposed to view upon completion of the Work, provide materials selected for their surface flatness, smoothness and freedom from surface blemishes. Do not use materials whose exposed surfaces exhibit pitting, seam marks, roller marks, rolled trade names, roughness, and, for steel sheet, variations in flatness exceeding those permitted by reference standards for stretcher-leveled sheet.

2.2 UNIVERSAL GRID SYSTEM

- A. Specified Manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Unistrut Corporation, Itasca, IL.
 1. Acceptable Manufacturers and Products: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following.
 - a. Unistrut Corporation, Itasca IL., product "Unistrut"
 - b. Cooper US, Inc., Houston TX., product "Cooper B-Line".
 - c. Gleason Partners, LLC., Grand Rapids, MI., product "Strut Channel Systems".
 - d. Thomas & Betts Corporation, Memphis TN, product "Kindorf Superstrut".
 2. There are no other manufacturers of this product type available in the United States, fabricators may choose to fabricate grid system components using structural steel shapes, with submittal and approval of complete engineering Drawings and calculations as a substitution.
 3. Finish: Electrolytically zinc coated per ASTM B633 Type III SC 1.
- B. All channel members shall be fabricated from structural grade steel confirming to the following ASTM specifications:
 1. ASTM A653 Grade A
- C. All fittings shall be fabricated from steel conforming to one of the following ASTM specifications:
 1. ASTM A36, A575, or A576.
- D. All materials shall be stamped and identifiable by manufacturer and part number (where appropriate). Materials that appear damaged, distressed, unidentifiable or rusted shall not be used and will not be accepted.

2.3 FASTENERS

- A. General: Provide all fasteners and attachments as required for work specified herein and as indicated on the Drawings.
 1. In general,
 - a. Provide all fasteners and attachments of the same material and finish as the metal to which it is applied unless otherwise noted.
 - 1) Provide Type 304 stainless-steel fasteners for exterior use.
 - 2) Provide Type 304 stainless-steel fasteners for fastening aluminum.
- B. Steel Bolts, Nuts and Washers: ASTM A307, galvanized to ASTM A153 for galvanized components.
- C. Fasteners at Blind Structural Tubes, or other Blind Conditions: Lindaptor North America, Ann Arbor MI, product: "Type HB Hollo-Bolt", or approved equal.
 1. Acceptable Manufacturers, or approved equal.
 - a. Lindaptor North America, Ann Arbor, MI.

- b. Simplified Building Components, Rochester, NY.
- c. Avdel USA LLC., Stanfield, NC.
- 2. Head type: Hexagonal.
- 3. Material: Hot-dipped galvanized steel.
- D. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel type 304 bolts, nuts and, where indicated, flat washers; ASTM F593 for bolts and ASTM F594 for nuts, Alloy Group 1.
- E. Anchor Bolts: ASTM F1554, Grade 36.
 - 1. Provide hot-dip or mechanically deposited, zinc-coated anchor bolts where item being fastened is indicated to be galvanized.
- F. Eyebolts: ASTM A489.
- G. Machine Screws: ASME B18.6.3.
- H. Lag Bolts: ASME B18.2.1.
- I. Plain Washers: Round, ASME B18.21.1.
- J. Lock Washers: Helical, spring type, ASME B18.21.1.

2.4 ACCESSORIES

- A. Adhesive for Attaching Anchors and for Direct Pinning: High-modulus, high strength, moisture tolerant, epoxy adhesive, two-component 100 percent solids, epoxy resin complying with ASTM C881.
 - 1. Minimum performance properties (as cured at 70 degrees F. and 50 percent relative humidity):
 - a. Minimum Compressive Strength, as tested per ASTM D695:
 - 1) At 3 days: 11,300 psi (31.0 MPa).
 - 2) At 7 days: 11,800 psi (44.8 MPa).
 - 3) At 28 days: 12,200 psi (58.6 MPa).
 - b. Shear Strength: 6200 psi (43 MPa) at 14 days, as tested per ASTM D732.
 - c. Minimum Flexural Strength: 10,700 psi (74 MPa) at 14 days, as tested per ASTM D790.
 - d. Minimum Bond Strength: At 14 days, as tested per ASTM C882:
 - 1) Plastic Concrete to Hardened Concrete: 2200 psi (13.8 Mpa).
 - 2) Plastic Concrete to Steel: 2000 psi (13.8Mpa).
 - e. Maximum Water Absorption: 24 hour 0.27%, as tested per ASTM D570
 - f. Minimum Tensile Properties: Tensile Strength 6900 psi (48 Mpa), as tested per ASTM D638.
 - 2. Products which may be considered as equal include the following, or approved equal:
 - a. Sika Corporation, Lyndhurst NJ., product: "Sikadur 32 Hi-Mod Gel.
 - b. Simpson Strong Tie, Pleasanton, CA., product "SET High Strength Epoxy".
 - c. Symons Corporation, Des Plaines, IL., product "Rescon Gel anchor 304".
- B. Grout: Ready mixed, non-metallic high-strength controlled expansion grout of flowable consistency, conforming to ASTM C1107 with minimum compressive strength of 8,000 pounds per square inch (55.2 MPa) at 28 days.
 - 1. Products which may be considered as equal include the following, or approved equal:
 - a. Five Star Products, Inc., Fairfield CT, product "Five Star Grout."
 - b. L&M Construction Chemicals, Omaha NE, Product: "Crystex."
 - c. BASF Construction Chemicals, Cleveland, OH., product "Masterflow 713".
 - d. Sika Corporation, Lyndhurst, NJ., product "SikaGrout 212".
 - e. ChemMasters, Madison, OH., product "Conset".
- C. Metal Paste Filler: 2 component epoxy, high strength, structural adhesive putty:
 - 1. Products which may be considered as equal include the following, or approved equal:
 - a. Abatron, Inc. Gilberts IL, product: "Ferrobond-P".

- b. Dynatron/Bondo Corp., Atlanta, GA, product: "Bondo Plastic Filler".
- D. Liquid Zinc Coating: For touch-up of welds, scratches, and abrasions in galvanized steel:
 - 1. Low VOC organic zinc-rich coating containing 92% metallic zinc, by weight in the dried film (ASTM D520, Type III) and conforming to SSPC Paint 20, Type II, Level 1. Liquid zinc coating shall be recognized under the Component Program of Underwriter's Laboratories, Inc. as an equivalent to hot-dip galvanizing; conforming to MIL-P-21035B and SSPC Paint 29, Type II, Level I, for repair of hot-dip galvanizing and meeting the requirements for Zinc-Rich Paints.
 - a. VOC limit: not more than 250 g/L.
 - b. Specified manufacturer and product: ZRC Worldwide, Marshfield MA, product "ZRC-221".
- E. Primer for Non-Galvanized Steel Surfaces:
 - 1. Modified alkyd rust-inhibitive, high solids primer.
 - 2. Products which may be considered as equal include the following, or approved equal:
 - a. International (Courtaulds Coatings): Interlac 260HS.
 - b. Rust-Oleum: 1069 Heavy Duty Rust Inhibitive Red Primer.
 - c. Sherwin Williams: Kem Flash Primer HS, Red Oxide E61R702.
 - d. Tnemec: 10-99 Red Primer.
 - e. Wibur & Williams (California Products Corporation): 1703 Universal Metal Primer.

2.5 FABRICATION - GENERAL

- A. Metal surfaces shall be clean and free from mill scale, flake, rust and rust pitting; well formed and finished to shape and size, true to details with straight, sharp lines, and angles and smooth surfaces. Curved work shall be to true radii. Exposed sheared edges shall be eased.
- B. Shop fabricate items wherever practicable, accurately fitting all parts and making all joints tight. Do not fabricate materials until all specified submittals have been submitted to, and approved by, the Architect.
- C. Do all cutting, punching, drilling, and tapping required for attachment of anchor bolts and other hardware and for attachment of work by other trades. All such work shall be done prior to hot-dip galvanizing of the various components.
- D. Grind all edges of bars and plates completely free from nicks and machine marks, prior to galvanizing and/or shop priming.
- E. Grind all exposed-to-view welds completely smooth and flush to the surface plane of the base metals. Perform welding work prior to galvanizing in all cases, except where field welding is necessary, in which case, completely coat all such welds with two coats of specified liquid zinc coating, after performing grinding operations.
- F. Use screws and bolts only where welding cannot be performed, of sufficient size to ensure against loosening from normal usage of miscellaneous metal items furnished hereunder.
 - 1. Countersink all screw heads and bolt heads as far as practicable. Use not less than two screw, bolts, or other anchorage items, at each connection point.
 - 2. Draw up all threaded connections tightly, after buttering same with pipe joint compound, to exclude water.
- G. Provision for Thermal Movement: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.
 - 1. Design, fabricate and install for temperature change range of 120 degrees F, ambient temperature and 180 degrees F, material surfaces.
- H. Carefully coordinate the installation of metal fabrications with the work of trades responsible for the installation of interfacing work, and for the installation of work into the various assemblies furnished hereunder, and permit the installation of the related materials to be made at the appropriate times.

- I. Fit and assemble metal fabrications in largest practical sections for delivery to site, ready for installation.
 1. Galvanized assemblies: Where size of assembly is too large for galvanizing kettle, galvanize components prior to fabrication and assemble after galvanizing.

2.6 FABRICATION - SUPPORTS

- A. Design, engineer and fabricate structural overhead support for equipment, furnishings, and products furnished under Sections, which includes, but is not limited to:
 1. Equipment furnished under individual specification sections.
 2. Medical equipment.
 3. Surgical lights.
 4. Owner's furnished equipment.
 5. Above ceiling support for intravenous and cubicle curtain track, toilet partitions and similar products furnished under other sections.
- B. Fabricate support system to carry the entire load of supported products to building structure above without transferring any horizontal or vertical load to ceiling system(s). Provide frequently spaced holes for multiple adjustment. Provide diagonal bracing. Use of a "Universal Grid" system members is acceptable.
- C. Fabricate supports for equipment, fixtures, and appurtenances utilizing a "Universal Grid" system with rails extending wall-to-wall, perpendicular to the path of travel of the same.
 1. Design, engineer and fabricate supporting framework to support a concentrated load at any single point along the exposed rails, as exerted by the equipment to be purchased by the Owner.
 - a. Installed framework shall have a minimum loading safety factor of 2.5, based upon ultimate strength under static loading conditions.
 - b. The concentrated load shall be the maximum that will be encountered by positioning the equipment at the extremities of its travel (maximal load configurations).
 - c. Base loads on the most severe conditions as may be encountered by any of the manufacturers producing equipment for the type of services of the rooms indicated.
 2. Rail shall be on centers as required by equipment manufacturer and allow continuous attachment along any point on the rail.
 3. System shall be true, plumb and level to the tolerances indicated, with no more than 1/720th of the span maximum deflection in either plane, when maximum loading conditions are applied due to equipment operations.

2.7 FINISHES - HOT-DIP GALVANIZING

- A. Surface preparation prior to galvanizing: Pickle steel prior to galvanizing in conformance with SSPC-SP8. Remove all rust, dirt, weld flux, weld spatter, and other foreign matter.
- B. Hot-Dip Galvanizing: For steel exposed to the elements, weather or corrosive environments and other steel indicated to be galvanized, provide coating for iron and steel fabrications applied by the hot-dip process.
 1. Basis-of-Design: "Duncan Galvanizing, Everett, MA., product "Duragalv."
 2. Comply with ASTM A123 for fabricated products and ASTM A153 for bolts, nuts, washers, and other rough hardware. Provide thickness of galvanizing specified in referenced standards.
 3. Wherever possible, perform galvanizing after assembly of items.
 4. Galvanized items shall be straightened to remove all warpage and distortion caused by the galvanization process.
 5. Fill vent holes after galvanizing (if applicable), and grind smooth.
 6. Touch-up all breaks on hot-dip surfaces caused by cutting, welding, drilling or undue abrasion with liquid zinc coating as specified herein above. Apply liquid zinc by brush or spray on all damaged areas in two coats to a total dry film thickness of not less than 3 mils. Apply first coat within two hours after damage to hot-dip film to prevent undue

oxidation of exposed surface. On all welds remove weld spatter by power wire brushing or equivalent before applying liquid zinc coating. Repair material should extend at least 3 inches beyond all edges of the damaged galvanized area as possible to assure continuity of galvanic protection.

7. Touch-up of galvanized surfaces with aerosol spray, silver paint, bright paint, brite paint, or aluminum paints is not acceptable.

2.8 FINISHES - SHOP APPLIED COATINGS

- A. Schedule: Shop applied coatings as scheduled at end of Section and as indicated on Drawings.
- B. For Non-Galvanized Steel Surfaces:
 1. Surface Preparation Prior to Priming: Thoroughly clean all steel of all loose mill scale by power wire brushing or sandblasting. Remove all rust, dirt, weld flux, weld spatter, and other foreign matter by wire-brushing or scraping (power wire-brushing, if necessary). Grind smooth any sharp projections.
 2. Shop apply specified primers thoroughly and evenly on the surfaces and worked into the joints and other open areas on the surfaces. Surfaces inaccessible after assembly shall be given two coats. Dry film thickness of primer shall be not less than 2.4 mils per coat.
- C. Hot Rolled Carbon Steel (HRCS): Fabrications and shapes exposed to view (interior only condition):
 1. Glass bead blast all fabrications clean to remove mill scale and other residue ensuring not damage or cutting of metal fabrications. Do not remove black layer of iron oxide from base metal.
 2. Treat cleaned metal with JAX steel blackener and apply two coats of matte Permalac lacquer and one coat of acid base free Renaissance Micro-Crystalline Wax
- D. Hot Rolled Steel with Clear Powder Coat Finish:
 1. Preparation: sheets to be cleaned of remaining manufactured residue with ScotchBrite by hand or glass bead blasted (preferred technique), using soft round edge bead type. Do not cut surface with sand blasting techniques.
 - a. during cleaning do not remove black layer of iron oxide as harder than base metal.
 2. After cleaning treat with JAX steel blackener.
 3. After blackening coat with 2 coats of matte Permalac lacquer
 4. After applying lacquer apply a coat of Renaissance Micro-Crystalline Wax, free of an acid base. Prohibited is use of Birchwood KC products.
 - a. For wax product information, contact: Bauer Fabrication, Eric Bauer 1.802.244.4002
- E. Field Touch-Up: Shall be the responsibility of the installing contractor and shall include the filling, and touch-up of exposed job made bolt or screw holes, refinishing of raw surfaces resulting from job fitting, repair of job inflicted scratches and marks, and final cleaning up of the finished surfaces.
 1. Touch-up finishes shall be fully compatible with, and exactly match shop applied finish, color, texture and sheen.

PART 3 - EXECUTION

3.1 ERECTION - GENERAL

- A. General: Accurately set all work to established lines and elevations, and rigidly fasten in place with suitable attachments to the construction of the building. At the completion of the work, check all work, re-adjust as required, and leave in perfect condition. Grind all exposed to view welds smooth to the touch.
- B. Setting Bearing and Leveling Plates:
 1. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of plates.
 2. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove

wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with grout.

- a. Use nonshrink grout, either metallic or nonmetallic, in concealed locations where not exposed to moisture; use nonshrink, nonmetallic grout in exposed locations, unless otherwise indicated.
 - b. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.
- C. Miscellaneous Framing and Supports: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and additional requirements indicated on Shop Drawings.
1. Anchor supports for operable partitions, and similar products, securely to and rigidly braced to building structure.

3.2 FIELD WELDING

- A. Field weld components indicated on approved shop drawings in accordance with AWS D1.1. Weld profile, quality, and finish shall be consistent with approved samples and mock-ups.
1. Welds Ground Smooth: For groove welds, the weld shall be made flush to the surfaces of each side and be within + 1/16", -0" of plate thickness.
 2. Contouring and Blending of Welds: Where fillet welds are indicated to be ground contoured, or blended, oversize welds as required; grind to provide a smooth transition and to match profile on approved mock-up .
 3. Continuous Welds: Where noted on the drawings, provide continuous welds of a uniform size and profile.
 4. Minimize Weld Show Through: At locations where welding on the far side of an exposed connection occurs, grind distortion and marking of the steel to a smooth profile with adjacent material.
- B. Immediately after welding, touch-up welds, burned areas and damaged surface coatings.
1. Thoroughly remove all spatter by power wire-brushing (or if inaccessible, wire brushing) per SSPC, surface preparation specification SP 2 or SP 3. Allow surface to cool to ambient temperature. Clean surface with solvent wipe to remove oils, grease and dirt in accordance with SSPC surface preparation specification SP 1.
 2. Apply one coat of liquid zinc to attain a minimum of 1.5 mils dry film thickness. Coating should extend at least two inches beyond either side of weldment to ensure complete coverage of welded area.

3.3 FIELD BOLTING

- A. Accurately drive all bolts into holes, protecting the bolt heads so as not to damage the thread during the driving. Ensure that bolt heads and nuts rest squarely against the metal. Where structural members have sloping flange faces, provide approved beveled washers at the bolted connections to afford square seating for bolt heads or nuts. Nick bolt threads for unfinished bolts to prevent the nuts from backing off.
1. Bolt Head Orientation: All bolt heads shall be oriented as indicated on the contract documents. Where bolt-head alignment is specified, the orientation shall be noted for each connection on the erection drawings. Where not noted, the bolt heads in a given connection shall be oriented to one side.
- B. Use an approved calibrated manual or power torque wrench to obtain the proper torque and tension as recommended by the bolt manufacturer for all ASTM F3125 bolts.

3.4 TOUCH-UP

- A. Touch-up all welds, burned areas, scratches, abrasions, on galvanized metals, using specified liquid zinc coating.
- B. Touch-up all welds, scratches, abrasions, and other surface damaged on shop-primed or painted metals, using the same coatings as specified under shop applied finishes, herein above.

END OF SECTION

SECTION 055100
METAL STAIRS

PART 1 - GENERAL

1.1 SUMMARY

A. SECTION INCLUDES

1. Stairs with concrete treads.
2. Structural steel stair framing and supports.
3. Handrails and guards.

1.2 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract and Division 01 Specification Sections apply to this Section.
- B. Section 016000 - Product Requirements: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- C. Section 017419 - Construction Waste Management and Disposal: Procedural and administrative requirements for construction and demolition recycling.
- D. Section 033000 - Cast-in-Place Concrete:
 1. Concrete fill in stair pans; mesh reinforcement.
 2. Placement of metal anchors in concrete.
- E. Section 055000 - Metal Fabrications.
- F. Section 099123 - Interior Painting: Paint finish.

1.3 REFERENCE STANDARDS

- A. AISC 201 - AISC Certification Program for Structural Steel Fabricators, Standard for Steel Building Structures; 2006.
- B. ASTM A6/A6M - Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling; 2017.
- C. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- D. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2018.
- E. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.
- F. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2013.
- G. ASTM A501/A501M - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing; 2014.
- H. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi (830 MPa) and 150 ksi (1040 MPa) Minimum Tensile Strength, Inch and Metric Dimensions; 2015a.
- I. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; 2012.
- J. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification; 2014 (Amended 2015).
- K. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015, with Errata (2016).
- L. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel; 2017.
- M. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer; 1999 (Ed. 2004).

- N. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); 2002 (Ed. 2004).
- O. UL 1994 - Luminous Egress Path Marking Systems; Current Edition, Including All Revisions.

1.4 SUBMITTALS

- A. See Section 013000 - 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 seal and signature on each sheet of shop drawings.
- C. Design Data: As required by authorities having jurisdiction.
- D. Design Data, Seismic Performance: Submit documentation that stairs meet performance requirements specified.
- E. Samples: One physical sample of each component for review and comment.
- F. Welders' Qualification Statement: Welders' certificates in accordance with AWS B2.1/B2.1M and dated no more than 12 months before start of scheduled welding work.
- G. Welders' Certificates.
- H. Designer's Qualification Statement.
- I. Fabricator's Qualification Statement: Provide documentation showing steel fabricator is certified under AISC 201.
- J. Fabricator's Qualification Statement: Provide documentation showing steel fabricator is accredited under IAS AC172.
- K. Delegated Design Submittals: Provide calculations for loading and stresses for the work of this section, bearing the Professional Structural Engineer's seal, registered in the State of Vermont. Show how design load requirements and other performance requirements have been satisfied as required by the applicable building codes.

1.5 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: Welding processes and welding operators qualified in accordance with AWS D1.1/D1.1M and dated no more than 12 months before start of scheduled welding work.
- C. Welder Qualifications: Show certification of welders employed on the Work, verifying AWS qualification within the previous 12 months.
- D. Fabricator Qualifications:
 - 1. A qualified steel fabricator that is certified by the American Institute for Steel Construction (AISC) under AISC 201.
 - 2. A qualified steel fabricator that is accredited by the International Accreditation Service (IAS) Fabricator Inspection Program for Structural Steel in accordance with IAS AC172.
 - 3. A company specializing in manufacturing products specified in this section, with not less than ten years of documented experience.

PART 2 - PRODUCTS

2.1 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 Contract Documents exceed those of regulations, comply with Contract Documents.
 2. Dimensions: As indicated on drawings.
 3. Shop assemble components; disassemble into largest practical sections suitable for transport and access to site.
 4. No sharp or rough areas on exposed travel surfaces and surfaces accessible to touch.
 5. 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.
 2. Industrial: All joints made neatly.
 - a. Welded Joints: Welded on back side wherever possible.
 - b. Welds Exposed to Touch: Ground smooth.
 - c. Bolts Exposed to Touch in Travel Area: No nuts or screw threads exposed to touch.
- 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.
- 2.2 METAL STAIRS WITH CONCRETE TREADS
- A. Jointing and Finish Quality Level: Industrial, as defined above.
- B. Risers: Closed.
- C. Treads: Metal pan with field-installed concrete fill.
 1. Concrete Depth: 1-1/2 inches (38 mm), minimum.
 2. Tread Pan Material: Steel sheet.
 3. Tread Pan Thickness: As required by design; 14 gage, 0.075 inch (1.9 mm) minimum.
 4. Concrete Reinforcement: None.
 5. Concrete Finish: For resilient floor covering.
- D. Risers: Same material and thickness as tread pans.
 1. Nosing Depth: Not more than 1-1/2 inch (38 mm) overhang.
 2. Nosing Return: Flush with top of concrete fill, not more than 1/2 inch (12 mm) wide.
- E. Stringers: Rolled steel channels.
 1. Stringer Depth: 10 inches (250 mm).
 2. End Closure: Sheet steel of same thickness as risers welded across ends.
- F. Railings: Wall-Mounted Rails.
- 2.3 HANDRAILS AND GUARDS
- A. Wall-Mounted Rails: Round pipe or tube rails unless otherwise indicated.
 1. Outside Diameter: 1-1/4 inch (32 mm), minimum, to 1-1/2 inches (38 mm), maximum.
- B. Guards:
 1. Top Rails: Round pipe or tube rails unless otherwise indicated.

- a. Outside Diameter: 1-1/4 inch (32 mm), minimum, to 1-1/2 inches (38 mm), maximum.
2. Infill at Pipe Railings: Pipe or tube rails sloped parallel to stair.
 - a. Outside Diameter: 1 inch (25 mm).
 - b. Material: Steel pipe or tube, round.
 - c. Vertical Spacing: Maximum 4 inches (100 mm) on center.
 - d. Jointing: Welded and ground smooth and flush.
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.

2.4 MATERIALS

- A. Steel Sections: ASTM A36/A36M.
- B. Steel Tubing: ASTM A500/A500M or ASTM A501/A501M structural tubing, round and shapes as indicated.
- C. Pipe: ASTM A53/A53M, Grade B Schedule 40, black finish.
- D. Concrete Fill: Portland cement Type I, 3000 psi (20 MPa) 28 day strength, 2 to 3 inch (50 to 75 mm) slump, unless otherwise specified in Division 03.
- E. Concrete Reinforcement: Mesh type as detailed, galvanized.

2.5 ACCESSORIES

- A. Photoluminescent Nosing: Factory fabricated aluminum extrusion with replaceable embedded photoluminescent and slip-resistant strip, complies with UL 1994.
 1. Finish: Manufacturer's standard clear anodized.
 2. Color: To be selected by Architect from manufacturer's standard range.
- B. Steel Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1, and galvanized to ASTM A153/A153M where connecting galvanized components.
- C. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.
- D. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.
- E. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

- A. When field welding is required, clean and strip primed steel items to bare metal.

3.3 INSTALLATION

- A. Install components plumb and level, accurately fitted, free from distortion or defects.
- B. Allow for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- C. Provide welded field joints where specifically indicated on drawings. Perform field welding in accordance with AWS D1.1/D1.1M.
- D. Other field joints may be either welded or bolted provided the result complies with the limitations specified for jointing quality levels.
- E. Obtain approval prior to site cutting or creating adjustments not scheduled.
- F. After erection, prime welds, abrasions, and surfaces not shop primed or galvanized, except surfaces to be in contact with concrete.

3.4 TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch (6 mm) per story, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch (6 mm).

END OF SECTION

SECTION 061000
ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes:
 - 1. Fire retardant treated plywood backer panels for mounting of electrical panelboards, telephone/data backboards, HVAC and fire control equipment and other equipment.
 - 2. Plywood wall sheathing beneath gypsum wallboard partitions, including but limited to the following:
 - a. Door frames.
 - b. Door stops, (wall mounted).
 - c. Window treatment.
 - d. Products bracketed to walls, (including sinks, cabinets and similar products).
 - 3. Concealed wood blocking, nailers, and supports.
 - 4. Various wood blockings, edgings, nailers, curbs, cants, grounds, furring, sheathing, framing members including wood preservative, as required for receipt of various finishes and surfacing materials, not described herein above.
 - 5. Rough installation hardware, including bolts, screws, spikes, nails, clips, and connection assemblies, as needed for installation of the rough carpentry work.
- B. Install the following furnished under the designated Sections:
 - 1. Metal door frames furnished under Section 081113 - HOLLOW METAL DOORS AND FRAMES.

1.2 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract and Division 01 Specification Sections apply to this Section.
- B. Section 016000 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- C. Section 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements for construction and demolition recycling.
- D. Section 092216 - NON-STRUCTURAL METAL FRAMING: Metal framing for drywall construction work.
- E. Section 092900 - GYPSUM BOARD: Wallboard construction work, having taped and compounded joint finish.
- F. Section 099100 - PAINTING: Applied primer and finish coatings to exposed to view rough carpentry work.
- G. Division 26 - ELECTRICAL: Providing and mounting electrical panels and equipment.

1.3 REFERENCE STANDARDS

- A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 014200 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. American Wood Council, WCD 1 - Details for Conventional Wood Frame Construction.
 - 2. American Lumber Standards Committee, National Lumber Grades Authority for Canadian Lumber, and applicable grading rules and standards of the various lumber associations whose species are being used for grades specified.
 - 3. APA - applicable grades and specifications.
 - 4. APA PRB-108 Performance Standards and Policies for Structural-Use Panels.
 - 5. ANSI/SDI-100 – Specifications for Standard Steel Doors and Frames.
 - 6. ANSI A250.11 (formerly SDI 105) - Recommended Erection Instructions for Steel Doors and Frames.

7. ASTM D226 - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.
8. ASTM D2898 - Standard Test Methods for Accelerated Weathering of Fire-Retardant-Treated.
9. ASTM D3201 – Standard Test Method for Hygroscopic Properties of Fire-Retardant Wood and Wood-Based Products.
10. ASTM D3498 - Standard Specification for Adhesives for Field-Gluing Wood Structural Panels (Plywood or Oriented Strand Board) to Wood Based Floor System Framing.
11. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
12. AWPA Standards and references for preservative treated wood including Standards C15, UC1, UC2, UC3A, UC3B, UC4A, UC4B, UC4C.
13. AWPA M4 - Care Of Preservative Treated Wood Products.
14. ICC Evaluation Services.
15. MIL L-1914OE - Lumber and Plywood, Fire Retardant Treated.
16. NER-643: ACQ Preserve® and ACQ Preserve Plus® Wood Preservative Treatment, ICBO Evaluation Service.
17. SDI 122 - Installation and Troubleshooting Guide for Standard Steel Doors and Frames.
18. SPIB Grading Rules, current edition.
19. UL - Building Materials Directory
20. US. Department of Commerce Voluntary Product Standard PS1 for Construction and Industrial Plywood.
21. US. Department of Commerce Voluntary Product Standard PS2 for Wood-Based Structural-Use Panels.
22. US. Department of Commerce Voluntary Product Standard PS-20 - American Softwood Lumber Standard.
23. U.S. Department of Commerce Simplified Practice Recommendation R-16, for sizes and use classifications of lumber.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate the work of this Section with the respective trades responsible for locating anchorages installed into blocking which is provided under this Section.
2. Coordinate work of this Section with the work of the various trades responsible for applying finish materials and other items to rough carpentry work, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.

1.5 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

1. Product Data: Manufacturer's product data sheets, specifications, performance data, physical properties and installation instructions for products specified herein.
2. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, accessories, to a minimum scale of 1-1/2 inch to 1 ft (1:8).
3. Samples: Submit two samples of wood trim 12 inch (300 mm) long.
4. Certifications:
 - a. Written certification from the respective treatment plants indicating types of wood preservative treatment and fire-retardant treatment used, treatments method, applications instructions, and conformance to the requirements specified herein.
 - 1) Provide certification that fire retardant treatment materials do not contain ammonium phosphate.
 - 2) Provide report from ICC Evaluation Service on fire retardant treated wood flame spreading, strength, corrosion and hygroscopic properties.
 - 3) Provide report from ICC Evaluation Service on pressure preservative treated wood strength, corrosion, anti-fungi, and anti-insect properties.

1.6 QUALITY ASSURANCE

- A. General: Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.
 - 1. All lumber shall:
 - a. Be new, dressed four sides (S4S), clear and free from warping and other defects.
 - b. Have a moisture content not exceeding 19 percent when delivered to the project.
 - c. Be in accordance with the grading rules of the lumber manufacturer's association under whose jurisdiction the lumber is produced and bear the mark of grade and mill identification.
- B. Certifications:
 - 1. Plywood: Conform to the requirements of Product Standard PS-1, and bear applicable APA grade trademarks.
 - a. Plywood for electrical boards treated for retardance, meet Class I or a flame spread rating of 25 or less and bear U.L. label "Classified FRS".

1.7 DELIVERY, STORAGE, AND HANDLING

- A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.
- B. Fire Retardant Treated Wood: Prevent exposure to precipitation during shipping, storage, or installation.

PART 2 - PRODUCTS

2.1 BOARD AND SHEET MATERIALS

- A. Lumber for Blocking, Nailers and Curbs: As indicated or required; Hem-Fir, Douglas Fir, Eastern Spruce, Eastern Hemlock, or Southern Pine, surfaced dried stud or utility grade. Wood members shall be of sizes indicated on the Drawings or of the same size as the members being braced.
 - 1. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.
 - 2. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.
- B. Plywood and Sheet Products:
 - 1. For electric panel board mountings and similar uses: APA graded B-D INT, Group 2 species, touch-sanded, fire-retardant treated, 3/4 inch thick, except as otherwise indicated on the Drawings.
 - 2. For unspecified interior concealed from view locations: APA graded C-D PLUGGED INT, Group 2 species, thickness as indicated on the Drawings.

2.2 WOOD TREATMENTS

- A. All blocking shall be fire retardant type wood except for areas subject to high moisture, such as window and door framing, and as additionally indicated on the Drawings.
- B. Treated wood products shall be produced by a single treatment plant, fully licensed by the chemical manufacturers, and conforming to the requirements specified herein.
 - 1. Toxicity and Environmental Quality:
 - a. Products containing chromium will not be permitted.
 - b. Products containing arsenic will not be permitted.
 - c. Fire-retardant-treated wood products shall be free of halogens, sulfates, ammonium phosphate and formaldehyde.
 - 2. Dye wood or otherwise color code all treated wood at treatment plant to clearly distinguish the different treatments in the field.
 - 3. Kiln dry all treated lumber and plywood to the following maximum moisture content after treatment.

- a. Lumber: 19 percent.
 - b. Plywood 15 percent.
 - c. Discard pieces with defects which might impair quality of work.
 4. Quality Marks: Each piece of lumber and plywood shall be permanently affixed with a quality mark, containing the following information:
 - a. Identification of the inspection agency.
 - b. Standard to which material was treated.
 - c. Identification of the treating plant.
 - d. Fire retardant treated wood shall include: stamp signifying a FR-S rating
 - e. Preservative treated wood shall include: Retention and end use for which product is suitable.
- C. Fire Retardant Treated Wood. Designated as "FRTW":
1. Manufacturers:
 - a. Hoover Treated Wood Products, Inc., Thomson, GA: www.frtw.com/#sle.
 - b. Koppers Performance Chemicals, Inc., Griffin, GA: www.koppersperformancechemicals.com/#sle.
 - c. Lonza Group, Alpharetta, GA: www.wolmanizedwood.com/#sle.
 - d. Viance, LLC, Charlotte, NC: www.treatedwood.com/#sle.
 2. Fire retardant treated wood shall comply with the following requirements:
 - a. All fire-retardant lumber and plywood must have an Underwriters Laboratories stamp signifying a FR-S rating certifying a 25 or less flame spread and smoke developed value, when tested in accordance to ASTM E84.
 - b. Corrosion Rates: Less than one mil per year for carbon steel, galvanized steel, aluminum, copper and red brass in contact with the fire retardant treated wood when tested in accordance with Federal Specification MIL-L-19140E Paragraph 4.6.5.2.
 - c. The fire retardant treated wood must have an equilibrium moisture content of not more than 25 percent when tested in accordance with ASTM D3201 procedures at 95 percent relative humidity and 80 degrees Fahrenheit.
 - d. Fire Retardant Chemical: Registered for use as a wood preservative by the U.S. Environmental Protection Agency.
 - e. Testing: Fire performance and strength properties for both lumber and plywood, of the fire retardant treated wood shall be recognized by issuance of a ICC Evaluation Service Report. Fire retardant chemical must not damage the middle lammella of the wood structure when exposed to 170 degrees Fahrenheit and 90 percent relative humidity for 23 days.
 3. Subject to compliance with the requirements specified herein, Products which may be incorporated in the work include:
 - a. Interior Type:
 - 1) Hoover Treated Wood Products, Inc., product Pyro-Guard.
 - 2) Koppers Performance Chemicals, Inc., product FirePRO.
 - 3) Lonza Group, product Dricon.
 - 4) Viance, LLC, D-Blaze FRTW
 - b. Exterior Type:
 - 1) Hoover Treated Wood Products, Inc., product Exterior Fire-X.
 - 2) Lonza Group, product FRX.
- D. Pressure Preservative Treated Wood. Designated as "PT":
1. Manufacturers:
 - a. Lonza Group, Alpharetta, GA: www.wolmanizedwood.com/#sle.
 - b. Koppers Performance Chemicals, Inc., Griffin, GA: www.koppersperformancechemicals.com/#sle.
 - c. Universal Forest Products, Inc., Grand Rapids MI: www.ufpi.com.
 - d. Viance, LLC, Charlotte, NC; Preserve ACQ: www.treatedwood.com/#sle.

2. Treatment: Ammoniacal Copper Quaternary Compound (ACQ), arsenic-free and chromium-free chemical "ACQ Preservative" in accordance with AWPA Standards. Apply the preservative in a closed cylinder by pressure process in accordance with AWPA Standard C15.
 - a. Minimum preservative retention for floor plates, framing, lumber and plywood above ground use: 0.25 pounds per cubic foot (4.0 kg/m³) of ACQ chemical, in accordance with AWPA UC1, UC2, UC3A, and UC3B, or NER-643 as appropriate.
 - b. Minimum preservative retention for framing, lumber and plywood in contact with water, ground, concrete and masonry: 0.40 pounds per cubic foot (6.4 kg/m³) of ACQ chemical, in accordance with AWPA UC4A, UC4B, UC4C, or NER-643 as appropriate.
 - c. Minimum preservative retention for lumber and plywood in permanent wood foundations: 0.60 pounds per cubic foot (9.6 kg/m³) of ACQ chemical, in accordance with AWPA UC4B, or NER-643.
3. Subject to compliance with the requirements specified herein, Products which may be incorporated in the work include:
 - a. Koppers Performance Chemicals, Inc., product NatureWood.
 - b. Lonza Group, product Wolman E.
 - c. Universal Forest Products, Inc., Grand Rapids MI., product ProWood.
 - d. Viance, LLC, product Preserve ACQ.
4. Fixation of Chemical: Treated wood shall not be shipped from treatment plant until fixation of the preservative has occurred in the wood.

2.3 ACCESSORIES

- A. Adhesives:
 1. General: Provide adhesives approved which are Low-VOC or non-VOC, non-flammable, water-proof after cured, odor free, .
 2. Adhesive for Lamination and Fabrication of Wood and Plywood Items: Exterior adhesives containing no urea formaldehydes, having a VOC limit of 70 g/L.
 3. Adhesive for Subfloors and Underlayment: High strength, waterproof and non-freezing adhesive complying with AFG-01 "Frozen Lumber Test" and ASTM D3498, and having a VOC limit of 50 g/L.
- B. Nails (Interior and Exterior): Galvanized common nails, of size and type to suit application and as required by state and local building codes.
- C. Screws:
 1. Screws for Interior Applications: Flat head electroplated-galvanized wood screws of the appropriate sizes.
- D. Anchor Bolts, Expansion Bolts and Lag Screws: Hot-dipped galvanized steel, of the following types:
 1. Lumber Having Actual Thickness of 1-1/2 inches or Greater: To masonry and concrete:
 - a. Anchor bolts or expansion bolts, as most applicable for the specific receiving surface material, 3/8-inch minimum diameter, spaced as shown on drawings, and staggered as far as practicable. Countersink all bolt heads, and provide head washers of matching material.
 2. For Lumber Having Actual Thickness of Greater than 7/8-inch but less than 1-1/2 inches: To masonry and concrete:
 - a. Anchor bolts or expansion bolts, as most applicable for the specific receiving surface material, at least 1/4-inch diameter of the most appropriate lengths for the specific application, spaced as shown, and staggered as far as practicable. Countersink all bolt heads, and provide head washers of matching material.
 3. For Lumber Having Actual Thickness of 7/8-inch and less: Anchor bolts or expansion bolts, at least 1/4-inch in diameter; or screws, of the most appropriate sizes; in lengths most suitable for the specific application, countersunk, spaced, and staggered.

- E. Protection Paper: Canadian red-rosen paper or kraft paper.
- F. Building Paper: ASTM D226, Non-perforated, No. 15 (73 kg/sq m) asphalt-saturated building felt.

PART 3 - EXECUTION

3.1 PREPARATION

- A. All materials shall be inspected before use, with all checked, split and otherwise deficient stock rejected, or used only for miscellaneous blocking, furring or other incidental use. The Contractor shall be responsible for replacing all lumber which, due to warpage, twist, splitting, or checking, results in unsatisfactory work. Such replacement shall be required at any time, whether before or after application of finish material under other Sections.
- B. Verify exact locations of wall mounted railing brackets, door stops, T.V. brackets and similar items with Architect prior to installation of blocking for accessories.

3.2 INSTALLATION - GENERAL

- A. Framing Standard: Comply with AWC WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- B. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.
- C. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry accurately to other construction. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.
- D. Install shear wall panels to comply with manufacturer's written instructions.
- E. Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.
- F. Do not splice structural members between supports unless otherwise indicated.
- G. Comply with AWWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
- H. Field Cuts of Fire Retardant Treated Lumber: Do not rip or mill fire retardant treated lumber. Only end cuts, drilling holes and joining cuts are permitted.
- I. Field Cuts of ACQ Pressure-Treated Lumber: Apply solution of copper naphthenate containing a minimum of 2 percent metallic copper in-solution, in accordance with AWWPA standard M4. Brush liberally all cuts and holes.
- J. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.
- K. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 - 1. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code (IBC).
 - 2. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's International Residential Code for One- and Two-Family Dwellings.
 - 3. ICC-ES evaluation report for fastener.

3.3 INSTALLATION - EQUIPMENT BACKBOARDS

- A. Provide panel mounting backboards for HVAC, Fire Prevention, Electrical and telephone/data equipment. Fabricate panels using fire-retardant treated 3/4 inch thick panels mounted to fire-retardant treated 2 by 4's. Provide a nominal space of 3-1/2 inches behind panels to permit wiring.

3.4 INSTALLATION - METAL DOOR FRAMES

- A. Place in position all steel frames, furnished under Section 081113 - HOLLOW METAL DOORS and Frames, in accordance with the approved shop drawings and frame schedule. Place, erect and level all frames into correct scheduled locations, including those in masonry partitions.
 - 1. During the installation of metal door frames, after the manufacturer's steel shipping bars have been removed, install wood spreaders at door opening, carefully dimensioned to permit square and plumb installation of door frames and doors.
 - a. Provide rigid temporary bracing for frames as required to ensure maintenance of positioning, and remove only after frames have been permanently anchored.
 - b. For doors located in masonry work, maintain frame position with temporary bracing until frames are built-into-place, and grout has sufficiently cured to maintain frame position.
 - c. Spreaders shall remain in place until doors are installed.
 - 2. Coordinate installation of frames with the various trades installing abutting wall construction for anchor placement.
- B. Coordinate installation of frames with installation of hardware under Section 062000 - FINISH CARPENTRY and as furnished under Section 087100 - DOOR HARDWARE.
- C. Install frames in accordance with the manufacturer's recommendations, ANSI/SDI-100, ANSI A250.11 (formerly SDI 105), and the Door Hardware Institute (DHI) recommendations.
 - 1. Secure frames with the following number of anchors per jamb.
 - a. For frames 7'-6" in height or less: 3 anchors per jamb.
 - b. For frames 7'-6" in height or less and having doors exceeding 3'-0" feet width, and for cross corridor frames: 4 anchors per jamb.
 - c. For frames greater than 7'-6", up to 10'-0" in height: 4 anchors per jamb.
 - d. For frames greater than 7'-6", up to 10'-0" in height, and having doors exceeding 3'-0" feet width, and for cross corridor frames: 5 anchors per jamb.
 - e. For frames over 10'-0' in height: 5 anchors per jamb.
 - 2. Where exposed fastener heads occur in frames, fill with automotive body filler and sand smooth.

3.5 TOLERANCES

- A. Door Frames: Maximum diagonal distortion 1/16 inch measured with straight edge, corner to corner.

3.6 CLEANING

- A. Daily clean work areas by sweeping and disposing of scraps and sawdust.
- B. Upon completion of the work of this Section in any given area, remove tools, equipment and all rubbish and debris from the work area; leave area in broom-clean condition.

3.7 PROTECTION

- A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.
- B. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes wet enough that moisture content exceeds that specified, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION

**SECTION 061643
GYPSUM SHEATHING**

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Glass-mat gypsum sheathing board.

1.2 RELATED REQUIREMENTS

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

1.3 DEFINITIONS

- A. Gypsum Board Construction Terminology Standard: Refer to ASTM C 11 for definitions of terms for gypsum sheathing board construction not defined in this Section or in other referenced standards.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.

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 by a testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. Fire-Resistance Ratings: Indicated by design designations from GA-600, "Fire Resistance Design Manual."

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store materials protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, or other causes. Stack sheathing flat on leveled supports off the ground, under cover, and fully protected from weather.

1.7 COORDINATION

- A. Glass-Mat Gypsum Sheathing Board:
 - 1. Do not leave exposed to weather for more than 180 days.

PART 2 - PRODUCTS

2.1 GYPSUM SHEATHING

- A. Sheathing Board 5/8 inch thick gypsum sheathing board complying with ASTM C 1177 with fiberglass mat surface front and back with silicone-treated gypsum core conforming to the following requirements:

Properties	Test (ASTM)	Results
Surfacing:		Glass mat
Width:		4'-0" nominal
Length:		10'-0" (+/- 1/4 inch) maximum
Flexural Strength, lb/ft parallel (4'-0" weak direction):	C 473	100 pounds

Humidity	C 473	1/8 inch, maximum
Deflection, (inches):		
Linear	C 518	6.25 x 10 ⁻⁶ , maximum
Expansion with Change		
Moisture (in/in % RH):		
Thermal	C 518	0.56 minimum
resistance "R" (in/ft ² °F/Btu):		
Weight (per 1,000 sq ft):	C 1177	2,500 pounds minimum
Bending Radius	C 1177	8 feet, minimum
Mold growth:	D 3273	Score 10 with no mold detected
Racking	E 72	>654 pounds per foot
Strength, lbs/ft, dry (ultimate):		
Surface burning	E 84	Flame spread: 10, maximum
characteristics:		
Permeance	E 96 (dry	17 perms, maximum
(ng/Pa•s•m ²):	cup method)	
Combustibility:	E 136	Noncombustible
Coefficient of	E 228	8.5 x 10 ⁻⁶ , maximum
Thermal	modified	
Expansion		
(in/in/°F):		

2.2 ACCESSORY MATERIALS

- A. Joint sealants: as indicated in Section 079200 - JOINT SEALANTS.
- B. Fasteners - General:
 - 1. Steel drill screws shall have organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.
 - 2. For steel framing from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick, attach sheathing with drill screws complying with ASTM C 954.
- C. Fasteners for 1/2 inch thick sheathing: Type S-12 fine thread rust resistant self-drilling screws, for applying single layer sheathing board to light gage metal framing.
 - 1. Fastener length for layer sheathing application: 1 inch [25 mm].
 - 2. Fastener length for double layer sheathing application: 1-1/2 inch [38 mm].
- D. Fasteners for 5/8 inch thick sheathing: Type S-12 fine thread rust resistant self-drilling screws, for applying single layer sheathing board to light gage metal framing.
 - 1. Fastener length for layer sheathing application: 1-1/4 inch [32 mm].
 - 2. Fastener length for double layer sheathing application: 2 inch [50 mm].

PART 3 - EXECUTION

3.1 GYPSUM SHEATHING INSTALLATION

- A. Comply with GA-253 and manufacturer's written instructions.
- B. Wall openings such as windows and doors shall be surrounded by a single sheet of sheathing with the opening cut from the center of the board. If the opening is larger than a single sheet the boards shall be centered on the opening with as much solid board as possible at the corners of the opening. In no case shall the edges of the opening correspond with a sheathing joint in the vertical or horizontal directions.
- C. Cut boards at penetrations, edges, and other obstructions of work; fit tightly against abutting construction, unless otherwise indicated.
 - 1. Install boards with a 3/8-inch(9-mm) setback where non-load-bearing construction abuts structural elements.
 - 2. Install boards with a 1/4-inch(6.4-mm) setback where they abut masonry or similar materials that might retain moisture, to prevent wicking.
- D. Coordinate sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed exterior wall assembly.
- E. Apply fasteners so screw heads bear tightly against face of sheathing boards but do not cut into facing.
- F. Do not bridge building expansion joints with sheathing; cut and space edges to match spacing of structural support elements.
- G. Horizontal Installation: Install sheathing with V-grooved edge down and tongue edge up. Interlock tongue with groove to bring 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-attach boards at perimeter and within field of board to each steel stud.
 - 1. Space fasteners approximately 8 inches(200 mm) o.c. and set back a minimum of 3/8 inch(9 mm) from edges and ends of boards.
 - 2. For sheathing under stucco cladding, boards may be initially tacked in place with screws if overlying self-furring metal lath is screw-attached through sheathing to studs immediately after sheathing is installed.
- H. Vertical Installation: Install board vertical edges centered over flanges of steel studs. Abut ends and edges of each board with those of adjacent boards. Screw-attach boards at perimeter and within field of board to each steel stud.
 - 1. Space fasteners approximately 8 inches(200 mm) o.c. and set back a minimum of 3/8 inch(9 mm) from edges and ends of boards.
 - 2. For sheathing under stucco cladding, boards may be initially tacked in place with screws if overlying self-furring metal lath is screw-attached through sheathing to studs immediately after sheathing is installed.
 - 3. Retain this Article if joints are sealed in lieu of using a weather-resistant barrier; verify requirements of authorities having jurisdiction.

END OF SECTION

SECTION 062000
FINISH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

- A. Finish carpentry items including:
 - 1. Interior trim to receive opaque field finishing.
 - 2. Interior trim and hardwood nosing to receive transparent field finishing.
 - 3. Wood shelving and hardware.
 - 4. Interior PVC wall base for 'secure' areas and as additionally indicated on the Drawings.
 - 5. Anti-ligature T.V. enclosure.
- B. Install the following furnished under the designated Sections:
 - 1. Plastic laminated shelves (for wall mounted adjustable shelving) furnished by Section 064000 - Architectural Woodwork.
 - 2. Steel doors furnished by Section 081113 - HOLLOW METAL DOORS AND FRAMES.
 - 3. Wood doors furnished by Section 081416 - FLUSH WOOD DOORS.
 - 4. Door hardware, thresholds, weatherstripping, seals and gaskets furnished by Section 087100 - DOORS, FRAMES AND HARDWARE SCHEDULE.

1.2 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract and Division 01 Specification Sections apply to this Section.
- B. Section 016000 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- C. Section 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements for construction and demolition recycling.
- D. Section 064000 - ARCHITECTURAL WOODWORK:
 - 1. Furnishing and installing cabinetry, plastic laminated shelving, and other built-in-place furniture.
 - 2. Plastic laminated countertops.

1.3 SUBMITTALS

- A. Product Data: For each product specified.
- B. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories, two to a minimum scale of 1-1/2 inch to 1 ft (1:8).
- C. Samples: Submit two samples of wood trim 12 inch (300 mm) long.
 - 1. Composite Wood and Agrifiber Products: Written documentation certifying that all composite wood and agrifiber products used on this Project contain no added urea-formaldehyde resins.
 - a. Written certification indicating, that only "no added urea-formaldehyde" manufactured composite panel products are incorporated into the Work, including all concealed components. Composite panel products include but are not limited to particle board (PB), Medium Density Fiberboard (MDF), wheatboard and strawboard and similar manufactured products.
 - b. Written certification indicating that laminating adhesives used in product fabrication on or off site do not contain any added urea-formaldehyde resins.

1.4 QUALITY ASSURANCE

- A. Grade materials in accordance with the following:
 - 1. Hardwood Lumber: In accordance with NHLA Grading Rules; www.natlhardwood.org.
- B. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.

1.5 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. Protect work from moisture damage.

PART 2 - PRODUCTS

2.1 FINISH CARPENTRY ITEMS

- A. Quality Grade: Unless otherwise indicated, provide products specified by AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Architectural Woodwork Standards for Premium Grade.
- B. Surface Burning Characteristics: Provide materials having fire and smoke properties as required by applicable code.

2.2 WOOD-BASED COMPONENTS

- A. Wood for interior use shall have a moisture content between 5 and 10 percent, when delivered to the project.

2.3 INTERIOR STANDING AND RUNNING TRIM

- A. Interior Exposed Painted Trim: Custom grade poplar, kiln dried (KD).
- B. Interior trim furnished under this Section, scheduled to receive transparent finish: Select White Maple, AWI Premium Grade (as installed).

2.4 BOARD AND PANEL MATERIALS

- A. Interior trim to receive paint (opaque finish):
 - 1. Typical: Clear straight-grained poplar, C-Select or better.
 - 2. At locations at least 7 feet above finished floor: Clear straight-grained Poplar, Sugar Pine, Ponderosa Pine, or Idaho White Pine, C-Select or better.
- B. Plywood and panel products:
 - 1. Shelving to receive paint: 3/4 inch thick Birch veneer plywood (AA) with 3/8 inch hardwood edge banding at all edges.

2.5 CLOSET AND SHELVING HARDWARE

- A. Metal closet rods and brackets.
 - 1. Closet Rod: 0.06 inch (1.5 mm) wall thickness steel tubing, 1-5/16 inch diameter, of custom cut lengths for full width of closet, chrome finish.
 - 2. Provide pole sockets for end support and intermediate support brackets for span lengths greater than 48 inches, material and finish to match closet rod.
 - a. Provide combination shelf and rod bracket where both shelf and closet rod are indicated.
- B. Adjustable shelving, wall mounted standards and brackets.
 - 1. Acceptable manufacturers, include the following, or approved equal:
 - a. Knape & Vogt, Grand Rapids MI.
 - b. Spur Systems International Limited.
 - c. Reeve Store Equipment Company (ReeveCo), Pico Rivera CA.
 - 2. Standards (uprights): Double-slotted channel standards for brackets adjustable in 1 inch (25 mm) increments along entire length of standard, drilled and countersunk for screws. 16 gage, in epoxy powder-coat finish, color as selected by Architect from manufacturer's full range of colors.
 - a. Load Capacity: Recommended by manufacturer for loading of 300 to 680 pounds (135 to 310 kg) per pair of standards.
 - b. Locate uprights no greater than 24 inches on center.
 - 3. Brackets: Double tab type, locking into slots; size to suit shelves; same finish as standards.
 - a. Depth: As indicated on Drawings.

- b. Gage:
 - 1) 16 gage for 8 inch through 12 inch brackets.
 - 2) 14 gage for 14 inch through 24 inch brackets.
- c. Bracket Quantity: Provide one bracket for each 12 inches (305 mm) of standard length.
- 4. Basis of Design: 85/185 series as manufactured by Knape & Vogt.

2.6 CELLULAR PVC WALL BASE

- A. Expanded rigid poly vinyl chloride with a small-cell microstructure, in profiles indicated, and complying with the following:
 - 1. Density: Minimum of 0.50 g/cc per ASTM D792.
 - 2. Water absorption: Less than 1 per cent per ASTM D570.
 - 3. Hardness: At least 50 per ASTM D2240 (Shore D).
 - 4. Flexural strength: At least 3,300 psi per ASTM D790.
 - 5. Tensile strength: At least 2,200 psi per ASTM D638.
- B. Acceptable manufacturers include the following:
 - 1. New England Specialty Lumber Inc, W. Springfield MA, product: "Nels-Tek 600".
 - 2. Vycom Corporation, Moosic PA, product: "Azek".
 - 3. CertainTeed Corp., Valley Forge, PA, product "Restoration Millwork".
 - 4. Wolfpac Technologies, Inc., Aliquippa, PA, product: "Versatex".
 - 5. Fypon, Ltd., Archbold, OH, product "Cellular PVC Trim".
 - 6. PVC Sheets and Trim: "Celtec550" as distributed by New England Lumber Specialties, Inc., West Springfield, MA.
- C. Finish: Wood grain, as selected by the Architect from manufacturer's options.

2.7 ANTI-LIGATURE T.V. ENCLOSURE

- A. Basis of Design Model#844-TV1 SR TV Enclosure, as distributed through Securing Hospitals.
 - 1. Ligature resistant design.
 - 2. No exposed hinges or cables.
 - 3. Keyed locks.
 - 4. Cable grommets for secure cable entry.
 - 5. Powder coated steel housing with polycarbonate window.
 - 6. Accommodates TV sizes from 15"-65" (diagonal screen length).

2.8 FASTENINGS

- A. Adhesive for Purposes Other Than Laminate Installation: Suitable for the purpose; not containing formaldehyde or other volatile organic compounds.
- B. All fasteners to be concealed from view in final installation.
- C. Concealed Joint Fasteners: Threaded steel.
- D. Screws: Select material, type, size, and finish required for each use. Comply with ASME B18.6.1 for applicable requirements.
- E. Nails: Select material, type, size, and finish required for each use. Comply with FS FF-N-105 for applicable requirements.

2.9 ACCESSORIES

- A. Primer: Alkyd primer sealer.
- B. Wood Filler: Solvent base, tinted to match surface finish color.
- C. Moldings and Trim: Type 304 stainless steel, sizes and profiles as indicated.

2.10 FABRICATION

- A. Shop assemble work for delivery to site, permitting passage through building openings.

- B. Fit exposed sheet material edges with 3/8 inch (9 mm) matching hardwood edging. Use one piece for full length only.
- C. Shop prepare and identify components for book match grain matching during site erection.
- D. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.

2.11 SHOP FINISHING

- A. Shop finish woodwork items where practical, otherwise prep for site finishing.
- B. Apply wood filler in exposed nail and screw indentations.
- C. Finish work in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Section 5 - Finishing for grade specified and as follows:
 - 1. Transparent and stained finish as specified in Section 099000 – Painting and Coating.
- D. Back prime woodwork items to be field finished, prior to installation.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify adequacy of backing and support framing.
- B. Verify mechanical, electrical, and building items affecting work of this section are placed and ready to receive this work.

3.2 INSTALLATION

- A. Install custom fabrications in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade indicated.
- B. Set and secure materials and components in place, plumb and level.
- C. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch (0.79 mm). Do not use additional overlay trim to conceal larger gaps.
- D. Install aluminum molding and trim according to manufacturer's instructions at wood panel and decorative glass locations where indicated.
- E. Mount adjustable shelving standards and closet rod supports to solid backing capable of supporting intended loads.

3.3 INSTALLATION - CELLULAR PVC TRIM

- A. Provide one field sample for review and approval. Proceed with installation of base only after receipt of Architect's acceptance. Approved installation may remain as part of the work.
 - 1. Install using #8 trim screw stainless steel fasteners or other stainless steel fasteners.
 - 2. Countersink screws and plug to achieve a seamless, tamper-resistant finish.
 - 3. Do not use staples, brads, or wire nails for installation of cellular PVC base.
 - 4. Glue adhere and fasten (with nails, or screws) profile trim elements to substrate using manufacturer's recommended adhesive.
 - 5. Provide scarfed joints where cellular PVC trim is joined. Glue all end to end cellular PVC trim joints using manufacturer's recommended adhesive.

3.4 INSTALLATION - DOORS AND HARDWARE

- A. Install doors in accordance with the manufacturer's recommendations, ANSI/SDI-100, ANSI A250.11, and the Door Hardware Institute recommendations.
- B. Install hardware in accordance with manufacturer's instructions and requirements of referenced organizations, and the requirements of Section 087100 - Door Hardware.
 - 1. Use the templates provided by hardware item manufacturer.
 - 2. Mount hardware units at heights indicated in the following applicable publications, except as specifically indicated or required to comply with the governing regulations.
 - a. Conform to ANSI 117.1 for positioning requirements for the handicapped.

- b. "Recommended Locations for Builders Hardware for Standard Steel Doors and Frames" by the Door and Hardware Institute (DHI.)
 - c. WDMA Industry Standard I.S.1.7, "Hardware Locations for Wood Flush Doors".
 - 3. Installation of hardware shall comply with NFPA 80 and NFPA 101 requirements
 - 4. Prefit hardware before finish is applied, remove and reinstall after finish is completed. Install hardware so that parts operate smoothly, close tightly and do not rattle.
 - 5. Drill and countersink units which are not factory-prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.
 - C. Set thresholds for exterior doors in full bed of butyl-rubber or polyisobutylene mastic sealant, forming tight seal between threshold and surface to which set. Securely and permanently anchor thresholds, using countersunk non-ferrous screws to match color of thresholds (stainless steel screws at aluminum thresholds).
 - D. Tools for maintenance: All special tools packaged with hardware items shall be saved, tagged/identified as to product use, and turned over to the Owner upon completion of the Work.
 - E. Clean adjacent surfaces soiled by hardware installation.
 - F. Prior to Final Inspection make final check and adjustment of all hardware, clean operating items as necessary to restore proper function and finish of hardware.
- 3.5 PREPARATION FOR SITE FINISHING
- A. Set exposed fasteners. Apply wood filler in exposed fastener indentations. Sand work smooth.
 - B. Site Finishing: See Section 099100.
- 3.6 TOLERANCES
- A. Maximum Variation from True Position: 1/16 inch (1.6 mm).
 - B. Maximum Offset from True Alignment with Abutting Materials: 1/32 inch (0.79 mm).
 - C. Maximum variation for doors and frames: Maximum diagonal distortion 1/16 inch measured with straight edge, corner to corner.
- 3.7 ADJUSTING
- A. Adjust doors for smooth and balanced movement.
- 3.8 CLEANING
- A. Daily clean work areas by sweeping and disposing of scraps and sawdust.
 - B. Upon completion of the work of this Section in any given area, remove tools, equipment and all rubbish and debris from the work area; leave area in broom-clean condition.
 - C. Remove protective material from pre-finished surfaces.
- 3.9 PROTECTION
- A. During the operation of finish carpentry, protect the work of other trades against undue soilage and damage by the exercise of reasonable care and precautions. Repair or replace any work so damaged and soiled.

END OF SECTION

SECTION 064000
ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 SUMMARY

- A. The work of this Section consists of shop fabricated millwork and architectural woodwork where shown on the Drawings, as specified herein, and as required for a complete and proper installation. Work includes, but is not limited to the following.
- B. Furnish and install the following:
 - 1. Plastic laminate casework.
 - 2. Plastic laminate cabinets.
 - 3. Plastic laminate divider and end panels.
 - 4. Plastic laminate countertops.
 - 5. Headwall panels.
 - 6. Wall panels.
 - 7. Slat-wall system.
 - 8. PVC edging of plastic laminate at edges of doors, drawer fronts, casework fronts, and shelving.
 - 9. Exposed blocking and blocking concealed by the work of this Section required for the installation of architectural woodwork.
 - 10. Hardware for work of this Section, including custom fabricated hardware and accessories.
- C. Furnish the following products to be installed under the designated Sections:
 - 1. Plastic laminate shelves (for wall mounted adjustable shelving) for installation under Section 062000 - FINISH CARPENTRY.
 - 2. Wood trim and wall base having shop-applied transparent finish, for installation by Section 062000 - FINISH CARPENTRY.
- D. Make all cut-outs within casework items as required to accommodate sinks, piping, conduit, and other mechanical and electrical work, from templates provided by the respective mechanical and electrical trades.
- E. Provide glass shelving and perform shop-glazing of casework, furniture and accessories items fabricated by this Section.
- F. No attempt is made in this Section to list all elements of architectural woodwork required on this project or to describe how each element will be installed. It is the responsibility of the Contractor to determine for itself the scope and nature of the work required for a complete installation from the information provided herein and in the Drawings.

1.2 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract and Division 01 Specification Sections apply to this Section.
- B. Section 016000 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- C. Section 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements for construction and demolition recycling.
- D. Section 061000 - ROUGH CARPENTRY: Concealed wood blocking and nailers.
- E. Section 062000 - FINISH CARPENTRY:
 - 1. Installation of plastic laminate shelving furnished under this Section 064000.
 - 2. Installation of wood interior trim and wall base furnished under this Section 064000.
- F. Section 066116 - SOLID SURFACE FABRICATIONS: Solid polymer countertops, skirts, backsplash and other trim pieces at locations as indicated on the Drawings.

- G. Section 092216 - NON-STRUCTURAL METAL FRAMING: Metal framing for drywall construction work.
- H. Section 092900 - GYPSUM BOARD: Wall board construction work, having taped and compounded joint finish.
- I. Division 22 - PLUMBING: Plumbing fixtures and piping.
- J. Division 26 - ELECTRICAL: Electrical connections for power, lighting, and data.

1.3 REFERENCES

- A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 014200 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. ASTM D 523 - Standard Specification for Specular Gloss.
 - 2. AWI (Architectural Woodwork Institute) Architectural Woodwork Standards (1st Edition, 2009).
 - 3. AWI Quality Certification Program.
 - 4. APA Grades and Specifications.
 - 5. National Lumber Grades Authority, American Lumber Standards, and Grading Rules and Standards of the various lumber associations whose species are being used, with grade-marks for same.
 - 6. U.S. Department of Commerce Simplified Practice Recommendation R-16, for sizes and use classifications of lumber; and Product Standard (PS):
 - a. PS-1 - Construction and Industrial Plywood Standard.
 - b. PS-20 - American Softwood Lumber Standard.
 - c. PS-51-71 - Hardwood Plugged Plywood Standard.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Sequencing:
 - 1. Field Measurements: Where possible the woodwork manufacturer shall take field measurements before preparation of shop drawings and fabrication to ensure proper fitting of Work.
 - a. Allow for adjustments within specified tolerances wherever taking of field measurements before fabrication might delay Work.
 - 2. Field dimensions which are not controlled by Project conditions: The woodwork manufacturer is responsible for details and dimensions not controlled by Project conditions and shall show on his shop drawings all required field measurements beyond his control.
 - a. The Contractor shall acknowledge the woodwork fabricator's need for accurate field dimensions prior to custom fabrication.
 - b. The Contractor and the woodwork manufacturer shall cooperate to establish and maintain these field dimensions.
- B. Scheduling:
 - 1. Coordinate the work of this Section with the respective trades responsible for installing interfacing work, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.
 - 2. Coordinate schedule of construction, size of access, and route to location of installation to prevent delay of installation due to physical impediments. Any work involving the demolition and reconstruction of partitions, walls, floors, roofing, windows, or doors to place and install the work of this Section shall be performed at no additional cost to the Owner.

1.5 SUBMITTALS

- A. Information and Review Submittals: Submit the following under provisions of Section 013000 - ADMINISTRATIVE REQUIREMENTS:

1. Product Data: Manufacturer's product data sheets, specifications, performance data, for each item furnished hereunder, including, but not limited to: Fastenings, adhesives, hardware, and accessories.
 2. Shop drawings bearing dimensions of actual measurements taken at the project, include at least the following, which are in addition to shop drawing requirements described in AWI Quality Standards:
 - a. 1/4 inch scale elevations and plans of each casework item.
 - b. Large scale design details of minimum 1-1/2 inch to 1-foot scale, showing abutting materials, installation conditions, clearances. Show profiles, jointing and fastening methods; details of drawers and doors.
 - c. Full size or half-full size sections, showing individual components, profiles and jointing.
 3. Selection Samples:
 - a. Plastic laminate chips for initial color selection by the Architect.
 - b. Chain of PVC edging materials.
 - c. Provide additional samples as requested by the Architect for initial selection of material colors and finishes.
 4. Verification Samples:
 - a. Cabinet hinge with manufacturer's product literature.
 - b. Drawer slide with manufacturer's product literature.
 - c. 12 inch long samples of solid hardwoods illustrating maximum range of color variations and applied transparent shop finish.
 - d. 12 by 12 inch samples of plastic laminate (of each color required for project).
 - e. 12 inch length samples of plastic edging material (of each color required for project).
 - f. One each of all cabinet hardware. (approved cabinet hardware samples will be returned to Contractor and may become part of the Work).
 5. Manufacturer's Instructions: Provide installation instructions and templates for hardware and field applied items.
 6. Source Quality Control Submittals: AWI letter of licensing for the project for AWI Quality Certification Program.
- B. Closeout Submittals: Submit the following under provisions of Section 017800 - CLOSEOUT SUBMITTALS.
- 1.6 QUALITY ASSURANCE
- A. Quality Standards: All work performed under this Section shall be as defined in the referenced AWI "Quality Standards" for PREMIUM GRADE, as modified herein by this Specification Section.
 - B. Qualifications:
 1. Fabricator/Installer: Work of this section shall be performed by a firm licensed by the AWI Quality Certification Program.
 - a. Woodwork fabricator/installer is required to be licensed by AWI as competent to perform the work specified. Certification shall be evidenced through the application of AWI Quality Certification labels and issuance of an AWI letter of licensing for the project. AWI certification labels shall be applied to each item of work.
- 1.7 MOCK-UPS
- A. Provide mock-up under provisions of Section 014000 - QUALITY REQUIREMENTS.
 - B. Mockups: Before fabricating and installing interior architectural woodwork, sub-contractor shall build a mockup to verify selections made under Sample Submittals and to demonstrate hardware operation, aesthetic effects and qualities of materials and execution. Build mockups to comply with the following requirements, using materials indicated for the completed Work:

1. Mockup configuration shall be as indicated on the Drawings. If not indicated on the Drawings, mockup shall consist of one entire length of upper cabinets, one entire length of lower drawers/cabinets, and all applicable hardware.
 - a. The mockup shall fully demonstrate the proposed range of aesthetic effects, workmanship, and the operation of all hardware, including but not limited to cabinet hinges, drawer slides, and pulls.
 2. Obtain Owner and Architect's approval of mockups before starting interior architectural woodwork fabrication.
 3. Build mockups in the location as indicated on the Drawings or, if not indicated, as directed by the Architect.
 4. Notify Architect seven days in advance of dates and times when mockups will be fabricated and installed.
 5. Maintain approved mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 6. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
 7. Demolish and remove mockups when directed.
- C. Locate mock-ups where directed and include all surfaces and materials scheduled to receive a field applied finish.

1.8 DELIVERY, STORAGE AND HANDLING

- A. Delivery and Acceptance Requirements:
1. General: The woodwork manufacturer, woodwork installer and the Contractor are jointly responsible to make certain that woodwork is not delivered until the building and storage areas are sufficiently dry so that the woodwork will not be damaged by excessive changes in ambient humidity and relative moisture content.
 2. Concrete, masonry, plaster, tile and marble setting and polishing and other wet work shall be completed and dry before delivery, storage and installation of woodwork items.
 3. Sequence deliveries to avoid delays and to minimize on-site storage.
- B. Storage and Handling Requirements:
1. Ship and handle all materials and fabricated items in a manner which will prevent damage thereto, and store all materials and fabricated items at a dry, elevated, ventilated, and protected interior location.

1.9 SITE CONDITIONS

- A. Temperature: Maintain ambient temperature above 55 degrees Fahrenheit for 5 calendar days before, and during installation of architectural woodwork; maintain temperature after installation until Owner's Final Acceptance.
- B. Relative Humidity: Maintain a relative humidity between 25 and 55 percent for a minimum period of 5 calendar days before, and during, installation of architectural woodwork: maintain relative humidity after installation until Owner's Final Acceptance.

PART 2 - PRODUCTS

2.1 WOOD MATERIALS - GENERAL REQUIREMENTS

- A. General requirements: New, dressed four sides (S4S), and free from warping and other defects.
- B. Panel Products: Composite panel products and plywood shall be "no added urea-formaldehyde", including all concealed components.
1. Softwood plywood with each sheet bearing the mark of a recognized association or independent inspection agency that maintains continuing control over the quality of the plywood. The mark shall identify the plywood by species group or identification index, and shall show glue type, grade and compliance with APS-1. Plywood shall be a minimum of 5 ply for ½ inch thick and above, and 7 ply for plywood 1-1/4 inch thick or thicker.

- a. Plywood cores for plastic laminate shall be exterior type and species group, with veneer grade "A-C".
- b. Plywood shelving for painted or stained finish shall be interior type of any species group, with veneer grade "A-B" for stained finish and grade "B-C" for painted finish
2. Moisture Content:
 - a. Solid hardwood(s) scheduled for transparent finish: Moisture content shall not exceed 8 percent when delivered to Project.
 - b. Typical (hardwood and softwoods): Moisture content of wood shall be between 5 and 10 percent when delivered to the project.
- C. Wood Species for WD as indicated on the Drawings:
 1. Exposed wood scheduled for transparent finish, meeting AWI Premium Grade Standards (as installed): Select White Maple (*Acer saccharum*) sapwood, Plain Sliced.
 - a. Wood shall color match specified veneer, and be clear without knots, and other natural defects.
- D. Concealed supports for edge and corner backing shall be kiln dried birch or poplar, meeting AWI Premium Grade Standards.
- E. Blocking and furring at base and walls shall comply with American Softwood Lumber Standard PS 20-70 and with specific grading requirements of SPIB: Kiln dried (KD15), Structural Light Framing, N^o. 2 grade, free of warping and large knots.
- F. Internal concealed framing for casework: Kiln-dried, (KD15), eastern pine, poplar, eastern spruce, or southern pine, conforming to AWI Premium grade.
- G. Fir plywood for concealed from view applications in conjunction with the various casework items: APA C-C PLUGGED EXT.

2.2 PLASTIC LAMINATE FACING

- A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work includes the following:
 1. PL-1 - Ralph Wilson Plastics Co. (Wilsonart), Temple TX.
 2. PL-2 - Formica Corp., Cincinnati, OH.
- B. Plastic laminate, general purpose, conforming to NEMA LD3.1 -1991 Grade GP50, nominal 0.050 inch thickness, in a low non-directional texture in color price group selected by the Architect.
 1. General purpose grade laminate shall be used for all exposed to view surfaces including:
 - a. Exposed outward face of cabinet fronts and closure trim.
 - b. Cabinet doors (all sides).
 - c. Drawer fronts (all sides).
 - d. Interior surfaces of open cabinets (without doors).
 - e. Plastic laminated trim.
- C. Plastic laminate, cabinet interior grade, conforming to NEMA LD3-1985 Grade CL20, 0.020 inch nominal thickness, in a low non-directional texture in solid color price group as selected by the Architect.
 1. Cabinet interior grade laminate may be used for the interior surfaces of all 'closed cabinets,' where general purpose grade is not required.
 2. All shelving shall be cabinet interior grade.
- D. Plastic laminate, unfinished balancing (backer) sheet, conforming to NEMA LD3-1985 undecorated laminate, Grade BK20, 0.020 inch nominal thickness.
- E. Edging:
 1. Edging for plastic laminate shelving: Flexible polyethylene tee moulding, having a 3/4 inch face, equal to Outwater Plastics, Woodridge NJ., (telephone 800 835-4400), model number 105-679, in custom color to match plastic laminate surface finish. Samples to be supplied to and reviewed for approval by the Architect.

- a. All sides of shelving, regardless of their exposure, shall receive edging.

2.3 BACKING FOR LAMINATES

- A. All laminate components with the exception of all toe spaces: Mattformed three layer medium density panel (PB), graded M2 per ANSI A 208.1 with a minimum density of 48 pounds per cubic foot or equivalent hardwood plugged plywood complying with PS 51-71.
 1. "No Formaldehyde Added": Provide board which is fabricated using pre-consumer recycled wood fibers and an exterior-grade urea-formaldehyde free resin binder. Product shall contain no formaldehyde additives. Acceptable products include the following or approved equal.
 - a. Collins Pine Company (distributed through Panel Source International, Tacoma, WA), product: "PureKor Particleboard Plus"
 - b. Plummer Forest Products, Post Falls, ID, product "PFP particleboard".
 - c. Rodman Industries, Oconomowoc, WI, product: "Rodman Resincore I".
 - d. SierrePine Inc., Martel, CA, product "Encore SDP"
 2. Thicknesses:
 - a. 3/4 inch thick at cases.
 - b. 1 inch thick at shelves under 30 inches wide.
 - c. 1 1/8 inch thick at shelves 30 inches or more wide.
 3. Thicknesses:
 - a. Typical: 3/4 inch thick panels, except as otherwise indicated or specified.
 - b. Doors over 36 inches tall: provide 1-1/4 inch thick panels.
- B. At all toe spaces: APA MARINE A-A EXT, fir veneer marine grade plywood, with plugged cores and sanded faces, 3/4 inch thick.

2.4 CABINET HARDWARE

- A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering similar products include the following:
 1. Sugatsune, Chicago, IL, www.sugatsune.com
 2. Accuride Corp., Santa Fe Springs, CA.
 3. CompX International, Inc., Dallas, TX.
 4. Doug Mockett & Company, Inc., Manhattan Beach, CA.
 5. Engineered Products Company, Flint, MI.
 6. Glynn-Johnson, Indianapolis, IN.
 7. H.B. Ives Company, Wallingford, CT.
 8. Häfele America Company, Archdale, NC.
 9. Julius Blum, Inc. , Stanley, NC.
 10. Knape & Vogt, Grand Rapids, MI.
 11. (Lamp) Sugatsune America, Inc. Carson, CA..
 12. Mepla Inc., High Point, NC.
 13. Outwater Plastic Industries Inc., Woodridge, NY.
 14. Stanley Hardware, New Britain, CT.
 15. Waterloo Furniture Components, Ontario, Canada.
- B. Door and drawer pulls:
 1. Cabinet and drawer pulls: Model No. 2650, 7-9/16 inches center-to-center, 26 Series stainless steel as manufactured by Sugatsune, www.sugatsune.com.
 2. Full-height cabinets and wardrobes: Model No. 2653, 13-15/32 inches center-to-center, 26 Series stainless steel as manufactured by Sugatsune, www.sugatsune.com.
- C. Locks:
 1. General:
 - a. Provide at least three keys per keyed alike group.
 - b. Finish: lock plug finish "nickel".

2. Locks for drawers and doors : "DualAxess - 90 Deg. Cam Turn" as manufactured by CompX International Inc, Dallas, TX.
- D. Catches: Magnetic touch latch type.
- E. Roller latches: Head frame mounted, stainless steel or cast bronze with brushed chrome finish, conforming to ANSI A 156.16, with manufacturers standard strike, equal to Glynn-Johnson model "1152B - Combination Roller Latch/Angle Stop".
- F. Casework hinges:
 1. General:
 - a. All hinges shall be screw-on type. No press-in or insertion type hinges will be accepted.
 - b. All hinges, after installation, shall be integral with the base plate and substrate, providing a contiguous system that insures against accidental release.
 - c. All hinges shall withstand a weight load of 150 pounds, minimum.
 2. Hinge for full overlay cabinet doors: Self closing concealed hinge having maximum 120 degree angle of opening. Hinges shall be equal to Blum "Screw-On - 71T5550", with straight arm configuration.
 - a. Number of hinges: Provide number of hinges indicated in Drawings, or if not indicated, provide number recommended by manufacturer for size and weight of door.
 - b. Number of hinges: Provide number of hinges indicated in Drawings, or if not indicated, provide number recommended by manufacturer for size and weight of door.
- G. Pad silencers for doors: 10 mm (3/8 inch) diameter, self-adhesive resilient plastic or nylon buttons, at least 2 per door, in clear color.
- H. Drawer Slides (provide one pair per drawer except as noted otherwise):
 1. For desk and casework drawers (excluding file drawers): Full extension type, 100 pounds per pair minimum rated capacity, steel ball bearing rollers, lever disconnect, drawer hold in detent feature.
 - a. Acceptable slides, include the following, or approved equal:
 - 1) Accuride N°. 3832E
 - 2) Knappe and Vogt N°. 8400.
 - 3) Häfele N°. 3832.
 - b. Finish: clear lacquered zinc.
 2. For pencil drawers: 3/4 extension type, 45 pounds per pair minimum rated capacity, steel ball bearing rollers, friction disconnect.
 - a. Acceptable slides include the following, or approved equal:
 - 1) Accuride N°. 2006 (regular mount), N°. 2009 (bracket mount).
 - 2) Knappe and Vogt N°. 8200
 - 3) Häfele N°. 2009
 3. For under drawer mounting: Single extension type, 35 pounds minimum rated capacity, steel ball bearing rollers, drawer hold in detent feature.
 - a. Acceptable slides include the following, or approved equal:
 - 1) Accuride N°. 1029.
 - 2) Knappe and Vogt N°. 1500.
 - 3) Häfele N°. 423.55.9xx 7xx (Note: xx number will vary depending on depth of drawer).
 - b. Finish: clear lacquered zinc.
- I. Wire management conduit and receptacle system: Medium voltage wire conduit system as manufactured by the Wiremold Company, West Hartford CT.

2.5 SLAT-WALL SYSTEM

- A. Slat-wall system:

1. Product: SlatWall EMX as distributed through Diamond Life, Pittsburgh, PA.
2. Description: Metal Aluminum Interlocking System.
3. Finish: Clear Anodized finish with J-Cap trim.
4. Provide an allowance for Owner to select accessories:
 - a. 4 x 8 System:
 - 1) (14) Faceout, 12"L, HD23-102.
 - 2) 6) Big Work Hooks, HS5613.
 - 3) 4) Baskets, HP6209.
 - b. 4 x 4 System:
 - 1) (4) 2" Hooks, HP2402.
 - 2) (16) 4" Hooks, HP2522.
 - 3) (4) 6" Hooks, HP2523.
 - 4) (4) Baskets, HP6209
 - c. 4 x 2 System:
 - 1) (4) 3" Faceouts, HD23-101.
 - 2) (4) 6" Faceouts, HD23-103

2.6 ACCESSORIES

- A. Edge protection: Stylex trim piece for all edges and corners as indicated on the Drawings.
- B. PVC Edging for plastic laminate casework:
 1. Manufactured by The Cloverdale Company (Band-it Brand), Cloverdale VA., or equal.
 2. Thickness: 2mm thick for door and drawer edges; 1mm for exposed edges of casework bodies.
 3. Edges: Square.
 4. Custom colors to match plastic laminate colors.
- C. Edging for adjustable shelving: Flexible PVC tee moulding, having equal to Outwater Plastics, Woodridge, NJ, in color as selected by the Architect.
 1. All sides of shelving shall receive edging, regardless of exposure.
- D. Glue for lamination and fabrication of wood and plywood items: Exterior Grade, phenolic resin glue.
- E. Fasteners:
 1. Concealed joint fasteners: Threaded steel.
 2. Bolts, nuts, washers, lags, pins, and screws: Of size and type to suit application chrome finish in exposed-to-view locations.
- F. Counter Support Brackets: Equal to Rakks Flush Mount Counter Supports by Rakks/Rangine Corp, Needham MA.
 1. Construction: Fabricated from horizontal aluminum T section and vertical aluminum L section. Vertical leg designed to attach to side of supporting stud and be concealed by gypsum board or other wall finish.
 - a. Model EH-1212FM for up to 18 inch deep counters.
 - b. Model EH-1818FM for up to 24 inch deep counters.
 - c. Model EH-1824FM for up to 30 inch deep counters.
 2. Factory applied finishes: Exposed aluminum surfaces shall be free of scratches and other serious blemishes and be factory finished with:
 - a. Electrostatically applied, powder paint coating complying with AAMA 2603 (minimum), custom color selected by Architect.
- G. Wire Management Grommets and Covers: 2 inch diameter, as manufactured by Doug Mockett & Company, Manhattan Beach CA., model number "MM3 with 3A cover" or approved equal.
 1. Grommet Finish: Provide in metallic finish selected by the Architect from Manufacturer's standard finishes.

2. Locations: Provide where shown on Drawings, and if not shown, allow the following numbers of grommets; exact locations to be determined in field.
 - a. For counters 6 feet or less provide 2 wire grommets and covers.
 - b. For counters over 6 feet, provide 1 wire grommet and cover for every 42 inches of counter, or fraction thereof.

2.7 FABRICATION - GENERAL

- A. Do not fabricate materials until all specified submittals have been submitted to, and approved by, the Architect.
- B. Coordinate the fabrication of casework with that of the various trades responsible for installing materials and items which will be inserted into, or applied to, the casework surfaces. Obtain and verify templates, dimensions, and instructions from the respective trades before making cut-outs, holes, slots, and other cutting in the casework.
- C. Shop assemble custom casework for delivery to site. Deliver in assemblies as large as possible for entrance into the designated areas. Provide for concealed job connections of adjacent units.
- D. Fabricate, install and finish all work so that both sides of panels, doors, shelves and other casework are of balanced construction, to prevent warping.
- E. Fit corners and joints hairline, secure with concealed fasteners.
- F. Finish all solid wood and plywood surfaces smooth, and free from all machine and tool marks that will show through the wood veneer or facing materials.
- G. Make all joints tight, and form to conceal shrinkage. Glue all miters having a dimension of 4 inches or more from heel to point.
- H. Finished work shall be free from visible adhesive and pencil marks.

2.8 FABRICATION - CASEWORK

- A. Fabricate casework in accordance with requirements of specified AWI Grade and the following additional requirements:
 1. Cabinets shall be in flush overlay construction, with drawer fronts and hinged doors overlapping openings a minimum of 1/4 inch all four sides.
 2. Fabricate cabinets in integral units, each completely enclosed, without the use of common partitions.
 3. Fabricate plastic laminated casework with top and bottom fillers and corner panels described as optional for Custom Grade Work in the Quality Standards.
 4. Drawers:
 - a. Laminated drawer fronts: High density laminate over 3/4 inch specified core material. Drawer fronts shall be applied to separate drawer body component sub-front.
 - b. Drawer bottoms (plastic laminated casework): 1/4 inch thick color polyester laminate, housed and glued into front, sides and back.
 - c. Underside of drawer to receive continuous hot melt glue at joint between bottom and back/sides/front for sealing and rigidity.
 - d. Reinforce drawer bottoms as required with intermediate spreaders.
 5. Doors: Square edge design, 3/4 inch thick, without any profiling and shall fully overlap the cabinet frame.
 - a. Laminate doors: Fabricate doors with particle board core and front and rear faces high-pressure laminate, of selected color.
 - b. Maintain a maximum 1/8" reveal between pairs of doors, between door and drawer front, or between multiple drawer fronts within the cabinet.
 6. Base cabinets: Provide full horizontal top frame with glued and doweled joints, 3/4 inch plywood end panels and bottom. Bottom shall be glued and doweled and let into routed end panels. Provide 4 inch high toe rail, securely screwed to the end panels and to the bottom panel by concealed glue blocks.

7. Wall cabinets: Provide same finishes as base cabinets, with 3/4 inch thick top and bottom veneered plywood panels. Top and bottom panels shall be glued and doweled and let into routed end panels. Back of case shall be recessed and let into routed end panels and further secured with glue blocks.
8. Door and drawer spreaders: Provide minimum 3/4 thick full width cabinet body spreaders immediately behind all door/drawer and multiple drawer horizontal joints to maintain exact body dimensions, and close off reveal. Front edge to be match face of adjacent cabinet doors/drawers.

2.9 FABRICATION OF PLASTIC LAMINATE CLAD ITEMS

- A. Do not fabricate materials until all specified submittals have been submitted to, and approved by, the Architect.
- B. Except as otherwise specified hereunder, fabricate plastic laminate clad items in strict accordance with the details on the Drawings, the approved shop drawings, and workmanship standards set forth in the AWI Quality Standards Section 400, for specified Quality Grade.
- C. Shop fabricate all plastic laminate clad items. Adhere plastic laminate to particle board backing sheets by cold-press-method. Use of contact cements are not permitted. Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Apply laminate backing sheet to reverse side of all laminated, panels, shelving and tops.
- D. Cap edges with specified banding, matching color of plastic laminate panels.
 1. Casework facing: Machine apply flat PVC banding, 0.018 inch (0.050 mm), using waterproof hot melt adhesive.
 2. Drawer and door fronts: Machine apply to all four edges, 2mm thick PVC banding, using waterproof hot melt adhesive, corner radiused profile for consistent design and safety.
 3. Shelving: Machine apply to all four edges, 2mm thick PVC banding, using waterproof hot melt adhesive, corner radiused profile for consistent design and safety.
- E. Fit corners and joints hairline. Make all joints and miters tight, secure with concealed fasteners.

2.10 FACTORY FINISHING

- A. General: Factory finish to be to comply with EPA Title 5 guidelines for Volatile Organic Compound (VOC) emissions limitations.
- B. Transparent finish: AWI Premium Grade Factory Finish System 5, having a Medium rubbed effect with a sheen of 24° to 28° gloss units per ASTM D523. Finish system shall not substantially increase flame spread.
 1. Finish system shall include the following:
 - a. Wash coat, reduced conversion varnish.
 - b. Wash coat, vinyl.
 - c. Stain coat.
 - d. Sealer, reduced conversion varnish.
 - e. Sealer, vinyl.
 - f. First topcoat.
 - g. Second topcoat.
- C. Concealed surfaces: Thoroughly coat all concealed surfaces of finish woodwork before assembling with two coats of clear wood preservative.
- D. Field Touch-up: Shall be the responsibility of the installing contractor and shall include the filling, and touch-up of exposed job made nail or screw holes, refinishing of raw surfaces resulting from job fitting, repair of job inflicted scratches and marks, and final cleaning up of the finished surfaces.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Inspect all surfaces and verify that they are in proper condition to receive the work of this Section.
 - 1. Verify adequacy of blocking, backing and support framing for all finish carpentry work.
 - 2. Examine pre-fabricated woodwork before installation and verify that back priming has been completed and all packing has been removed.
 - 3. Do not install base cabinets and other floor mounted casework unless the finished floor is in place.
 - 4. Beginning of installation means acceptance of existing substrate and project conditions.

3.2 PREPARATION

- A. Before installing work under this section, woodwork shall be conditioned to average prevailing humidity conditions in areas of installation.
- B. Protect other Work against undue soilage and damage by the exercise of reasonable care and precautions. Clean, repair, or replace any work so damaged and soiled to the acceptance of the Architect.

3.3 INSTALLATION - GENERAL

- A. Install work in accordance with the latest AWI quality standards in grade specified herein, under the Article entitled "QUALITY ASSURANCE".
- B. Woodwork shall be installed plumb, level, true and straight without distortions.
 - 1. Use concealed shims as required.
 - 2. Work shall be installed to a tolerance of 1/8 inch in 8 feet for plumb and levelness, including tops.
 - 3. There shall be no variations in flushness of adjoining surfaces.
- C. Tops and woodwork shall be scribed and trimmed to fit adjoining work.
 - 1. Where cuts occur, refinish surfaces and repair damaged finishes
- D. Secure woodwork to anchors or built-in blocking or blocking directly attached to substrates.
 - 1. Secure woodwork to grounds, furring, stripping and blocking as required with countersunk, concealed fasteners and blind nailing performing a complete installation.
 - 2. Use thin gauge finishing nails for exposed nailing, countersunk and filled flush with woodwork finished surface.
 - a. Match final finish materials where transparent finish is indicated.

3.4 INSTALLATION - CASEWORK

- A. Install casework without distortion so that doors and drawers fit openings properly and are accurately and evenly aligned.
 - 1. Install end cabinet panels with a continuous bead of Sealant Type SL applied to bottom edge that abuts finish flooring. Immediately remove all excess sealant from surfaces of the casework and flooring.
- B. Adjust casework hardware centering the doors and drawers in the openings, and provide unencumbered operation.
- C. Complete the installation of hardware and accessory items as indicated.
- D. Maintain veneer sequence matching of casework with transparent finish, where so manufactured.
- E. Tops: Anchor tops securely to base units and to other support systems as required.
- F. Install back and side splashes with a continuous bead of Sealant Type SL applied to splash edges that abut materials and adjoining splashes. Immediately remove all excess sealant from surfaces of the casework.

3.5 FIELD FINISHING

- A. Except where expressly noted otherwise on Drawings, shop finish all woodwork. Where field finishing is indicated or scheduled on Drawings, finishing Work shall be as specified under Section 099100 - PAINTING.

3.6 TOLERANCES

- A. Maximum variation from true position 1/16 inch with a maximum of 1/32 inch offset from true alignment with adjoining surfaces intended to be flush.

3.7 ADJUSTING

- A. To whatever extent work was not completed at shop or prior to installation of woodwork, perform and complete the specified finishing of woodwork.
- B. Repair damaged and defective woodwork where possible eliminating defects functionally and visually.
 - 1. Where not possible to repair damaged or defective work, replace with matching new work.
 - 2. Adjust joinery for uniform appearance.
- C. Adjust doors and drawers for smooth and balanced movement, lubricate hardware for use.

3.8 CLEANING

- A. Daily clean work areas by sweeping and disposing of scraps and sawdust.
- B. Upon completion of the work of this Section in any given area, remove tools, equipment and all rubbish and debris from the work area leave area in broom-clean condition.
- C. Remove protective material from pre-finished surfaces, immediately prior to Final Acceptance.
- D. Carefully clean exposed and semi-exposed wood surfaces, in strict accordance with fabricator's instructions. Touch-up shop-applied finishes to restore damaged or soiled areas, matching adjoining finish.
- E. Wash down plastic laminate with a solution of mild detergent in warm water, applied with soft clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.
- F. Clean and polish hardware, and bright metal trim components.

3.9 PROTECTION

- A. Protect installed woodwork and maintain specified conditions, in a manner acceptable to both fabricator and installer. Ensure that work of this Section will not be damaged or soiled, and is completely free of defects at the time of final acceptance of Project by the Architect.

END OF SECTION

SECTION 066116
SOLID SURFACING FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

- A. Solid polymer countertops, skirts, backsplash, sills and other trim pieces at locations as indicated on the Drawings.

1.2 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract and Division 01 Specification Sections apply to this Section.
- B. Section 016000 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- C. Section 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements for construction and demolition recycling.
- D. Section 061000 - ROUGH CARPENTRY: Wood blocking.
- E. Section 064000 - ARCHITECTURAL WOODWORK: Shop fabricated millwork and architectural woodwork.

1.3 SUBMITTALS

- A. See Section 013000 - ADMINISTRATIVE REQUIREMENTS, for submittal procedures.
- B. Product Data: Provide data on specified component products.
- C. Indicate product description, fabrication information and compliance with specified performance requirements.
- D. Shop Drawings: Indicate dimensions, thicknesses, required clearances, tolerances, materials, colors, finishes, fabrication details, field jointing, adjacent construction, design load parameters, methods of support, integration of plumbing components, and anchorages.
- E. Samples: Submit two samples representative of each component, 2 by 2 inch (50 by 50 mm) in size, illustrating color, texture, and finish.
- F. Maintenance Data: Indicate list of approved cleaning materials and procedures required; list of substances that are harmful to the component materials.
- G. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years of documented experience.
- B. Installer Qualifications: Company specializing in performing the work of this section and approved by manufacturer.

1.5 DELIVERY, STORAGE, AND PROTECTION

- A. Deliver fabrications appropriately wrapped in protective materials.
- B. Deliver materials to site when construction is ready for installation. Store materials indoors in a controlled environment as recommended by the manufacturer.
- C. Handle materials to prevent damage to finished surfaces. Provide protective coverings to prevent damage or staining following installation.

1.6 PROJECT CONDITIONS

- A. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.

1.7 ENVIRONMENTAL REQUIREMENTS

- A. Maintain relative humidity and ambient temperature during and after installation at levels recommended by manufacturer.

1.8 WARRANTY

- A. See Section 017800 - CLOSEOUT SUBMITTALS, for additional warranty requirements.
- B. Provide ten year manufacturer warranty against defects in materials. Warranty to cover material and labor to repair or replace defective materials.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Specified Manufacturer, (**SSM**): To establish a standard of quality, design and function desired, Drawings and specifications have been based on **The DuPont Company; product: "Corian"**.

2.2 SOLID SURFACING FABRICATIONS

- A. Polymer solid surfacing material: Non-porous surfacing material, homogeneously composed of natural minerals and high-performance polymer. Fabricated sizes and profiles as shown on the Drawings, in colors and finishes as selected by Architect.
 - 1. Solid surfacing material shall be NSF (National Sanitation Foundation) listed under publication 51 - Plastic Materials and Components used in Food Equipment and bear the "component" mark.
 - 2. Solid surfacing material shall meet ANSI Z124.3 or ANSI Z124.6.
- B. Solid surfacing material shall have minimum physical and performance properties as specified herein below:
 - 1. Superficial damage to a depth of 0.010 inch (0.25 mm) shall be repairable by sanding and/or polishing.
 - 2. Surface Burning Characteristics: Class I or A in accordance with ASTM E84, and as follows:
 - a. Flame Spread Index: 25 or less.
 - b. Smoke Developed Index: 450 or less.
 - 3. Performance Characteristics:
 - a. Tensile Strength: 6,000 psi minimum, as tested in accordance with ASTM D638.
 - b. Tensile Modulus: 000001.5 psi, as tested in accordance with ASTM D638.
 - c. Tensile Elongation: 0.4% minimum, as tested in accordance with ASTM D638.
 - d. Flexural Strength: 10,000 psi minimum, as tested in accordance with ASTM D790.
 - e. Flexural Modulus: 000001.2 psi, as tested in accordance with ASTM D790.
 - f. Thermal Expansion: 0.000018 inch per inch per degree F, maximum, as tested in accordance with ASTM D696.
 - g. Hardness:
 - 4. Rockwell "M" Scale: Greater than 85, as tested in accordance with ASTM D785.
 - 5. Barcol Impressor: 57, as tested in accordance with ASTM D2583.
 - a. Gloss (60 degree Gardner): 5 (matte) - 75 (highly polished), as tested in accordance with ANSI Z124.
 - b. Light Resistance: No effect (Xenon Arc), as tested in accordance with NEMA LD 3-2000 Method 3.3.
 - c. Wear and Cleanability: Passes, as tested in accordance with ANSI Z124.3 and Z124.6.
 - d. Stain Resistance: Passes, as tested in accordance with ANSI Z124.3 and Z124.6.
 - e. Fungus and Bacteria Resistance: Does not support microbial growth, as tested in accordance with ASTM G21 and G22.
 - f. Boiling Water Resistance: No visible change, as tested in accordance with NEMA LD 3-2000 Method 3.5.

- g. High Temperature Resistance: No change, as tested in accordance with NEMA LD 3-2000 Method 3.6.
 - h. Izod Impact (Notched Specimen): 0.28 foot pounds per inch of notch, as tested in accordance with ASTM D256, Method A.
 - i. Ball Impact Resistance (Sheets): No fracture using 1/2 pound ball, as tested in accordance with NEMA LD 3-2000 Method 3.8:
 - 1) 1/4 inch thickness: 36 inch drop.
 - 2) 1/2 inch thickness: 144 inch drop.
 - j. Long-Term Water Absorption: As tested in accordance with ASTM D570:
 - 1) 1/4 inch thickness: 0.8%.
 - 2) 1/2 inch thickness: 0.6%.
 - 3) 3/4 inch thickness: 0.4%.
 - k. Toxicity: As tested in accordance with the Pittsburgh Protocol Test ("LC50" Test):
 - 1) Solid Colors: 99.
 - 2) Patterned Colors: 66.
 - l. Specific Gravity (Density): 1.7 grams per cubic centimeter, as tested in accordance with ASTM D792.
 - m. Approximate Weight: For 1/4 inch thickness = 2.2 pounds per square foot.
- C. Solid surfacing countertops: Solid surfacing sheet or plastic resin casting over continuous substrate.
- 1. Sheet thicknesses: As indicated on Drawings.
 - 2. Exposed Edge Treatment: Refer to Drawings for edge types and additional information.
 - 3. Back and end splashes: Same sheet material unless noted otherwise; square top, minimum 4 inches (100 mm) high by 1/2 inch (12.5 mm) thick, in locations and heights as shown on the Drawings.
 - 4. Color, finish and pattern: As selected by the Architect from the manufacturer's full range of available options, unless otherwise indicated.
 - 5. Provide integral sinks where indicated.

2.3 ACCESSORIES

- A. Plywood for Supporting Substrate: PS 1 Exterior Grade, A-C veneer grade, minimum 5-ply; minimum 3/4 inch (19 mm) thick; join lengths using metal splines.
- B. Particleboard for Supporting Substrate: ANSI A208.1 Grade 2-M-2, 45 pcf (20 kg/cu m) minimum density; minimum 3/4 inch (19 mm) thick; join lengths using metal splines.
- C. Medium Density Fiberboard for Supporting Substrate: ANSI A208.2.
- D. Conductive Tape: Manufacturer's standard aluminum foil tape, with required thickness, for use with cutouts near heat sources.
- E. Insulating Felt Tape: Manufacturer's standard for use with conductive tape in insulating solid surface material from adjacent heat source.
- F. Joint Adhesive: Manufacturer's standard one- or two-part adhesive kit to create inconspicuous, non-porous joints, with a chemical bond.
- G. Panel Adhesive: Manufacturer's standard panel adhesive.
- H. Sealant: As specified in Section 079200 - JOINT SEALANTS, appropriate to application, and compatible with adjacent materials.
 - 1. Color: Match color of product selected.
- I. Polishing Cream: Compatible polishing cream to achieve specified sheen to gel coat.
- J. Counter Support Brackets: Equal to Rakks Counter Supports by Rakks/Rangine Corp, Needham MA, with standard white color powder coat finish.
 - 1. Model EH-1818 for 24 inch counters.
 - 2. Model EH-1824 for 30 inch counters.

- a. Provide plastic laminate end panels at ends of all countertops and as additionally indicated on the Drawings.
- K. Wire Management Grommets and Covers:
1. Basis of Design: Outwater Plastics 35 Series 3" diameter grommet with coordinating liner.
 2. Color: As selected by the Architect from manufacturer's full range of available options.
 3. Locations: Provide where shown on Drawings, and if not shown, allow the following numbers of grommets; exact locations to be determined in field.
 - a. For counters 6 feet or less provide 2 wire grommets and covers.
 - b. For counters over 6 feet, provide 1 wire grommet and cover for every 42 inches of counter, or fraction thereof.
- L. Shelf Supports.
1. Shelf pins for laminated shelving: plug-in type for 5mm diameter hole, Häfele model number 282.11.710 cast zinc alloy with nickel plated finish and recessed seat.

2.4 FABRICATION

- A. Fabricate countertops in one piece or adhesively joined sections to fit size and shape indicated.
1. Form joints between components using manufacturer's standard joint adhesive. Joints to be inconspicuous in appearance and without voids. Attach 2 inch wide reinforcing strip of same material under each joint.
 2. Rout and finish component edges to a smooth, uniform finish.
 3. Ease corners and edges.
 4. Gel coat the finish exposed surfaces smooth and polish to a uniform matte finish, with a gloss rating of 5 - 20.
- B. Fabricate tops and splashes in the largest sections practicable, with top surface of joints flush.
1. Join lengths of tops using best method recommended by manufacturer.
 2. Fabricate to align with fronts (face of cabinet doors) and ends of cabinets.
 3. Prepare all cutouts accurately to size; replace tops having improperly dimensioned or unnecessary cutouts or fixture holes.
 4. Provide back/end splash wherever counter edge abuts vertical surface unless otherwise indicated.
 - a. Secure to countertop with concealed fasteners and with contact surfaces set in waterproof glue.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that joint preparation and affected dimensions are acceptable.
- C. Verify mechanical, electrical, and building items affecting work of this section are placed and ready to receive this work.

3.2 PREPARATION

- A. Field Measurement:
1. Measure actual room dimension at the site, prior to fabrication, to assure proper fit and installation.
- B. Blocking:
1. Coordinate location of blocking behind all mounting locations for components.
 2. Provide all blocking required for anchorage or support of all items where such blocking is not to be installed concealed in walls or bulkheads.
 3. Coordinate all concealed blocking to be provided under Section 061000 - ROUGH CARPENTRY.
- C. Coordinate mechanical and electrical provisions that are to be integrated into components.

3.3 INSTALLATION

- A. Install components in accordance with shop drawings and manufacturer's instructions.
- B. Align work plumb and level.
- C. Form joints using manufacturer's approved adhesive, with joints inconspicuous in finished work.
- D. Reinforce field joints with solid surface strips extending a minimum of 1 inch on either side of the seam with the strip being the same thickness as the top.
- E. Rigidly anchor to substrate to prevent misalignment.
- F. Attach countertops securely to base units or support brackets in accordance with manufacturer's printed instructions.
- G. Provide backsplashes and endsplashes as indicated. Adhere loose backsplashes and endsplashes to countertop using manufacturer's standard color-matched silicone sealant.
- H. Seal between wall and component with manufacturer's recommended silicone sealant.
- I. Carefully dress joints smooth, remove surface scratches and clean entire surface.

3.4 TOLERANCES

- A. Maximum Variation from True Dimension: 1/8 inch (3 mm).
- B. Maximum Offset from True Position: 1/8 inch (3 mm).

3.5 CLEANING

- A. Clean and polish surfaces in accordance with manufacturer's instructions.

3.6 PROTECTION

- A. Protect installed components from subsequent construction operations.
- B. Do not permit construction near unprotected surfaces.
- C. Replace all scratched, marred, or otherwise damaged materials that cannot be restored to "like new" appearance with new, undamaged materials.

END OF SECTION

SECTION 071113
BITUMINOUS DAMPPROOFING

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Bituminous dampproofing.

1.2 RELATED REQUIREMENTS

- A. Section 072100 - Thermal Insulation: Rigid insulation board used as protection board.

1.3 REFERENCE STANDARDS

- A. ASTM D41/D41M - Standard Specification for Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing; 2011 (Reapproved 2016).
- B. ASTM D43/D43M - Standard Specification for Coal Tar Primer Used in Roofing, Dampproofing, and Waterproofing; 2000 (Reapproved 2012).
- C. ASTM D449/D449M - Standard Specification for Asphalt Used in Dampproofing and Waterproofing; 2003 (Reapproved 2014).
- D. ASTM D450/D450M - Standard Specification for Coal-Tar Pitch Used in Roofing, Dampproofing, and Waterproofing; 2007 (Reapproved 2013).
- E. ASTM D1187/D1187M - Standard Specification for Asphalt-Base Emulsions for Use as Protective Coatings for Metal; 1997 (Reapproved 2011).
- F. ASTM D1227/D1227M - Standard Specification for Emulsified Asphalt Used as a Protective Coating for Roofing; 2019.
- G. ASTM D4479/D4479M - Standard Specification for Asphalt Roof Coatings - Asbestos-Free; 2007, with Editorial Revision (2012).
- H. ASTM D4586/D4586M - Standard Specification for Asphalt Roof Cement, Asbestos-Free; 2007, with Editorial Revision (2012).
- I. ASTM D5643/D5643M - Standard Specification for Coal Tar Roof Cement, Asbestos Free; 2006, with Editorial Revision (2012).
- J. NRCA (WM) - The NRCA Waterproofing Manual; 2005.

1.4 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide properties of primer, bitumen, and mastics.
- C. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.
- D. Installer's qualification statement.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing the work of this section with at least three years of documented experience.

1.6 FIELD CONDITIONS

- A. Maintain ambient temperatures above 40 degrees F (5 degrees C) for 24 hours before and during application until dampproofing has cured.

PART 2 - PRODUCTS

2.1 BITUMINOUS DAMPPROOFING

- A. Bituminous Dampproofing: Cold-applied water-based emulsion; asphalt with mineral colloid or chemical emulsifying agent; with or without fiber reinforcement; asbestos-free; suitable for application on vertical and horizontal surfaces.

1. Asphalt-Base Emulsion for Metal Protective Coating: ASTM D1187/D1187M, Type I - Continuous water exposure within few days after drying or Type II - Continuous weather exposure after drying.
 2. Emulsified Asphalt for Roofing Protective Coating: ASTM D1227/D1227M, Type II, Class 1 - Mineral colloid emulsifying agents with non-asbestos fibers.
 3. VOC Content: Not more than permitted by local, State, and federal regulations.
 4. Applied Thickness: 1/16 inch (1.5 mm), minimum, wet film.
 5. Products:
 - a. Karnak Corporation; 220 Fibered Emulsion Dampproofing:
www.karnakcorp.com/#sle.
 - b. W. R. Meadows, Inc; Sealmastic Emulsion Type I (spray-grade):
www.wrmeadows.com/#sle.
 - c. Substitutions: See Section 016000 - Product Requirements.
- B. Primers, Mastics, and Related Materials: Type as recommended by dampproofing manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify existing conditions are acceptable prior to starting this work.
- B. Verify substrate surfaces are durable, free of matter detrimental to adhesion or application of dampproofing system.
- C. Verify that items penetrating surfaces to receive dampproofing are securely installed.

3.2 PREPARATION

- A. Protect adjacent surfaces not designated to receive dampproofing.
- B. Clean and prepare surfaces to receive dampproofing in accordance with manufacturer's instructions.
- C. Do not apply dampproofing to surfaces unacceptable to manufacturer.
- D. Apply mastic to seal penetrations, small cracks, or minor honeycombs in substrate.

3.3 APPLICATION

- A. Foundation Walls: Apply two coats of asphalt dampproofing.
 1. Patch disturbed areas of existing dampproofing with two additional coats of dampproofing of the same generic type.
- B. Perform this work in accordance with manufacturer's instructions and NRCA (WM) applicable requirements.
- C. Prime surfaces in accordance with manufacturer's instructions and NRCA (WM) applicable requirements.
- D. Prime surfaces at a rate approved by manufacturer for application indicated, and allow primer to dry thoroughly.
- E. Apply bitumen with mop.
- F. Apply bitumen at a temperature limited by equiviscous temperature (EVT) plus or minus 25 degrees F (14 degrees C); do not exceed finish blowing temperature for four hours.
- G. Seal items watertight with mastic, that project through dampproofing surface.
- H. Immediately backfill against dampproofing to protect from damage.

END OF SECTION

SECTION 071326
SELF-ADHERING SHEET WATERPROOFING

PART 1 - GENERAL

1.1 SUMMARY

- A. Furnish and install the following:
 - 1. Adhered Vertical Waterproofing: Self-adhesive sheet membrane vertical waterproofing applied to exterior surfaces of new below-grade concrete foundation walls.
 - a. Protection board over membrane waterproofing system.
- B. Factory representative field inspections of installed waterproofing.

1.2 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract and Division 01 Specification Sections apply to this Section.
- B. Section 016000 - Product Requirements: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- C. Section 017419 - Construction Waste Management and Disposal: Procedural and administrative requirements for construction and demolition recycling.
- D. Section 033000 - Cast-In-Place Concrete:
 - 1. Forming and placing concrete foundations, walls and slabs.
 - 2. Waterstops cast-in concrete.

1.3 REFERENCES

- A. Reference Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 014200 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. ACI 515 - Guide to the Use of Waterproofing, Dampproofing, and Protective and Decorative Barrier Systems for Concrete.
 - 2. ASTM C 578 - Preformed Cellular Polystyrene Thermal Insulation.
 - 3. ASTM C 836 Standard Specification for High Solids, Cold Liquid-Applied Elastomeric Waterproofing Membrane for Use with Separate Wearing Course.
 - 4. ASTM C 898 Standard Guide for Use of High Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane With Separate Wearing Course.
 - 5. ASTM D 146 - Sampling and Testing Felted and Woven Fabrics Saturated with Bituminous Substances for Use in Waterproofing and Roofing.
 - 6. ASTM D 412 - Standard Test Methods for Rubber Properties in Tension.
 - 7. ASTM D 903 - Standard Test Method for Peel or Stripping Strength of Adhesive Bonds.
 - 8. ASTM D 1079 - Standard Terminology Relating to Roofing and Waterproofing.
 - 9. ASTM D 1434 - Standard Test Method for Determining Gas Permeability Characteristics of Plastic Film and Sheeting.
 - 10. ASTM D 1876 Standard Test Method for Peel Release of Adhesives (T-Peel).
 - 11. ASTM D-1970 - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection.
 - 12. ASTM D-3767 - Standard Practice for Rubber - Measurements of Dimensions.
 - 13. ASTM D 3787 - Test Method for Bursting Strength of Knitted Goods: Constant Rate of Traverse (CRT), Ball Burst Test.
 - 14. ASTM D 4833 - Standard Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products.
 - 15. ASTM D 5385 - Standard Test Method for Hydrostatic Pressure Resistance of Waterproofing Membranes.
 - 16. ASTM E 96 - Tests for Water Vapor Transmission of Materials in Sheet Form.

17. ASTM E 154 - Testing Materials for Use as Vapor Barriers Under Concrete Slabs and as Ground Cover in Crawl Spaces.

B. General References The following reference materials are hereby made a part of this Section by reference thereto:

1. International Concrete Repair Institute (ICRI) Technical Guideline No. 03730 - Surface Preparation Guidelines for the Repair of Deteriorated Concrete Resulting From Reinforcing Steel Corrosion.
2. International Concrete Repair Institute (ICRI) Technical Guideline No. 03732 - Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Coordinate the work of this Section with the respective trades responsible for installing interfacing work, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.
- B. Sequencing: Coordinate the work of this Section with the respective trades responsible for installing work concealed by waterproofing.
1. Proceed with waterproofing work only after pipe sleeves, vents, curbs, inserts, drains, and other projections through the substrate to be waterproofed have been completed. Proceed only after concrete substrate defects, including honeycombs, voids, and cracks, have been repaired to provide a sound substrate free of forming materials, including reveal inserts.

1.5 SUBMITTALS

A. Information and Review

1. Product Data: Manufacturer's product data sheets, specifications, performance data, physical properties.
2. Shop Drawings:
 - a. Provide large scale details of all termination and transition details, penetrations, and drainage composite.
 - b. Provide large scale details of crack treatment in concrete substrate.
3. Verification Samples:
 - a. 24 by 24 inch samples of Fluid applied membrane applied to cement board substrate.
 - b. 24 by 24 inch samples Prefabricated drainage composite.
 - c. 24 by 24 inch samples of each type of sheet membrane waterproofing.
4. Test and Evaluation Reports: Submit manufacturer's test reports of in-place testing performed by an independent testing agency.
5. Manufacturer's Instructions: Manufacturer's application instructions including data for surface conditioners, joint and crack treatment and application temperature range.
6. Applicator Reports:
 - a. Review statement: Written statement, signed by the waterproofing applicator, stating that the Contract Drawings have been completely reviewed with an agent of the waterproofing system manufacturer; accompanied by a written statement from the manufacturer that the selected sheet membrane waterproofing system is proper, compatible, and adequate for the application shown.
 - 1) The waterproofing applicator will notify the Architect and Owner in writing that the as-built field conditions when exposed are in conflict with the Contract Documents for the proper application of the selected waterproofing system or the warranty requirements.
7. Manufacturer Reports: Submit manufacturer's representative's field inspections reports.
8. Qualification Submittals:
 - a. Workmen Qualifications: Statement of qualifications for on-site supervisor, as required under the Article entitled "Quality Assurance" specified herein below, include certifications of workers who have completed a installation training program.

- B. Closeout Submittals: Bonds and Warranty Documentation: Manufacturer's and Applicator's warranties, include coverage of materials and installation and resultant damage from failure of installation to resist penetration of moisture.

1.6 QUALITY ASSURANCE

- A. General: Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.
 - 1. Field Supervised Work: Contractor shall notify Architect before beginning work of this Section. Obtain Architect's approval of Contractor's procedures before proceeding with the work.
- B. Sole Source: Obtain products required for the Work of this Section from a single manufacturer, or from manufacturers recommended by the prime manufacturer of waterproofing system.
- C. Qualifications:
 - 1. Installer/Applicator: Minimum of 3 years documented experience demonstrating previously successful work of the type specified herein, trained and authorized by product manufacturer.
 - a. Qualifications of on-site supervisor (foreman): Minimum 5 years of experience in successful application of specified waterproofing system, fully trained, and authorized by the waterproofing manufacturer.
 - b. Qualifications of on-site workman: The Applicator shall maintain a steady work crew consisting of qualified craftsmen and a full time foreman (supervisor), on site daily. The Contractor shall confirm that all workmen under his direction fully understand the requirements of the job.
 - 2. Testing Agencies: Submit to Architect/Engineer a minimum of three independent testing laboratories for flood testing or EVFM testing as specified.
- D. Manufacturer's On-site Inspections: Make arrangements to have Manufacturer's representative (employed by manufacturer) be present on-site during the Work of this Section at key points, which include, but are not limited to:
 - 1. Pre-installation conference.
 - 2. Review of installation procedures (a minimum of 2 site visits are required).
 - 3. Inspection of installation prior to flood testing.
- E. Preconstruction Testing: Applicator's review statement that in-situ conditions are acceptable for application of waterproofing system.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Delivery and Acceptance Requirements:
 - 1. Do not deliver items to the site, until all specified submittals have been submitted to, and approved by, the Architect.
 - 2. Deliver and store waterproofing materials in new, sealed, containers showing manufacturer's identification, year of production, net weight, date of packaging, and location of packaging.
- B. Storage and Handling Requirements:
 - 1. Store and handle materials following manufacturer's recommended procedures, and in accordance with material safety data sheets.
 - 2. General: Protect materials from damage due to moisture, direct sunlight, excessive temperatures, surface contamination, corrosion and damage from construction operations and other causes.
 - a. Store all materials in an elevated, dry location, protected by waterproof coverings.
 - b. Protect materials from freezing.
 - c. Store liquid products in a well ventilated area having a minimum ambient temperature of 40 degrees Fahrenheit and a maximum of 80 degrees Fahrenheit. Protect primers, mastic and adhesives from high heat, flames or sparks.

- d. Store protection board flat, on a wood platform, protected by waterproof coverings.
 - 3. Do not use the sanitary system for mixing or disposal of refuse material. Carry water to mixing rooms and dump waste material in a suitable refuse receptacle.
 - C. Damaged material: Remove any damaged or contaminated materials from job site immediately, including materials in broken packages, packages containing water marks, or show other evidence of damage, unless Architect specifically authorizes correction thereof and usage on project.
- 1.8 SITE CONDITIONS
- A. Maintain ambient temperatures above 40 degrees Fahrenheit for 24 hours before and during application and until liquid or mastic accessories have cured.
- 1.9 WARRANTY
- A. General: Submit warranties under provisions of Section 017800 - CLOSEOUT SUBMITTALS.
 - B. Manufacturer's Warranty: Provide 5 year Manufacturer's warranty which shall include replacement of defective materials.
 - C. Special Warranty: Provide 3 year Applicator's warranty or performance bond which shall include removal and replacement of defective materials, and repairs or replacement of Owner's materials and products damaged due to failure of waterproofing installation to resist water or moisture penetration
 - D. Extended Correction Period: Membrane waterproofing shall be guaranteed for 3 years with the Contractor or water-proofing Subcontractor agreeing to repair or replace work which leaks or otherwise fails to perform as required due to failures of materials or workmanship. This shall include the removal and replacement of any work which conceals the membrane work.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - 1. Carlisle Coatings and Waterproofing, Inc., Wylie, TX., ("Carlisle").
 - 2. W.R. Grace & Co., Cambridge MA., ("Grace").
 - 3. Henry Company, El Segundo CA., ("Henry").
 - 4. Polyguard Products Inc. Ennis, TX., ("Polyguard").
 - 5. W.R. Meadows, Hampshire, IL., ("Meadows").
- B. Acceptable Substitutions:
 - 1. Contractor must provide appropriate product data with bid for the Architect to consider the substitutions as "equal" to the manufacturer and product specified.
 - 2. Contractor must include unit prices showing any add or deduct costs for all recommended substitutions which have a greater or lesser cost than furnishing and installing the specified manufacturer and product.

2.2 ADHERED VERTICAL WATERPROOFING

- A. Basis of Design (Specified Product): Carlisle, product "MiraDri 860/861".
 - 1. Acceptable Manufacturers/Products: Subject to compliance with the requirements specified herein, similar sheet waterproofing products include the following:
 - a. Carlisle, product "MiraDri 860/861".
 - b. Grace, product "Bituthene 3000".
 - c. Henry, product "Blueskin WP 200".
 - d. Polyguard, product "Polyguard Underseal PRM".
 - e. Meadows, product "Mel-Rol".

- B. 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 -45oF, 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
 - a. For application temperatures between 25 and 65oF, 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
- C. Primer: Rubber based low VOC content primer formulated with high solids content which shall comply with regulatory VOC requirements.
1. Carlisle:
 - a. Conventional use: CCW-702.
 - b. Low temperature: CCW-702LT.
 - c. Green or damp concrete: CCW-715.
 2. Grace:
 - a. Conventional use: WP-3000.
 - b. Low temperature: B2.
 - c. Green or damp concrete: B2.
 3. Henry:
 - a. Conventional use: Aquatac.
 - b. Low temperature: Blue Skin Adhesive.
 - c. Green or damp concrete: No available product.
 4. Polyguard:
 - a. Conventional use: "Polyguard 650 LT Liquid Adhesive" or "Polyguard California Sealant".
 - b. Low temperature: "Polyguard 650 LT Liquid Adhesive".
 - c. Green or damp concrete: No available product.
 5. Meadows:
 - a. Conventional use: Mel-Prime.
 - b. Low temperature: Mel-Prime VOC.
 - c. Green or damp concrete: No available product.

2.3 ACCESSORY PRODUCTS

- A. Surface Primer: Shall be equal to CCW-702LV Solvent-Based Contact Adhesive, 702WB or Cav-Grip.
- B. Mastic: Shall be equal to CCW-704 Mastic.
- C. Sealants: Shall be equal to CCW-703 Vertical Grade Liquiseal7 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 equal to CCW MiraDRAIN as recommended by the manufacturer for each condition.

- G. Perimeter Drainage System: Where required shall be CCW QuickDRAIN.
- H. Primers, Sealants, crack filler, mastics, liquid detailing compound, tape, and adhesives: As recommended by the sheet membrane manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Inspect all surfaces and verify that they are in proper condition to receive the work of this Section.
 - 1. Verify items which penetrate surfaces to receive waterproofing are rigidly installed.
 - 2. Verify surfaces are free of cracks, depressions, waves, or projections which may be detrimental to successful installation.
 - 3. Beginning of installation means acceptance of existing substrate and project conditions.
- B. Pre-installation Testing: Verify concrete substrate has been cured and is sufficiently dry in accordance with the waterproofing manufacturer's recommended application requirements.
- C. Evaluation and Assessment:
 - 1. Notify the Contractor in writing if concrete substrate requires patching of holes over 1/2 inch in diameter or length and over 1/4 inch deep, by Section 03 30 00 - Cast-in-Place Concrete. Do not proceed until patching is completed.
 - 2. Do not apply waterproofing to damp, frozen, dirty, dusty or surfaces unacceptable to membrane manufacturer.

3.2 PREPARATION

- A. Protection of In-situ Conditions: During the operation of work of this Section, protect finished materials and products against undue soilage and damage by the exercise of reasonable care and precautions. Clean, or repair all materials which are soiled or otherwise damaged by Work of this Section. Materials and finishes which cannot be cleaned, or repaired shall be removed and replaced with new work to match existing.
- B. Substrate Preparation
 - 1. Cast-in-place concrete must be smooth, and free of unapproved curing compounds, form release agents and other surface contaminants.
 - 2. Fill form tie rod holes with concrete and finish flush with surrounding surface.
 - 3. Repair bugholes over 1/2 inch in length and 1/4 inch deep and finish flush with surrounding surface.
 - 4. Remove scaling to sound, unaffected concrete and repair exposed area.
 - 5. Grind irregular construction joints to suitable flush surface.
- C. Cracks and joints in substrate surface must be properly sealed with joint filler and sealant as recommended by the sheet membrane waterproofing manufacturer.

3.3 INSTALLATION - GENERAL

- A. Apply waterproofing system in strict accordance the manufacturer's installation specifications, Contract Document details, approved shop drawings and the recommendations of Manufacturer's on-site technical representative, and as additionally specified herein.

3.4 INSTALLATION - ADHERED VERTICAL WATERPROOFING

- A. Primer: Where sheet membrane is to be applied, apply primer as recommended by manufacturer at a rate of 250 to 350 square feet per gallon; areas not covered with membrane in 24 hours must be reconditioned.
- B. General: Perform the application of the sheet membrane waterproofing system in strict accordance with the manufacturer's installation specifications, details, and recommendations, and as specified herein.
 - 1. At all external and internal corners, apply a continuous strip of sheet membrane, at least 12 inches wide, centered on the axis of the corner, before the general application of the membrane.

2. Apply 8 inch wide strips of the sheet membrane over all cracks greater than 1/16 inch in width.
 3. Apply a double layer of the sheet membrane around all penetrations in the surface. Apply a bead of compatible sealant between the top layer of membrane and the clamping rings of penetrating items and at all terminations.
 4. Apply the sheet membrane in strips of 8 feet in length or less, overlapping edge seams at least 2-1/2 inches. Stagger all end laps. Roll the entire surface of the membrane firmly and completely, as soon as possible after application thereof. Seal all tee joints at the end of each working day. Seal all daily terminations, and permanent terminations with manufacturer's recommended sealant material.
- C. After application of membrane is completed, carefully inspect the entire waterproofed surface for defects therein. Patch tears and inadequately lapped seams with membrane material. Slit fishmouths, repair with a patch extending at least 6 inches in all directions from the slit, and seal all edges of the patch with manufacturer's recommended sealant.
- D. Arrange for inspection of waterproofing system by representative of waterproofing manufacturer, prior to installation of insulation and backfill. Schedule and sequence manufacturer's inspection in manner to prevent delays in construction schedule.

3.5 INSTALLATION OF ACCESSORIES

- A. Application - Drainage Composite Board (Vertical Application).
1. Apply drainage composite board in an manner acceptable by the membrane manufacturer and as recommended by the composite board manufacturer and following the general guidelines specified herein.
 2. Install composite drainage board on same day sheet membrane waterproofing is applied.
 3. Apply first row of drainage composite board horizontally starting at base of foundation, peel fabric back approximately 12 inches from the lower edges, tuck exposed drain core behind perimeter sub-drainage pipe installed under Division 33, and wrap fabric over pipe.
 4. Adhere drainage composite to membrane as recommended by membrane manufacturer.
 5. Apply subsequent rolls of drainage composite butted tightly to previous row, overlapping fabric over next lowest row.
 6. At inside corners, cut backing but not fabric. At outside corners cut backing and fabric and overlay with second layer of fabric, adhered.
 7. Terminate composite board system at 6 inches below finish grade.
 8. Patch or replace any damage to fabric prior to backfilling.

3.6 CLEANING

- A. Clean all finished surfaces which have been damaged by the work of this Section.

3.7 PROTECTION

- A. Protect finished work under provisions of Section 015000 - TEMPORARY FACILITIES AND CONTROLS.
- B. Protect applied sheet membrane waterproofing and composite drainage board fabric from damage by other trades, construction materials or backfill.

END OF SECTION

SECTION 071600
CEMENTITIOUS WATERPROOFING

PART 1 - GENERAL

1.1 SUMMARY

- A. Prepare surfaces and repair cracks in substrate scheduled to receive waterproofing.
- B. Furnish and install Portland cement-based, acrylic-modified, fiber-reinforced waterproofing membrane.

1.2 RELATED REQUIREMENTS

- A. Section 079200 - Joint Sealants: Sealant materials, for control joints in concrete.

1.3 REFERENCES

- A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 014200 - References. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. ASTM D 4541, Pull-Off Strength of Coatings Using Portable Adhesion Testers.
 - 2. ASTM D 412, Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers. ASTM D 522, Standard Test Methods for Mandrel Bend Test of Attached Organic Coatings.
 - 3. ASTM D 4060, Abrasion Resistance Using the Taber Abrader.
 - 4. ASTM D 570, Standard Test Method for Water Absorption of Plastics.
 - 5. ASTM D E96, Standard Test Methods for Water Vapor Transmission of Materials.

1.4 SUBMITTALS

- A. Submit the following:
 - 1. Literature: Manufacturer's product data sheets, specifications, performance data and physical properties.
 - 2. Manufacturer's instructions: Manufacturer's installation instructions indicating special procedures, and perimeter conditions requiring special attention.
 - 3. Product schedule: A complete schedule of waterproofing work, coordinated with the Contract Drawings, submitted for record only to Architect.
 - 4. Manufacturer's sample warranty.

1.5 QUALITY ASSURANCE

- A. Waterproofing applicator, with a minimum of 5 years documented experience demonstrating previously successful work of the type specified herein and as approved by product manufacturer.
- B. Make all necessary arrangements with the respective waterproofing systems manufacturer to provide qualified supervision at the site, commencing immediately prior to the first application of materials, and continuing until completion of the application all waterproofing materials. Perform all preparation, mixing, and application procedures as recommended by each manufacturer's representative. Bear all costs in conjunction with such supervision.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver and store waterproofing materials in new, sealed, containers showing manufacturer's identification, year of production, net weight, date of packaging, and location of packaging.
- B. Store all materials in an elevated, dry location, protected by waterproof coverings. Following manufacturer's recommended storage procedures for humidity and temperature conditions, protect materials from freezing.

1.7 PROJECT CONDITIONS

- A. Maintain ambient temperatures above 40 degrees Fahrenheit for 24 hours before and during application and 72 hours after until cementitious waterproofing has cured.

- B. Water saturated substrates scheduled to receive waterproofing must be fully dried and areas of active water leakage must be repaired prior to application of waterproofing.

PART 2 - PRODUCTS

2.1 CEMENTITIOUS WATERPROOFING

- A. Manufacturer: Products which may be considered by the Architect, include the following:
1. Ardex Engineered Cements, 400 Ardex Park Drive, Aliquippa, Pa.
 2. Approved equal.
- B. Description: Two-component flexible membrane, consisting of a liquid acrylic emulsion and a blended cement powder, providing a waterproof coating suitable for all types of concrete and masonry on horizontal or vertical surfaces above, on and below grade.
- C. Basis of Design product: "Ardex Ardicoat Plus".
1. Performance and Physical Properties:
 - a. Meet or exceed the following values for material cured at 70° F (20° C) and 50 percent relative humidity:
 - 1) Working Time: 30 - 90 minutes.
 - 2) Adhesion to Concrete: 150 psi (1.05 MPa) at 7 days, ASTM D4541.
 - 3) Tensile Strength: 470 psi (3.24 MPa) without mesh, 3800 psi (26.2 MPa) with mesh, ASTM D412.
 - 4) Flexibility Mandrel Bend: passes 1/8" @ 77° F (25° C) at 28 days, ASTM D522.
 - 5) Abrasion Resistance: .2 g weight loss at 3,000 cycles, .34 g at 6,000 cycles, ASTM D4060, Taber CS-10 Wheel.
 - 6) Water Absorption: 4.5% at 24-hr immersion, ASTM D570.
 - 7) Waterproofing (hydrostatic pressure resistance) Greater than 101.5 psi (0.7 MPa) over concrete substrate, DIN 1048.
 - 8) Vapor Permeability: 3.85 US Perms (2.2x10⁻⁷ g/Pa·m·s), ASTM E96 Procedure B.
 - 9) Rapid Chloride Permeability: 550 coulombs j. Color: Concrete gray (CR 241), white (CR 242).
 - 10) Combustibility: Non-combustible, both before and after use.
 - b. Reinforcing Mesh: Polymer coated glass fiber interlaced reinforcing mesh, compatible with cementitious waterproofing material. 1. Acceptable Product: "Ardex Ardicoat Plus Mesh".
 - c. Joint filler, and other installation accessories: As recommended by the waterproofing manufacturer.
 - d. Portland cement plaster to be mixed with waterproofing: As recommended by the waterproofing manufacturer.
 - e. Water: Clean and fresh without contaminates.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Inspect all surfaces and verify that they are in proper condition to receive the work of this Section.
1. Verify substrate surfaces are durable; free of frozen matter, dampness, loose particles, cracks, pits, projections, or foreign matter detrimental to adhesion or application of waterproofing system.
 2. Verify that substrate surfaces are smooth, free of pitting, and not detrimental to full contact bond of waterproofing materials.
 3. Verify that items which penetrate surfaces to receive waterproofing are securely installed.
- B. Beginning of installation means acceptance of existing substrate and site conditions.

3.2 PREPARATION

- A. All substrates must be solid, thoroughly clean and free of oil, wax, grease, asphalt, existing patching materials, curing and sealing compounds, and any contaminant that might act as a bond breaker. Over watered, frozen or otherwise weak concrete surfaces must also be cleaned down to sound solid concrete.
- B. Prepare surface, as necessary, by mechanical methods such as scarifying, scabbling or similar. Sand blasting and high pressure water blasting (min. 3000 psi) are also acceptable, though the surface must then be allowed to dry prior to proceeding with the installation. Acid etching, solvents, sweeping compounds and sanding are not acceptable means of preparing the substrate.

3.3 INSTALLATION OF CEMENTITIOUS WATERPROOFING

- A. Examine substrates and conditions under which materials will be installed. Do not proceed with installation until unsatisfactory conditions are corrected.
- B. Coordinate installation with adjacent work to ensure proper sequence of construction. Protect adjacent areas and landscaping from contact due to mixing and handling of materials.
- C. Mixing: Comply with manufacturer's printed instructions and the following:
 - 1. Precondition components to temperature of 70° plus or minus 5° F (21° plus or minus 2.5° C) prior to mixing.
 - 2. Mix using a 1/2" to 3/4" (12mm to 19mm) low speed heavy duty mixing drill until components are evenly blended to uniform lump-free consistency. Do not add water.
- D. Application: Comply with manufacturer's printed instructions and the following.
 - 1. Where required, reinforce dormant cracks and transitions where there are changes of plane or change in materials using specified mesh.
 - 2. Apply Ardicoat Plus at a thickness of 1/16" (1.5mm) to the substrate and immediately lay the mesh into the Ardicoat Plus.
 - 3. Work the Ardicoat Plus through the mesh with a steel trowel to ensure the fabric is completely encapsulated.
 - 4. When doing large areas, overlap the mesh a minimum of 2 1/2" (64 mm). At corners and transitions, use two layers of mesh.
 - 5. Allow the first coat to dry for one to two hours, and then apply finish coat.
- E. Curing: Ardicoat Plus needs to cure a minimum of 24 hours before sealing or overcoating. This time will vary with air temperature, humidity and surface temperature. Do not install if rain, freezing or continuous high humidity is expected in the first 24 hours.

3.4 PROTECTION

- A. During the operation of waterproofing work, protect the work of other trades against undue soilage and damage by the exercise of reasonable care and precautions. Repair and/or replace any work so damaged and soiled.

3.5 CLEANING

- A. After completion of the work of this Section, remove equipment, and clean all interfacing wall areas, free from excess deposits of waterproofing, and other materials installed under this Section.
- B. Remove excess material before material cures. If material has cured, remove using mechanical methods that will not damage substrate.

END OF SECTION

SECTION 072100
THERMAL INSULATION

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. The work of this Section consists of building insulation where shown on the Drawings, as specified herein, and as required for a complete and proper installation. Work includes, but is not limited to the following scope.
- B. Furnish and install the following:
 - 1. Rigid insulation beneath interior concrete slabs.
 - 2. Rigid insulation at perimeter foundation walls.
 - 3. Semi-rigid mineral wool insulation, as indicated on the Drawings.
 - 4. Low pressure, low expansion polyurethane foamed-in-place insulation / air barrier sealant: applied to seal gaps, cracks, cavities and joints in the building envelope, at door frames, perimeter of window frames, and other similar penetrations in exterior walls.

1.2 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract and Division 01 Specification Sections apply to this Section.
- B. Section 016000 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- C. Section 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements for construction and demolition recycling.

1.3 REFERENCE STANDARDS

- A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 014200 - REFERENCES. The standards referenced herein are included to establish recognized minimum quality only. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern. Equivalent quality and testing standards will be acceptable, subject to their timely submission, review and acceptance by the Architect.
 - 1. ASTM C203 - Breaking Load and Flexural Properties of Block Type Thermal Insulation.
 - 2. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2017.
 - 3. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; 2018.
 - 4. ASTM D1621 - Compressive Properties of Rigid Cellular Plastics.
 - 5. ASTM E84 - Surface Burning Characteristics of Building Materials.
 - 6. ASTM E96 - Water Vapor Transmission of Materials.
 - 7. ASTM E136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace At 750 Degrees C; 2016a.
 - 8. All applicable federal, state and municipal codes, laws and regulations for thermal insulation.
- B. Definitions:
 - 1. The term "R-Value" referred to herein refers to the thermal resistance of the insulation alone and does not allow consideration of air spaces or other factors.

1.4 SUBMITTALS

- A. Information and Review Submittals: Submit the following under provisions of Section 013000 - Administrative Requirements.
- B. Product Data: Manufacturer's product data sheets, specifications, performance criteria, and physical properties for each item furnished hereunder.

1.5 QUALITY ASSURANCE

- A. General: Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Delivery and Acceptance Requirements:
 - 1. Do not deliver items to the site, until all specified submittals have been submitted to, and approved by, the Architect.
 - 2. Deliver materials in original packages, containers or bundles bearing brand name and identification of manufacturer or supplier.
- B. Storage and Handling Requirements:
 - 1. Store and handle materials following manufacturer's recommended procedures, and in accordance with material safety data sheets.
 - a. Rigid board insulation materials are combustible and may constitute a fire hazard, do not expose insulation materials to open flames or other ignition sources, comply fully with manufacturer's recommendations and the requirements of local authorities having jurisdiction, for delivery, handling, storage and installation.
 - 2. Protect materials from damage due to moisture, direct sunlight, excessive temperatures, surface contamination, corrosion and damage from construction operations and other causes.
- C. Damaged material: Remove any damaged or contaminated materials from job site immediately, including materials in packages containing water marks, or show evidence of mold.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - 1. Rigid insulation board (extruded polystyrene):
 - a. Dow Chemical Corp., Midland, MI.
 - b. Owens Corning Commercial Insulation, Toledo, OH.
 - c. Pactiv Building Products, Atlanta, GA.
 - d. DiversiFoam Products, Rockford, MN.
 - 2. Semi-rigid mineral wool envelope insulation:
 - a. Owens Corning Commercial Insulation, Toledo, OH.
 - b. Roxul Inc, Milton, ON., www.roxul.com, or approved equals.
 - 3. Low pressure polyurethane foamed-in-place insulation / air barrier sealant:
 - a. Fomo Products, Inc., Norton, OH.
 - b. Dow Chemical Company, Midland, MI.
 - c. Premier industrial Supply, Phoenix, AZ.
 - d. Convenience Products, Division of Clayton Corp., Fenton, MO.
 - e. Henry Company, El Segundo, CA.

2.2 MATERIALS

- A. Foundation insulation, rigid extruded polystyrene insulation: Closed cell foam board, square edge, self-extinguishing, conforming to ASTM C 578, Type IV, with a compressive strength of 25 pounds per square inch when tested in accordance with ASTM D 1621.
 - 1. Panel size: 48 by 96 inches beneath slab, and 24 by 96 inches at verticals.
 - 2. Minimum R-value: 5 per inch thickness.
 - 3. Thickness as indicated on Drawings.
 - 4. Acceptable products include but are not limited to:
 - a. Dow Chemical Corp., product, Styrofoam Brand "Square Edge"
 - b. Owens Corning, product "Foamular 250".

- c. Pactiv, Corp. product "GreenGuard Type IV 25 PSI Insulation Board".
 - d. DiversiFoam Products, product "CertiFoam 25 SE".
 - B. Under-slab, high compressive strength rigid insulation: Closed cell extruded polystyrene foam board, square edge, self-extinguishing, conforming to ASTM C 578, Type VII, with a compressive strength of 60 pounds per square inch when tested in accordance with ASTM D 1621 equal to Dow Chemical Corp., Styrofoam Brand "High Load 60" insulation.
 1. Minimum R-value: 5 per inch thickness.
 2. Thickness: As indicated on Drawings.
 3. Acceptable products include but are not limited to:
 - a. Dow Chemical Corp., product, Styrofoam Brand "High Load 60"
 - 1) Owens Corning, product "Foamular 600".
 - 2) DiversiFoam Products, product "CertiFoam 60".
 - C. Semi-rigid mineral fiber board:
 1. Owens Corning, product "Thermafiber Industrial Board":
 - a. Mineral fiber board thermal insulation - Type IVB Compliant per ASTM C612 and MEA Approval.
 - 1) Industrial Board 80: Types IA, IB, II, III, IVA, IVB.
 - b. Density per ASTM C303 (Industrial Board 80): 8.0 pcf.
 - c. Maximum Use Temperature³ per ASTM C411: up to 1,200°F (649°C).
 - d. Linear Shrinkage per ASTM C356: <2.0% at 1,200°F (649°C).
 - e. Water Vapor Sorption per ASTM C1104: <3.0% by weight at 120°F (49°C), 95% R.H.
 - f. Fungi Resistance per ASTM C1338: Pass – No Growth.
 - g. Corrosion to Copper, Aluminum, and Steel per ASTM C665: Pass.
 - h. Corrosion to Steel per ASTM C1617: Pass.
 - i. Stress Corrosion Evaluation on external stress corrosion cracking tendency of austenitic stainless steel⁴ per ASTM C795 and ASTM C692: Pass.
 - j. Chemical Analysis for Cl-, Fl-, Na+, SiO₃ ⁴ per ASTM C795 and ASTM C871: Results fall within acceptability limits.
 - k. Nonmetallic Thermal Insulation⁴ per NRC 1.36: Complies.
 - l. Noncombustibility per ASTM E136 and CAN/ULC S114 Pass: Noncombustible as defined per NFPA 220.
 - m. Surface Burning Characteristics⁵ per UL 723, ASTM E84, and CAN/ULC S102:
 - 1) Flame Spread Index 0.
 - 2) Smoke Developed 0.
 - D. Foamed-in-place insulation for air barrier sealant: Low Pressure Polyurethane foam sealant. Acceptable products include the following or approved equal:
 1. Fomo Products, Inc., product: "Handi Foam" or "Handi-Seal".
 2. Dow Chemical Company, product: "Great Stuff Pro".
 3. Premier industrial Supply, product: "XtraFoam".
 4. Convenience Products, Division of Clayton Corp., product: "Touch 'n Foam No Warp".
 5. Henry Company, product: "NailTite NT-100".

2.3 ACCESSORIES

- A. Staples, tape, adhesives and fasteners required for the proper and complete installation for work of this Section shall be as recommended by each respective manufacturers of each insulation type.
- B. Adhesively Attached, Spindle-Type Anchors: Plate welded to projecting spindle; capable of holding insulation of specified thickness securely in position indicated with self-locking washer in place.
 1. Baseplate: Perforated, galvanized carbon-steel sheet, 0.030 inch, minimum 2 inches square.

2. Pin: Copper-coated, low-carbon steel; fully annealed; 0.105 inch (2.67 mm) in diameter; length to suit depth of insulation indicated.
 3. Adhesive, as recommended by anchor manufacturer for substrate.
 4. Acceptable products include the following, or approved equal to:
 - a. Gripnail Corporation, East Providence, RI., product "SnapStik Spindle Anchors".
 - b. Gemco, Danville IL., product "Perforated Base Insulation Hangers."
 - c. AGM Industries, Brockton MA. product: Tactoo Insul-Hangers."
- C. Setting adhesive for rigid insulation: Conforming with ASTM C-557.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Inspect all surfaces and verify that they are in proper condition to receive the work of this Section.
1. Beginning of installation means acceptance of existing substrate and project conditions.

3.2 INSTALLATION

- A. Insulation beneath slabs-on-grade and exterior of foundation walls: 2 inch thick rigid insulation.
1. Place insulation boards at the exterior perimeter of foundation walls and beneath slabs-on-grade.
 - a. At exterior perimeter of foundation walls, extend insulation from 2 inches below grade to top of footing.
 - b. Beneath slabs-on-grade, extend insulation 24 inches inside of perimeter of foundation walls.
 2. Butt edges and ends tight to adjacent boards. Bevel insulation to allow snug fit at cants.
 3. Place soil as a perimeter restraint to minimize movement of insulation.
- B. Board installation as indicated on the drawings:
1. Install boards to fit snugly between wall ties.
 2. Install boards horizontally or vertically on walls, as detailed on the drawings.
 3. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.
- C. Foamed-in-place insulation / air barrier sealant: Apply insulation in method to a uniform monolithic density without voids, in accordance with manufacturer's instructions.
1. Apply application of foam for air barrier seal includes, but is not limited to:
 - a. Door frames, window frames, and similar penetrations in exterior walls.
 - b. Gaps, cracks, cavities and joints in the building envelope, not sealed with other forms of air boots, including electrical boxes and conduit, ducts, fans, and piping.
 - c. Where additionally indicated on Drawings.

3.3 CLEANING

- A. Clean work under provisions of Section 017300 - EXECUTION.
- B. Daily clean work areas by sweeping and disposing of debris, and scraps.
- C. Upon completion of the work of this Section in any given area, remove tools, equipment and all rubbish and debris from the work area; leave area in broom-clean condition.

END OF SECTION

**SECTION 072500
WEATHER BARRIERS**

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Vapor retarder on inside under interior cladding; vapor retarder on outside, under exterior cladding.
- 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.

1.2 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, $57.2 \text{ ng}/(\text{Pa s sq m}) = 1 \text{ perm}$.
- 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.

1.3 SUBMITTALS

- A. See Section 013000 - 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 each contractor accreditation and installer certification on site during and after installation, and present on-site documentation upon request.
- H. Testing Agency Qualification Statement.
- I. Warranty Documentation for Installation of Building Rainscreen Assembly: Submit installer warranty and ensure that forms have been completed in Owner's name and registered with installer.

1.4 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, and use secondary materials approved in writing by primary material manufacturer.

1.5 FIELD CONDITIONS

- A. Maintain temperature and humidity recommended by the materials manufacturers before, during and after installation.

PART 2 PRODUCTS

2.1 WEATHER BARRIER ASSEMBLIES

- A. Interior Vapor Retarder:
 - 1. On inside face of studs of exterior walls, under cladding, use mechanically fastened vapor retarder sheet.
- B. Basis of Design: CertainTeed, product: "MemBrain Continuous Air Barrier & Smart Vapor Retarder" consisting of the following:
 - 1. Water Vapor Permeance, (572ng/Pa•s•m²) per ASTM E96 - Water Method: >10 perms.
 - 2. Water Vapor Permeance, (57ng/Pa•s•m²) per ASTM E96 - Desiccant Method: <1.0 perm.
 - 3. Corrosivity per ASTM C665: No unusual aspect of corrosion such as pitting, cracking and adhesive cure inhibition.
 - 4. Fungi Resistance per ASTM C1338: No growth.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that surfaces and conditions are ready to accept the work of this section.

3.2 INSTALLATION

- A. Install materials in accordance with manufacturer's instructions.
- B. Mechanically Fastened Sheets - Vapor Retarder On Interior:
 - 1. When insulation is to be installed in assembly, install vapor retarder over insulation.
 - 2. Seal seams, laps, perimeter edges, penetrations, tears, and cuts with self-adhesive tape, making air tight seal.
 - 3. Locate laps at a framing member; at laps fasten one sheet to framing member then tape overlapping sheet to first sheet.
 - 4. Seal entire perimeter to structure, window and door frames, and other penetrations.
 - 5. 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.

3.3 PROTECTION

- A. Do not leave materials exposed to weather longer than recommended by manufacturer.

END OF SECTION

SECTION 072600
VAPOR RETARDERS

PART 1 - GENERAL

1.1 SUMMARY

- A. The work of this Section consists of vapor retarders (vapor barriers) where shown on the Drawings, as specified herein, and as required for a complete and proper installation. Work includes, but is not limited to the following.
- B. Furnish and install the following:
 - 1. Membrane vapor barrier.
 - 2. Sheet membrane vapor barriers (vapor retarders) under concrete slabs-on-grade including seam tape, and pipe boots.
 - 3. Foamed-in-place insulation/air barrier sealant: applied to seal gaps, cracks, cavities and joints in the building envelope, at door frames, perimeter of window frames, and other similar penetrations in exterior walls.

1.2 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract and Division 01 Specification Sections apply to this Section.
- B. Section 016000 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- C. Section 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements for construction and demolition recycling.
- D. Section 033000 - CAST-IN-PLACE CONCRETE: Concrete slabs on grade.
- E. Section 061000 - ROUGH CARPENTRY: Wood, blocking, nailers.
- F. Section 071113 - BITUMINOUS DAMPPROOFING: Dampproofing at foundation walls.
- G. Section 072100 - THERMAL INSULATION: Thermal insulation.

1.3 REFERENCES

- A. Reference Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 014200 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. ASTM D 570 - Water Absorption of Plastics.
 - 2. ASTM D 1004 - Initial Tear Resistance of Plastic Film and Sheeting.
 - 3. ASTM D 1622 - Apparent Density of Rigid Cellular Plastics.
 - 4. ASTM D 1938 - Tear Propagation Resistance of Plastic Film and Thin Sheeting by a Single-Tear Method.
 - 5. ASTM D 1970 - Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection.
 - 6. ASTM D 2842 - Water Absorption of Rigid Cellular Plastics.
 - 7. ASTM D 2582 - Puncture-Propagation Tear Resistance of Plastic Film and Thin Sheeting.
 - 8. ASTM D 2856 - Open Cell Content of rigid Cellular Plastics by Air Pycnometer.
 - 9. ASTM E 136 - Behavior of Materials in a Vertical Tube Furnace at 750°C.
 - 10. ASTM E 154 - Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover
 - 11. ASTM E 1643 - Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.
 - 12. ASTM E 1745 - Plastic Vapor Retarders Used in Contact with Soil or Granular fill under Concrete Slabs
 - 13. ASTM E 154 - Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover

14. ASTM E 1643 - Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.
15. ASTM E 1745 - Plastic Vapor Retarders Used in Contact with Soil or Granular fill under Concrete Slabs
16. ASTM E 84 - Surface Burning Characteristics of Building Materials.
17. ASTM E 96 - Water Vapor Transmission of Materials.

B. General References The following reference materials are hereby made a part of this Section by reference thereto:

1. ACI 302.1R Vapor Barrier Component (plastic membrane) is not less than 10 mils thick.
2. NFPA 701 - Fire Tests for Flame Resistant Textiles and Films
3. All applicable federal, state and municipal codes, laws and regulations for thermal insulation and vapor barriers.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. General: Coordinate the work of this Section with the respective trades responsible for installing interfacing and adjoining work for proper sequence of installation, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.

B. Sequencing: Coordinate work of this section with related work.

1.5 SUBMITTALS

A. Information and Review Submittals: Submit the following under provisions of Section 013000 - ADMINISTRATIVE REQUIREMENTS:

1. Product Data: Manufacturer's product data sheets, specifications, performance data, physical properties for each item furnished hereunder.
2. Manufacturer's Instructions: Manufacturer's installation instructions for placement, seaming and pipe boot installation.

1.6 QUALITY ASSURANCE

A. General: Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.

B. Sole Source: Obtain products required for the Work of this Section for each type of vapor retarder shall be from a single manufacturer, and the related accessories as recommended by the prime manufacturer of the vapor retarder.

1.7 DELIVERY, STORAGE AND HANDLING

A. Delivery and Acceptance Requirements:

1. Do not deliver items to the site, until all specified submittals have been submitted to, and approved by, the Architect.
2. Deliver materials in original packages, containers or bundles bearing brand name and identification of manufacturer or supplier.

B. Storage and Handling Requirements:

1. Store and handle materials following manufacturer's recommended procedures, and in accordance with material safety data sheets.
2. Store materials under cover and in manner to keep them dry, protected from weather, direct sunlight and damage from construction traffic and other causes.

PART 2 - PRODUCTS

2.1 VAPOR BARRIERS WITHIN BUILDING ASSEMBLIES

- A. Membrane vapor barrier: Flexible self-sealing, self-healing, fully adhering composite flexible membrane consisting of .8 mm (32 mils) of self adhesive rubberized asphalt integrally bonded to .2 mm (8 mils) of cross-laminated, high-density polyethylene film to provide a min. 1 mm (40 mil) thick membrane. Membrane shall be interleaved with silicone-coated release paper until

installed. Provide with manufacturer recommended surface conditioners and termination mastics.

1. Acceptable Products include:
 - a. Grace Construction Products, product: "Perm-A-Barrier Wall Flashing".
 - b. Carlisle Waterproofing, product: "CCW-705".
 - c. W.R. Meadows, product: "Air-Shield Thru-Wall Flashing".
2. Minimum performance characteristics.
 - a. Water Vapor Transmission: ASTM E 96, Method B - 0.05 perms maximum
 - b. Water Absorption: ASTM D 570 - Max. 0.1% by weight
 - c. Puncture Resistance: ASTM E 154 - 40 lbs.
 - d. Tear Resistance:
 - 1) Initiation - ASTM D 1004 - minimum 58 N (13.0 lbs.) M.D.
 - 2) Propagation - ASTM D 1938 - minimum 40 N (9.0 lbs.) M.D.
 - e. Lap Adhesion at -4°C (25°F): ASTM 1876 - 880 N/M (5.0 lbs./in.) of width
 - f. Low Temperature Flexibility - ASTM D 1970 - Unaffected to -43°C (-45° F)
 - g. Tensile Strength: ASTM D 412, Die C Modified - Minimum 5.5 MPa (800 psi)
 - h. Elongation, Ultimate Failure of Rubberized Asphalt: ASTM D 412, Die C - Min. 200%
3. Surface primer: Latex based, water dispersed liquid for substrate as recommended by membrane manufacturer.
4. Termination mastic: Rubberized asphalt-based mastic with 200 grams/liter max VOC content for use in sealing flashing membrane terminations and punctures, as recommended by wall flashing manufacturer.

2.2 UNDER SLAB VAPOR BARRIERS

- A. Reinforced vapor barrier: UV stabilized, 5 ply high density polyethylene copolymer laminated to a non-woven yarn grid, equal to Reef Industries Inc., Houston TX., product "Griffolyn T-85 vapor barrier". Reinforcement consists of 2 non-woven grids of high strength nylon yarn having no less than 96 yarns per square foot.
 1. Water Vapor Transmission Rate (WVTR) of not more than 0.040 grams per 100 square inches per 24 hours (tested per ASTM E96)
 2. Puncture Propagation Tear (PPT) strength (of yarn grid): at least 23.0 pounds (tested per ASTM D2582).
 3. Puncture strength (of vapor barrier): at least 36.8 pounds (tested per ASTM D4833).

2.3 FOAMED-IN-PLACE INSULATION

- A. Foamed-in-place insulation for air barrier sealant: UL Class I, two component polyurethane self frothing foam insulation equal to Dow Chemical Corporation, product "Froth-Pak" having the following characteristics:
 1. Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:
 - a. BASF Corp., Polymers Div., Styropar Group, Parsippany NJ.
 - b. Dow Chemical Corporation (Dow Building Solutions), Midland MI.
 - c. Universal Protective Coatings, San Rafael CA.
 2. Product characteristics.
 - a. Propellant: HCFC or HFC, No CFC's are permitted.
 - b. Apparent Density (ASTM D1622): 1.7 pounds per cubic foot. (with 1.75 pcf HCFC)
 - c. Water Absorption (ASTM D2842): less than 2.5 percent water absorbed.
 - d. Open cell content (ASTM D2856): less than 2 percent.
 - e. Apparent aged (18 months) R value: 4.9 per inch.
 - f. Flexural Strength, parallel (ASTM C203): 17 to 23 pounds per square inch.
 - g. Flexural Strength, perpendicular (ASTM C203): 26 to 42 pounds per square inch.
 - h. Flame Spread (ASTM E84): 25 or less (Class 1 rated).
 - i. Smoke Developed (ASTM E84): 350 (Class 1 rated), tested for 2 inch depth.

2.4 ACCESSORIES

- A. General: Staples, tape, adhesives and fasteners required for the proper and complete installation for work of this Section shall be as recommended by each respective manufacturers of each type of vapor barrier.
- B. Seam Tape: High Density Polyethylene Tape or HDPE Tape as recommended by vapor barrier manufacturer, with pressure sensitive adhesive. Minimum width 4 inches.
- C. Pipe Boots: Construct pipe boots from vapor barrier material and pressure sensitive tape per manufacturer's instructions.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Ensure that subsoil is approved by Architect.
- B. Level and tamp or roll aggregate, sand or tamped earth base.

3.2 INSTALLATION - VAPOR BARRIER

- A. Install materials in accordance with manufacturer's instructions:
- B. When insulation is to be installed in assembly, install vapor retarder over insulation.
- C. Seal seams, laps, perimeter edges, penetrations, tears, and cuts with self-adhesive tape, making air tight seal.
- D. Locate laps at a framing member; at laps fasten one sheet to framing member then tape overlapping sheet to first sheet.
- E. Seal entire perimeter to structure, window and door frames, and other penetrations.
- F. 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.

3.3 INSTALLATION - BELOW-SLAB VAPOR BARRIERS/RETARDERS

- A. General: Install Vapor Barrier in accordance with manufacturer's instructions and ASTM E 1643-98. Place vapor barrier beneath all floor slabs
- B. Unroll Vapor Barrier with the longest dimension parallel with the direction of the pour.
- C. Lap Vapor Barrier over footings and seal to foundation walls.
- D. Overlap joints a minimum of six inches with top lap in direction of spreading concrete. Turn up double layer at slab edges abutting walls. Seal with manufacturer's tape.
- E. Seal all penetrations (including pipes, reinforcing steel, and permanent utilities) with manufacturer's pipe boot or vapor barriers recommended detail.
- F. Do not puncture vapor barrier. No punctures or unsealed penetrations are permitted.
- G. Repair damaged areas by cutting patches of vapor barrier, overlapping damaged area 6 inches and taping all four sides with tape.

3.4 INSTALLATION - FOAMED-IN-PLACE AIR BARRIER

- A. Foamed-in-place air barrier: Apply foam in froth method to a uniform monolithic density without voids, in accordance with manufacturer's instructions.
 - 1. Apply application of foam for air barrier seal includes, but is not limited to:
 - a. Door frames, window frames, and similar penetrations in exterior walls.
 - b. Gaps, cracks, cavities and joints in the building envelope, not sealed with other forms of air boots, including electrical boxes and conduit, ducts, fans, and piping.
 - c. Where additionally indicated on Drawings.

END OF SECTION

SECTION 072713
SHEET AIR BARRIERS

PART 1 – GENERAL

1.1 SUMMARY

- A. The work of this Section consists of air and vapor membrane system where shown on the Drawings, as specified herein, and as required for a complete and proper installation. Work includes, but is not limited to the following.
- B. Furnish and install the following:
 - 1. Self-adhesive elastomeric sheet membrane air and vapor barrier system, including specified sheet membrane, required primers and adhesives.

1.2 RELATED REQUIREMENTS

- A. Section 016000 - Product Requirements: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- B. Section 017419 - Construction Waste Management and Disposal: Procedural and administrative requirements for construction and demolition recycling.
- C. Section 042000 - Unit Masonry: Brick veneer.
- D. Section 061643 - Gypsum Sheathing: Wall sheathing.
- E. Section 072100 - Thermal Insulation.
- F. Section 072131 - Closed Cell Sprayed Foam Insulation.
- G. Section 072600 - Vapor Retarders: Vapor barrier, seam tape, pipe boots, detail strip for installation under concrete slabs.
- H. Section 074243 - Composite Metal Panels: Metal composite faced panel system.
- I. Section 076200 - Sheet Metal Flashing and Trim: Aluminum flashing
- J. Section 079200 - Joint Sealants: Requirements for joint sealant and backing materials.
- K. Section 084110 - Aluminum Entrances and Storefronts: Storefront framing and entrance systems.

1.3 REFERENCES

- A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - References. The standards referenced herein are included to establish recognized minimum quality only. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern. Equivalent quality and testing standards will be acceptable, subject to their timely submission, review and acceptance by the Architect.
 - 1. ASTM E 96 - Test Methods for Water Vapor Transmission of Materials.
 - 2. ASTM D 570 - Test Method for Water Absorption of Plastics.
 - 3. ASTM E 154 - Test Method for Water Vapor Retarders used in contact with Earth Under Concrete Slabs, on Walls or as Ground Cover.
 - 4. ASTM D 1004 - Test Method for Initial Tear Resistance of Plastic Film and Sheeting.
 - 5. ASTM D 1938 - Test Method for Tear Propagation Resistance of Plastic Film and Thin Sheeting by a Single-Tear Method.
 - 6. ASTM D 1876 - Test Method for Peel Resistance of Adhesives.
 - 7. ASTM D 1970 - Standard Specifications for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection.
 - 8. ASTM D 412 - Test Methods for Vulcanized Rubber & Thermoplastic Rubbers and Thermoplastic Elastomers – Tension.
 - 9. ASTM E2178: Standard Test Method for Air Permeance of Building Materials

10. ASTM E2357: Standard Test method for Determining Air Leakage of Air Barrier Assemblies
11. ICC ES (ICC Evaluation Service) AC48 – Acceptance Criteria for Roof Underlayment for Use in Severe Climate Areas.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. General: Coordinate the work of this Section with the respective trades responsible for installing interfacing and adjoining work for proper sequence of installation, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.
2. Sequence activities to accommodate required inspection and testing services with a minimum of delay. Coordinate activities to avoid the necessity of removing and replacing construction to accommodate inspections and tests.
 - a. The Contractor is responsible for scheduling times for inspections, tests, taking samples, and similar activities.
 - b. Provide for continuity of the air barrier materials and products within each assembly in the air barrier system.
 - c. Provide for continuity of all the enclosure assemblies with joints and transition materials to provide a whole building air barrier system.
 - d. Cooperate with agencies performing required inspections, tests, and similar services. Notify the agency sufficiently in advance of operations to permit assignment of personnel. Provide supplemental assistance to testing agencies
 - 1) Provide access to the Work.
 - 2) Furnish incidental labor and facilities necessary to facilitate inspections and tests.
 - 3) Take adequate quantities of representative samples of materials that require testing or assist the agency in taking samples.
 - 4) Deliver samples to testing laboratories.
 - 5) Provide security and protection of samples and test equipment at the Project Site.

1.5 PRE-INSTALLATION CONFERENCE

- ##### A. Pre-Installation Meetings: At least two weeks prior to commencing the work of this Section, conduct a pre-installation conference at the Project site. Comply with requirements of Section 013000. Coordinate time of meeting to occur prior to installation of work under the related sections named below.
1. Required attendees: Owner, Architect, Contractor, air barrier applicator's project superintendent, air barrier manufacturer's technical representative and representatives of other related trades as directed by the Architect or Contractor, and representatives for installers of related work specified Sections:
 - a. Agenda:
 - 1) Review of shop submittal requirements.
 - 2) Scheduling and sequencing of building envelope operations.
 - 3) Review of staging and material storage locations.
 - 4) Coordination of work by other trades.
 - 5) Review of mock-up requirements.
 - 6) Review of substrate preparation, compatibility of materials and Installation procedures.
 - 7) Installation procedures for air barrier and flashings including surface preparation requirements and minimum curing periods.
 - 8) Review connection methods of air barrier to doors, windows, curtain wall, storefront, louvers and similar product connections.
 - 9) Protection of completed Work.

- 10) Establish weather and working temperature conditions to which Architect and Contractor must agree.
- 11) Emergency rain protection, foul weather and cold temperature procedures.
- 12) Discuss process for manufacturer's inspection and acceptance of completed air barrier enclosure.
- 13) Review protection requirements of completed in-place air barrier.
- 14) Review procedures for field inspections, testing and repair procedures.

1.6 SUBMITTALS

- A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - Submittal Procedures:
1. Product Data: Manufacturer's product data sheets, specifications, performance data, physical properties.
 - a. Include certification of data indicating Volatile Organic Compound (VOC) content of all components of waterproofing system.
 - b. Shop Drawings: Developed for specific project conditions including mock-up, submittal of manufacturer's standard details are prohibited.
 - 1) Show the locations and extent of air and vapor barrier system including details of typical conditions including:
 - (a) Intersections with other envelope systems and materials.
 - (b) Membrane counter-flashings.
 - (c) Bridging of gaps.
 - (d) Penetrations through barrier including conduits, pipes and similar items.
 - c. Verification Samples:
 - 1) Self-adhered air and vapor barrier membrane.
 - 2) Through-wall flashing membrane.
 - 3) Transition membrane.
 - d. Test and Evaluation Reports:
 - 1) Provide an Evaluation Report as the manufacturer's documentation confirming material has been evaluated and conforms to the requirements of the ASTM E2176 Standard for Air Barrier Materials.
 - 2) Provide dew point analysis of exterior wall assembly and field testing of mockup for static air, pressure air, static water, and bond/adhesion in compliance with applicable ASTM standards.
 - e. Manufacturer's Instructions:
 - 1) Installation Instructions: indicate preparation, installation requirements and techniques, joint and crack treatment and application temperature range, product storage and handling criteria, and limitations of the material.
 - f. Special Procedure Submittals:
 - 1) Written statement, signed by the air barrier applicator, stating that the Contract Drawings have been completely reviewed with an agent of the air barrier and vapor barrier system manufacturer; accompanied by a written statement from the manufacturer that the selected air barrier and vapor barrier system is proper, compatible, and adequate for the application shown.
 - (a) Manufacturer's review shall include recommendations for detailed conditions and specific application requirements for project. Copies shall be sent to Architect, Owner, General Contractor and application sub-contractor.
 - 2) The applicator will notify the Architect and Owner in writing that the existing conditions when exposed are in conflict with the Contract Documents for the proper application of the selected air barrier and vapor barrier system or the warranty requirements.
 - g. Qualification Submittals:

- 1) Submit proof of License of the Contractor by ABAA (Air Barrier Association of America, Inc.) at the time of bidding and prior to commencing the work
 - B. Closeout Submittals: Submit the following under provisions of Section 01 78 00 - Closeout Submittals.
 1. Bonds and Warranty Documentation:
 - a. Manufacturer's Warranties and Guarantees as specified elsewhere herein this Section.
- 1.7 QUALITY ASSURANCE
- A. General: Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.
 - B. Sole Source: Obtain products required for the Work of this Section from a single manufacturer, or from manufacturers recommended by the prime manufacturer of air barrier system.
 - C. Qualifications:
 1. Installer/Applicator: Minimum of 3 years documented experience demonstrating previously successful work of the type specified herein, and approved by product manufacturer.
 - D. Manufacturer's Installation Review: Make arrangements to have Manufacturer's representative (employed by manufacturer) on-site during work of this Section to periodically review installation procedures. A minimum of 3 site visits are required.
- 1.8 DELIVERY, STORAGE AND HANDLING
- A. Delivery and Acceptance Requirements:
 1. Do not deliver items to the site, until all specified submittals have been submitted to, and approved by, the Architect.
 2. Deliver and store air barrier materials in new, sealed, containers showing manufacturer's identification, year of production, net weight, date of packaging, and location of packaging.
 - B. Storage and Handling Requirements:
 1. Store and handle materials following manufacturer's recommended procedures, and in accordance with material safety data sheets.
 - a. Protect primers, mastic and adhesives from high heat, flames or sparks.
 - b. Store all materials in an elevated, dry location, protected by waterproof coverings. Following manufacturer's recommended storage procedures for humidity and temperature conditions, protect materials from freezing.
- 1.9 SITE CONDITIONS
- A. Maintain ambient temperature above 30 degrees Fahrenheit for 24 hours before, during, and after installation until liquid or mastic accessories have cured.
- 1.10 WARRANTY
- A. General: Submit warranties under provisions of Section 01 78 00 - Closeout Submittals.
 - B. Manufacturer Warranty:
 1. Provide 5 year Manufacturer's product warranty which shall include replacement of defective materials.
 - a. Warranty shall include provisions for coverage of the following: Membrane will bridge ruptures caused by cracking of the immediate substrate up to 1/16 inch width.
 - C. Special Warranty:
 1. Provide 2 year Applicator's warranty or bond which shall include removal and replacement of defective materials, and repairs or replacement of Owner's materials and products damaged due to failure of air and vapor barrier installation to resist water or moisture penetration.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design Manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Henry Company, Inc., Huntington Park, CA.
 - 1. Product: "Blueskin SA".
- B. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - 1. Carlisle Coatings & Waterproofing Inc., Wylie, TX. (Carlisle)
 - 2. W.R. Grace & Co., Construction Products Division, Cambridge MA. (Grace)
 - 3. Tremco, Inc., Beachwood OH. (Tremco)
- C. Acceptable Substitutions: The products specified herein establish standards of quality, design and function desired. Under provisions of Massachusetts General Laws, Chapter 149, other equal products not named herein, may be considered for acceptance as an equal by the Architect upon submission of complete product information as described in Section 016200 - Product Substitutions. Further additional information may be requested by the Architect for determination that the proposed product substitution is fully equal to the specified product(s). There is no guarantee that proposed substitutions will be approved, and the Contractor is hereby directed not to order any materials until said approval(s) are received in writing.
 - 1. Requesting substitutions is at the Contractor's own risk, with regard to uncompensated delays of the Project. Time is required for sufficient review and additional requests for information. Delays of work which result from substitution reviews and resubmissions are not grounds for additional time or cost change orders, and will not be considered by the Awarding Authority.

2.2 PERFORMANCE/DESIGN CRITERIA

- A. General: The air barrier shall have the following characteristics:
 - 1. It must be continuous, with all joints made airtight.
 - 2. It shall have an air permeability not to exceed 0.004 cfm/ft² under a pressure differential of 0.3 in. water. (1.57 psf.) (equal to 0.02 L/s/m² @ 75 Pa.) when tested in accordance with ASTM E2178.
 - 3. It shall be capable of withstanding positive and negative combined design wind, fan and stack pressures on the envelope without damage or displacement, and shall transfer the load to the structure. It shall not displace adjacent materials under full load.
 - 4. The air barrier shall be joined in an airtight and flexible manner to the air barrier material of adjacent systems, allowing for the relative movement of systems due to thermal and moisture variations and creep. Transition connections shall be made between the following:
 - a. Foundation and walls.
 - b. Walls and windows or doors.
 - c. Different wall systems.
 - d. Wall and roof.
 - e. Wall and roof over unconditioned space.
 - f. Walls, floor and roof across construction, control and expansion joints.
 - g. Walls, floors and roof to utility, pipe and duct penetrations.
 - h. All penetrations of the air barrier and paths of air infiltration/exfiltration shall be made airtight.

2.3 MATERIALS

- A. Sheet membrane: Prefabricated composite sheet 0.9 mm (36 mils) of self-adhesive rubberized asphalt integrally bonded to 0.1 mm (4 mils) of cross-laminated, high-density polyethylene film to provide a minimum 1 mm (40 mil) thick membrane. Membrane shall be interleaved with disposable silicone-coated release paper until installed.

1. Performance Requirements:
 - a. Water Vapor Transmission: ASTM E 96, Method B - 2.9 ng/m²sPa (0.05 perms) maximum.
 - b. Water Absorption: ASTM D 570 - Max. 0.1% by weight.
 - c. Puncture Resistance: ASTM E 154 - 178 N (40 lbs.).
 - d. Tear Resistance:
 - 1) Initiation: ASTM D 1004 - min. 58 N (7.0 lbs.) M.D.
 - 2) Propagation: ASTM D 1938 - min. 40 N (4.0 lbs.) M.D.
 - 3) Lap Adhesion at -4 degrees C (25 degrees F): ASTM D 1876 - 880 N/m (5.0 lbs./in.) of width.
 - 4) Low Temperature Flexibility: ASTM D 1970 - Unaffected to -43 degrees C (-45 degrees F).
 - 5) Tensile Strength: ASTM D 412, Die C Modified, Min. 2.7 MPa (400 psi).
 - 6) Elongation, Ultimate Failure of Rubberized Asphalt: ASTM D 412 - Die C - Min. 200%.
 - e. Acceptable products:
 - 1) Henry product: "Blueskin SA".
 - 2) Carlisle product: "CCW-705 Vapor/Air Barrier System".
 - 3) Grace product: "Perm-A-Barrier Wall Membrane (Air & Vapor Barrier)".
 - 4) Tremco product: "ExoAir 110" or "ExoAir 110LT" (low temperature), as recommended by manufacturer for field conditions present at time of installation.
 - B. Surface conditioner, liquid membrane tape, crack filler, mastics, and accessories as recommended by the sheet membrane manufacturer and comply with the following:
 1. Description: Latex-based, water-dispersible liquid for substrate preparation.
 - a. Flash Point: No flash to boiling point.
 - b. Solvent Type: Water.
 - c. VOC Content: Not to exceed 350 g/l.
 - d. Application Temperature: -4 degrees C (25 degrees F) and above.
 - e. Freeze/Thaw Stability: 5 cycles min.
 - f. Freezing point (as packaged): -20 degrees C (-5 degrees F).
 - g. Acceptable products
 - 1) Grace Product: "Perm-A-Barrier Surface Conditioner".
 - C. Termination Mastic: Rubberized asphalt-based mastic with 200 g/l max. VOC Content.
 1. Acceptable Products:
 - a. Grace product: "Bituthene Mastic".
 - b. Carlisle product: "CCW-704".
 - c. Henry product: "Air-Bloc 21".
 - d. Tremco product "ExoAir Termination Mastic".
 - D. Primer: Rubber-based primer in solvent with 680 g/l max. VOC content.
 1. Acceptable Products:
 - a. Grace product: "Bituthene P-3000" Primer.
 - b. Carlisle product: "CCW-702" or "CCW-714" as recommended by manufacturer.
 - c. Henry product: "Blueskin Primer", "Aquaprime" or "Aquatek" as recommended by manufacturer.
 - d. Tremco product: "ExoAir 10 Primer".
- ## 2.4 ACCESSORIES
- A. Transition Aluminum Membrane: 0.9 mm (35 mils) of self-adhesive rubberized asphalt integrally bonded to 0.1 mm (5 mil) of aluminum film to provide a min. 1.0 mm (40 mil) thick membrane. Membrane shall be interleaved with disposable silicone-coated release paper until installed, and comply with the following:
 1. Water Absorption, ASTM D570: max 0.1% by weight

2. Puncture Resistance, ASTM E154: 355N (80 lbs) min.
 3. Lap Adhesion at -4°C (25°F), ASTM D1876 Modified: 880 N/m (5.0 lbs./in.) of width
 4. Low Temperature Flexibility, ASTM D1970 Modified: Unaffected to -26°C (-15°F)
 5. Tensile Strength, ASTM D412, Die C Modified: min. 4.1 MPa (600 Psi)
 6. Elongation, Ultimate Failure of Rubberized Asphalt: ASTM D412, Die C Modified: min. 200%
- B. Flexible membrane: Minimum 1 mm (.040 inch) thick membrane comprised of 0.8 mm (0.032 inch) of self-adhesive rubberized asphalt integrally bonded to 0.2 mm (.008 in) of cross-laminated, high-density polyethylene film. Membrane shall be interleaved with disposable silicone-coated release paper until installed, and comply with the following:
1. Water Vapor Transmission, ASTM E 96, Method B: 2.9 ng/m²sPa (0.05 perms) max.
 2. Water Absorption, ASTM D 570: max. 0.1% by weight
 3. Puncture Resistance, ASTM E 154: 356 N (80 lbs.) min.
 4. Tear Resistance
 - a. Initiation ASTM D 1004: min. 58 N (13.0 lbs.) M.D.
 - b. Propagation ASTM D 1938: min. 40 N (9.0 lbs.) M.D.
 5. Lap Adhesion at -4°C (25°F), ASTM D 1876: 880 N/m (5.0 lbs./in.) of width
 6. Low Temperature Flexibility, ASTM D 1970: Unaffected to -43°C (-45°F)
 7. Tensile Strength, ASTM D 412, Die C Modified: min. 5.5 MPa (800 psi)
 8. Elongation, Ultimate Failure of Rubberized Asphalt, ASTM D412, Die C: min. 200%
- C. Preformed Silicone-Sealant Extrusion / Transition Strip System: Manufacturer's standard preformed extruded pre-engineered pre-cured, low-modulus silicone-rubber extrusion, sized to fit opening widths, with a single-component, neutral-curing, 40 durometer. Class 100/50 (low-modulus) translucent silicone sealant for bonding extrusions to substrates, with a lock-in dart designed to fit pressure bar race conditions
1. Basis of Design: Tremco Commercial Sealants & Waterproofing, Beachwood, OH. Product: "Proglaze ETA, System 3".
 - a. Width: As required by field conditions.
 - b. Acceptable Products: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - 1) Dow Corning Corporation, Midland MI., product: "123 Silicone Seal".
 - 2) Momentive Performance Materials, Inc., (GE Silicones), Waterford NY., product: "US11000 UltraSpan".
 - 3) Pecora Corporation, Harleysville PA., product: "Sil-Span".
 - 4) Tremco Commercial Sealants & Waterproofing, Beachwood, OH. Product: "Proglaze ETA, System 3".
- D. Lap Sealant: Manufacturer's Two-part, elastomeric, trowel grade material designed for use with self-adhered membranes and tapes 10 g/l max. VOC Content.
1. Lap Sealant for terminations within 12 inches of fenestration assemblies to receive silicone sheet transition membrane:
 2. Silicone sealant compatible with rubberized asphalt, and approved by both the sealant manufacturer and air barrier manufacturer for use as a lap sealant. Basis of design Dow 758 Silicone Weather Barrier Sealant.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Inspect all surfaces and verify that they are in proper condition to receive the work of this Section.
1. Verify items which penetrate surfaces to receive air barrier and vapor barrier are rigidly installed.

2. Verify surfaces are free of cracks, depressions, waves, or projections which may be detrimental to successful installation.
3. Concrete Masonry Substrates: Notify the Construction Manager in writing if concrete unit masonry substrate requires filling of voids and holes greater than ½ inch, gaps and joints exceeding ¼ inch, or surface irregularities greater than ¼ inch, or other corrections required by Section 04 20 00 – Unit Masonry, for application of air barrier over concrete unit masonry.
4. Concrete Substrates: Notify the Contractor in writing if concrete substrate requires patching of holes over 1/2 inch in diameter or length and over 1/4 inch deep, by Section 03 30 00 - Cast-in-Place Concrete. Do not proceed until patching is completed.
5. Do not apply air barrier and vapor barrier system to damp, frozen, dirty, dusty or surfaces unacceptable to membrane manufacturer.
6. Examine joints and transitions to other building materials. Verify surfaces and size of transitions are suitable for products specified herein.
7. Report in writing defects in substrates which may adversely affect the performance of the air and vapor barrier.
8. Beginning of installation means acceptance of existing substrate and project conditions.

3.2 PREPARATION

- A. Perform all preparation work on receiving surfaces as required, including removal of fins, scaling, and projecting rough spots. Remove all dirt, oil, and other foreign matter from the concrete surfaces. Clean substrate surfaces (broom, vacuum or compressed air) to remove dust, loose stones and debris.
- B. All masonry joints shall be filled and struck flush with the face of masonry and limestone, using a 3:1 mix of sharp sand and Portland cement mixed with a one part bonding agent to five parts water, and allowed to cure.
- C. Apply primer as recommended by manufacturer at a rate of 250 to 350 square feet per gallon; Prime only the area which will be covered with membrane in a working day, areas not covered with membrane in 24 hours must be reconditioned.
- D. Prepare inside corners by installing a fillet of liquid membrane, latex modified cement mortar or epoxy mortar, extend 6 inches in all directions beyond the corner.
- E. Cracks and joints in substrate surface must be properly sealed with waterstop, joint filler and sealant as recommended by the sheet membrane waterproofing manufacturer.

3.3 APPLICATION

- A. Perform the application of the sheet membrane air barrier and vapor barrier system in strict accordance with the manufacturer's installation specifications, details, and recommendations, and as specified herein.
- B. Condition and prime substrate surfaces:
 1. When required by dirty or dusty site conditions; by surfaces having irregular or rough texture, or if it becomes difficult to adhere the air and vapor barrier to the substrate, apply surface conditioner by spray, brush, or roller at the rate recommended by manufacturer, prior to membrane installation. Allow surface conditioner to dry completely before membrane application.
 2. Apply a bead or trowel coat of mastic along membrane edges, seams, cuts, and penetrations.
 3. Apply primer by brush or heavy nap, natural-material roller at rate recommended by manufacturer prior to membrane installation. Allow primer to dry completely before membrane application.
- C. Application of Membrane:
 1. Precut pieces of air & vapor barrier into easily-handled lengths.
 2. Remove silicone-coated release paper and position membrane carefully before placing length horizontally against the surface.

3. Begin installation at the base of the wall placing top edge of membrane immediately below any masonry reinforcement or ties protruding from substrate.
4. When properly positioned, place against surface by pressing firmly into place. Roll membrane with extension-handled countertop roller immediately after placement.
5. Overlap horizontally-adjacent pieces 2 inches [50 mm] and roll seams.
6. Subsequent sheets of membrane applied above shall be positioned immediately below masonry reinforcement or ties. Bottom edge shall be slit to fit around reinforcing wires or ties, and membrane shall overlap the membrane sheet below by 2 inches [50 mm]. Roll firmly into place.
7. Seal around masonry reinforcing or ties and all penetrations with termination mastic.
8. Continue the membrane into all openings in the wall, such as doors, windows, and terminate at points that will prevent visibility from interior.
9. Coordinate the installation of air & vapor barrier with roof installer to ensure continuity of membrane with rooftop air & vapor membrane.
10. At end of each working day seal top edge of air & vapor barrier to substrate with termination mastic.
11. Do not allow the rubberized asphalt surface of the air & vapor barrier membrane to come in contact with polysulfide sealants, creosote, uncured coal tar products or EPDM.

3.4 INTERFACE WITH OTHER WORK

- A. Connect and seal exterior wall air-barrier membrane continuously to roofing-membrane air barrier, concrete below-grade structures, floor-to-floor construction, exterior glazing and window systems, glazed curtain-wall systems, storefront systems, exterior louvers, exterior door framing, and other construction used in exterior wall openings, using accessory materials.
- B. Coordinate the work of this Section with installation of curtainwall, storefront and door frames. Ensure air and vapor barrier transitions from curtain wall, storefront and door frames is completed with specified silicone sheet tie-ins.
- C. Provide compatible lap sealant over all membrane laps and terminations within 12 inches of window, curtainwall, storefront, door frames, louvers, and similar envelope openings, to silicone sheet tie-ins.
- D. Silicone sheet transition tie-ins: Install silicone transition sheet following manufacturer's instructions and recommendations, and as additionally specified herein:
 1. Preparation: Solvent wipe clean with isopropyl alcohol (IPA) using a clean, white, lint-free rag of all surfaces to receive silicone sheet transition strip from all dirt, debris, and contaminants that may affect the bond of performance of the sealant and silicone sheet. Dry wipe using a clean, white, lint-free rag.
 2. Use manufacturer's pre-made corners where applicable.
 3. Lap sheets to shed water, and seal all laps and transitions.
 4. Bed silicone transition sheet in a minimum 1 inch bed of approved sealant. Sealant shall extend to the outboard edge of the silicone sheet, and the counterflash from the wall AVWB onto the face of the silicone sheet.
 5. Bed silicone sheet into sealant in the glazing pocket of curtain wall framing. If the silicone sheet has a dart, fully engage dart into receiver in curtain wall system. Counterflash edge of silicone sheet with sealant such that the sealant extends from the curtain wall framing onto the face of the silicone sheet. Provide continuous pressure against silicone sheet with curtain wall framing components.
 6. Transitions shall be subjected to all testing conducted for air, vapor and water barriers, as well as all fenestration testing for fenestrations to which the silicone sheet is applied.

3.5 FIELD QUALITY CONTROL

- A. Field inspection will be performed under the provisions of Section 01 45 00 - Quality Control.
 1. Fully inspect air and vapor barrier installation, including transitions, prior to enclosing. Repair punctures, damaged areas and inadequately lapped seams with a patch of the

membrane sized to extend 6 inches [150 mm] in all directions from the perimeter of the affected area.

3.6 CLEANING

- A. Daily clean work areas by sweeping and disposing of debris, and scraps.

3.7 PROTECTION

- A. Protect finished work under provisions of Section 01 50 00 - Temporary Facilities and Controls.
- B. Do not expose air and vapor barrier membrane to sunlight for more than thirty days prior to enclosure.
- C. Protect installed membrane from all deleterious environmental conditions, and damage from construction. Maintain warrantable product with respect to Manufacturer's requirements; maintain "as new condition" until covered.

END OF SECTION

SECTION 074213.23
METAL COMPOSITE MATERIAL WALL PANELS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Exterior curtain wall system consisting of formed metal composite material (MCM) sheet, framing, secondary supports, and anchors to structure.
- B. Matching flashing and trim.

1.2 RELATED REQUIREMENTS

- A. Section 076200 - Sheet Metal Flashing and Trim: Metal flashing components integrated with this wall system.

1.3 REFERENCE STANDARDS

- A. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2017a.
- B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- C. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
- D. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.
- E. ASTM A276/A276M - Standard Specification for Stainless Steel Bars and Shapes; 2017.
- F. ASTM A480/A480M - Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip; 2017.
- G. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2017.
- H. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.
- I. ASTM A792/A792M - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process; 2010 (Reapproved 2015).
- J. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2021.
- K. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.
- L. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2013.
- M. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.
- N. ASTM D1781 - Standard Test Method for Climbing Drum Peel for Adhesives; 1998 (Reapproved 2012).
- O. ASTM D1929 - Standard Test Method for Determining Ignition Temperature of Plastics; 2016.
- P. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2018.
- Q. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components; 2012.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Meeting: Convene one week before starting work of this section to verify project requirements, coordinate with installers of other work, establish condition and

completeness of building substrate, and review manufacturers' installation instructions and warranty requirements.

1. Require attendance by the installer and relevant sub-contractors.
2. Include MCM sheet manufacturer's representative and wall system manufacturer's representative to review storage and handling procedures.
3. Review in detail truck transportation, parking, vertical transportation, schedule, personnel, installation of adjacent materials and substrate.
4. Review procedures for protection of work and other construction.

1.5 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data - MCM Sheets: Manufacturer's data sheets on each product to be used, including thickness, physical characteristics, and finish, and:
 1. Finish manufacturer's data sheet showing physical and performance characteristics.
 2. Storage and handling requirements and recommendations.
 3. Fabrication instructions and recommendations.
 4. Specimen warranty for finish, as specified herein.
- C. Product Data - Wall System: Manufacturer's data sheets on each product to be used, including:
 1. Physical characteristics of components shown on shop drawings.
 2. Storage and handling requirements and recommendations.
 3. Installation instructions and recommendations.
 4. Specimen warranty for wall system, as specified herein.
- D. Shop Drawings: Show layout and elevations, dimensions and thickness of panels, connections, details and location of joints, sealants and gaskets, method of anchorage, support clips, exposed fasteners, number of anchors, supports, reinforcement, trim, flashings, and accessories.
 1. Indicate panel numbering system.
 2. Differentiate between shop and field fabrication.
 3. Indicate substrates and adjacent work with which the wall system must be coordinated.
 4. Include large-scale details of anchorages and connecting elements.
 5. Include large-scale details or schematic, exploded or isometric diagrams to fully explain flashing at a scale of not less than 1-1/2 inches per 12 inches (1:10).
 6. Include design engineer's stamp or seal on shop drawings for attachments and anchors.
- E. Selection Samples: For each finish product specified, submit at least three sample color chips representing manufacturer's standard range of available colors and patterns.
- F. Certificate: Certify that the work results of this section meet or exceed specified requirements.
- G. Design Data: Submit structural calculations stamped by design engineer, for Architect's information and project record.
- H. Test Report: Submit report of full-size mock-up tests for air infiltration, water penetration, and wind performance.
- I. Test Report: Submit test report verifying compliance with NFPA 285 for previously-tested exterior wall assembly.
- J. Manufacturer's Field Reports: Provide within 48 hours of field review. State what was observed and what changes, if any, were requested or required.
- K. Designer's qualification statement.
- L. Manufacturer's qualification statement.
- M. Installer's qualification statement.
- N. Testing agency's qualification statement.

- O. Maintenance Data: Care of finishes and warranty requirements.
- P. Executed Warranty: Submit warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
- Q. Warranty Documentation for Installation of Building Rainscreen Assembly: Submit installer warranty and ensure that forms have been completed in Owner's name and registered with installer.

1.6 QUALITY ASSURANCE

- A. Design Engineer's Qualifications: Design structural supports and anchorages under direct supervision of a Structural Engineer experienced in design of this type of work and licensed in the State in which the Project is located.
- B. Manufacturer Qualifications: Company specializing in manufacturing wall panel systems specified in this section.
- C. Installer Qualifications: Company specializing in performing work of the type specified in this section.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products in manufacturer's original, unopened, undamaged containers with identification labels intact.
 - 1. Protect finishes by applying heavy-duty removable plastic film during production.
 - 2. Package for protection against transportation damage.
 - 3. Provide markings to identify components consistently with drawings.
 - 4. Exercise care in unloading, storing, and installing panels to prevent bending, warping, twisting, and surface damage.
- B. Store products protected from exposure to harmful weather conditions and at temperature conditions recommended by manufacturer.
 - 1. Store in well-ventilated space out of direct sunlight.
 - 2. Protect from moisture and condensation with tarpaulins or other suitable weathertight covering installed to provide ventilation.
 - 3. Store at a slope to ensure positive drainage of accumulated water.
 - 4. Do not store in enclosed space where ambient temperature can exceed 120 degrees F (49 degrees C).
 - 5. Avoid contact with other materials that might cause staining, denting, or other surface damage.

1.8 WARRANTY

- A. See Section 017800 - Closeout Submittals for additional warranty requirements.
- B. Correct defective work within a five year period after Date of Substantial Completion, including defects in water tightness and integrity of seals for insulated metal wall panel systems.
- C. Correct defective work within a five year period after Date of Substantial Completion for degradation of panel finish, including color fading caused by exposure to weather.
- D. Installation Warranty for Building Rainscreen Assembly: Installer of exterior rainscreen assembly (including air/vapor barrier and attachments, framing, and exterior panels) to provide 10-year warranty that includes coverage for defective materials and/or workmanship. This warranty will also clearly include materials, labor, necessary activity to access these areas, and removal of any materials to effect repairs and restore to watertight conditions; [www.edacontractors.com/#sle.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Metal Composite Material (MCM) Sheet Manufacturers:
 - 1. ALUCOBOND USA; ALUCOBOND PLUS: www.alucobondusa.com/#sle.

2. Alcotex, Inc; Alcotex PE - Aluminum Composite Material (ACM): www.alcotex.com/#sle.
3. Alfrex, LLC; Alfrex fr: www.alfrexusa.com/#sle.
4. ALPOLIC Materials; ALPOLIC/fr (Fire Retardant core): www.alpolic-america.com/#sle.
5. Alucoil North America LLC; larson by Alucoil, FR Core (fire resistant):
www.alucoilnorthamerica.com/#sle.
6. ATAS International, Inc; SterraCore: www.atas.com/#sle.
7. Citadel Architectural Products, Inc; Envelope 2000: www.citadelap.com/#sle.
8. Fairview Architectural LLC; VitraBond (Fire Rated): www.fairview-na.com/#sle.
9. Substitutions: See Section 016000 - Product Requirements.

2.2 WALL PANEL SYSTEM

- A. Wall Panel System: Metal panels, fasteners, and anchors designed to be supported by framing or other substrate provided by others; provide installed panel system capable of maintaining specified performance without defects, damage, or failure.
 1. Provide structural design by or under direct supervision of a Structural Engineer licensed in the State in which the Project is located.
 2. Provide panel jointing and weatherseal using a "wet", sealant-sealed system.
 3. Anchor panels to supporting framing without exposed fasteners.

2.3 PERFORMANCE REQUIREMENTS

- A. Thermal Movement: Provide for free and noiseless vertical and horizontal thermal movement due to expansion and contraction under material temperature range of minus 20 degrees F (minus 29 degrees C) to 180 degrees F (82 degrees C) without buckling, opening of joints, undue stress on fasteners, or other detrimental effects; allow for ambient temperature at time of fabrication, assembly, and erection procedures.

2.4 MATERIALS

- A. Metal Composite Material (MCM) Sheet: Two sheets of aluminum sandwiching a core of extruded thermoplastic material; no foamed insulation material content.
 1. Overall Sheet Thickness: 0.118 inch (3 mm), minimum.
 2. Bond and Peel Strength: No adhesive failure of the bond between the core and the skin nor cohesive failure of the core itself below 22.4 inch-pound/inch (100 N-mm/mm) with no degradation in bond performance, when tested in accordance with ASTM D1781, simulating resistance to panel delamination, after 8 hours of submersion in boiling water and after 21 days of immersion in water at 70 degrees F (21 degrees C).
 3. Surface Burning Characteristics: Flame spread index of 25, maximum; smoke developed index of 450, maximum; when tested in accordance with ASTM E84.
 4. Flammability: Self-ignition temperature of 650 degrees F (343 degrees C) or greater when tested in accordance with ASTM D1929.
- B. Metal Framing Members: Include sub-girts, zee-clips, base and sill angles and channels, hat-shaped and rigid channels, and furring channels required for complete installation.
 1. Provide material strength, dimensions, configuration as required to meet the applied loads applied and in compliance with applicable building code.
 2. Sheet Steel Components: ASTM A653/A653M galvanized to G90/Z275 or zinc-iron alloy-coated to A60/ZF180; or ASTM A792/A792M aluminum-zinc coated to AZ60/AZM180.
 3. Stainless Steel Sheet Components: ASTM A480/A480M.
 4. Aluminum Components: ASTM B209/B209M; or ASTM B221 (ASTM B221M).

2.5 FINISHES

- A. Fluoropolymer Coil Coating System: Polyvinylidene fluoride (PVDF) multi-coat superior performing organic coatings system complying with AAMA 2605, including at least 70 percent PVDF resin, with at least 80 percent of coil coated aluminum surfaces having minimum total dry film thickness (DFT) of 0.9 mils, 0.0009 inch (0.023 mm); color and gloss as selected by Architect from manufacturer's standard line.

1. Manufacturers:
 - a. PPG; Duranar: www.ppgmetalcoatings.com/#sle.
 - b. Sherwin-Williams Company; Fluropon: www.coil.sherwin.com/#sle.

2.6 ACCESSORIES

- A. Flashing: Sheet aluminum; 0.040 inch (1.0 mm) thick, minimum; finish and color to match MCM sheet; see Section 076200 for additional requirements.
- B. Cladding Support Clips: Thermally-broken, galvanized steel clips for support of cladding z-girts, angles, channels and other framing.
 1. Galvanized Steel Sheet: ASTM A653/A653M, with G90/Z275 galvanized coating.
 2. Manufacturers:
 - a. Northern Facades; ISO Clip: www.northernfacades.com/#sle.
 - b. Substitutions: See Section 016000 - Product Requirements.
- C. Anchors, Clips, and Accessories: Use one of the following:
 1. Stainless steel complying with ASTM A276/A276M, ASTM A480/A480M, or ASTM A666.
 2. Steel complying with ASTM A36/A36M and hot-dipped zinc coating to ASTM A153/A153M.
 3. Steel complying with ASTM A36/A36M and hot-dipped galvanized coating to ASTM A123/A123M, Coating Grade 10.
- D. Fasteners:
 1. Exposed Fasteners: Stainless steel; permitted only where absolutely unavoidable and subject to prior approval of the Architect.
 2. Screws: Self-drilling or self-tapping Type 410 stainless steel or zinc-alloy steel hex washer head, with EPDM or PVC washer under heads of fasteners bearing on weather side of metal wall panels.
 3. Bolts: Stainless steel.
 4. Fasteners for Flashing and Trim: Blind fasteners of high-strength aluminum or stainless steel.
- E. Joint Sealer: Provide color to match wall panels silicone sealant of type approved by MCM sheet manufacturer, and in compliance with ASTM C920.
- F. Provide panel system manufacturer's and installer's standard corrosion resistant accessories, including fasteners, clips, anchorage devices, and attachments.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine dimensions, tolerances, and interfaces with other work.
- B. Examine substrate on-site to determine that conditions are acceptable for product installation in accordance with manufacturer's written instructions.
- C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- D. Notify Architect in writing of conditions detrimental to proper and timely completion of work, and do not proceed with erection until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Do not install products that are defective, including warped, bowed, dented, and broken members, and members with damaged finishes.
- B. Comply with instructions and recommendations of MCM sheet manufacturer and wall system manufacturer, as well as with approved shop drawings.
- C. Install wall system securely allowing for necessary thermal and structural movement; comply with wall system manufacturer's instructions for installation of concealed fasteners.

- D. Do not handle or tool products during erection in manner that damages finish, decreases strength, or results in visual imperfection or failure in performance. Return component parts that require alteration to shop for refabrication, if possible, or for replacement with new parts.
- E. Do not form panels in field unless required by wall system manufacturer and approved by the Architect; comply with MCM sheet manufacturer's instructions and recommendations for field forming.
- F. Separate dissimilar metals; use gasket fasteners, isolation shims, or isolation tape where needed to eliminate possibility of electrolytic action between metals.
- G. Where joints are designed for field-applied sealant, seal joints completely with specified sealant.
- H. Install flashings as indicated on shop drawings. At flashing butt joints, provide a lap strap under flashing and seal lapped surfaces with a full bed of non-hardening sealant.
- I. Install square, plumb, straight, and true, accurately fitted, with tight joints and intersections maintaining the following installation tolerances:
 - 1. Variation From Plane or Location: 1/2 inch in 30 feet (10 mm in 10 m) of length and up to 3/4 inch in 300 feet (20 mm in 100 m), maximum.
 - 2. Deviation of Vertical Member From True Line: 0.1 inch in 25 feet (3 mm in 9 m) run, maximum.
 - 3. Deviation of Horizontal Member From True Line: 0.1 inch in 25 feet (3 mm in 9 m) run, maximum.
 - 4. Offset From True Alignment Between Two Adjacent Members Abutting End To End, In Line: 0.03 inch (0.75 mm), maximum.
- J. Replace damaged products.

3.3 FIELD QUALITY CONTROL

- A. See Section 014000 - Quality Requirements for additional requirements.
- B. Wall System Manufacturer's Field Services: Provide field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with instructions.

3.4 CLEANING

- A. Ensure weep holes and drainage channels are unobstructed and free of dirt and sealants.
- B. Remove protective film after installation of joint sealers, after cleaning of adjacent materials, and immediately prior to completion of work.
- C. Remove temporary coverings and protection of adjacent work areas.
- D. Clean installed products in accordance with manufacturer's instructions.

3.5 PROTECTION

- A. Protect installed panel system from damage until Date of Substantial Completion.

END OF SECTION

SECTION 075423
TPO MEMBRANE ROOFING SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

- A. Provide all labor, material, tools, equipment, and supervision necessary to complete the installation of the Sure-Weld reinforced TPO (Thermoplastic Polyolefin) membrane Mechanically Fastened-Induction Welded 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 cost proposal.
- 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.
- E. Complete roofing system shall be furnished and installed in strict compliance with the Owner's loss prevention insurance carrier's requirements.

1.2 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. 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 fasteners are capable of providing a static backout resistance of 10 inch pounds minimum is required.
 - 5. Certification from the membrane manufacturer indicating the membrane thickness over the reinforcing scrim (top ply membrane thickness) is nominal .15-mil or thicker.
 - 6. 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.

1.3 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 the original undisturbed plastic wrap in a cool, shaded area and cover with light-colored, breathable, waterproof tarpaulins. Sure-Weld membrane that has been exposed to the elements for approximately 7 days must be prepared with Carlisle 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.

1.4 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 any completed sections of the membrane system.
- B. Do not disrupt activities in occupied spaces.

1.5 EXISTING CONDITIONS

- A. 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.

1.6 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, either by 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 materials and return the job site to its original condition upon completion of the work.

1.7 SAFETY

- A. 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.

1.8 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.

1.9 JOB CONDITIONS, CAUTIONS AND WARNINGS

- A. Refer to manufacturer's roofing system specification for General Job Site Considerations.
- B. Safety Data Sheets (SDS) must be on location at all times during the transportation, storage and application of materials.
- C. 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.
- D. When loading materials onto the roof, the manufacturer's authorized roofing applicator must comply with the requirements of the building owner to prevent overloading and possible disturbance to the building structure.
- E. 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.
- F. 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.
- G. 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.
- H. 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.
- I. New roofing shall be complete and weathertight at the end of the work day.
- J. Contaminants such as grease, fats and oils shall not be allowed to come in direct contact with the roofing membrane.

1.10 WARRANTY

- A. Provide manufacturer's Total System Warranty covering both labor and material with no dollar limitation. Certification is required with bid submittal indicating the manufacturer has reviewed and agreed to such wind coverage.
 - 1. Warranty shall provide coverage for uplift created by maximum wind speed of 72 miles per hour (measured 10 meters above grade).
 - 2. Warranty Length: 20 years.
 - 3. A Reflectivity Warranty Amendment is available indicating the membrane will meet the Energy Star program reflectivity guidelines for both new and aged membrane for a period of 10 years.
 - 4. Pro-rated System Warranties shall not be accepted.
 - 5. Evidence of the manufacturer's warranty reserve shall be included as part of the project submittals for the specifier's approval.

PART 2 - PRODUCTS

2.1 GENERAL

- A. All components of the specified roofing system shall be single sourced or accepted by manufacturer as compatible.
- B. All products (including insulation, fasteners, fastening plates, prefabricated accessories and edgings) must be manufactured and/or supplied by the roofing system manufacturer and covered by the warranty.
- C. Performance Requirements:
 - 1. Wind Loading: Panels and installation shall be designed to conform to Vermont State Building Code for basic wind speed, (3 second gust).

2. Additional Wind Uplift Performance Requirements: Design and construct roofing to in accordance with requirements of Owner's loss prevention insurance carrier's requirements.

2.2 MEMBRANE

- A. Basis of Design: Carlisle SynTec Systems, <https://www.carlislesyntec.com>.
- B. Furnish and install membrane system equal to Carlisle, "RhinoBond TPO"
 1. Furnish and install membrane system equal to Carlisle, "RhinoBond TPO" 60-mil thick white reinforced TPO (Thermoplastic Polyolefin) membrane with Protective Film as needed to complete the roofing system.

2.3 INSULATION/UNDERLAYMENT

- A. When applicable, insulation shall be installed in multiple layers. The first and second layer of insulation shall be mechanically fastened to the substrate in accordance with the manufacturer's published specifications.
- B. Recovery board shall be Dens-Deck Prime or Securock.
- C. Insulation shall be polyisocyanurate insulation board: Rigid-roof insulation panel composed of a closed-cell polyisocyanurate foam core bonded on each side to fiber-reinforced paper facers.
 1. B.O.D: Carlisle HP-H Polyiso.

2.4 ADHESIVES AND CLEANERS

- A. General: All products shall be sole sourced and specifically formulated for the intended purpose.
- B. Adhesive: High-strength, synthetic rubber adhesive used for bonding membrane to various surfaces. The adhesive is applied to both the membrane and the substrate at a coverage rate of approximately 60 square feet per gallon per finished surface (includes coverage on both surfaces).
 1. B.O.D: Sure-Weld TPO Bonding Adhesive.
- C. 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.
- D. 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).
- E. 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.
- F. 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.
- G. 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).
- H. TPO Low VOC Primer: A solvent-based, low solids primer used to prepare the surface of the 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.

2.5 FASTENERS AND PLATES

- A. General: To be used for mechanical attachment of insulation and to provide additional membrane securement: delete the fastener and fastening plate types which will not be used

- B. HP-X Fasteners: A heavy duty #15 threaded fastener with a #3 phillips drive used for membranre or insulation securement into steel, wood plank or minimum 15/32 inch thick plywood.
- C. 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.
- D. Welding Plate: A 3" diameter, 0.028" thick, corrosion-resistant steel plate with high solids coating on the top surface. The plate is secured with Carlise's HP-X Fastener or Purlin Fastener and the membrane is welded to the top surface using the RhinoBond or Isoweld Induction Welding Tool.
- E. Sure-Weld Pressure-Sensitive RUSS™ (Reinforced Universal Securement Strip): a 6" wide, nominal 45-mil thick reinforced TPO membrane with 3" wide Pressure Sensetive Tape laminated along one edge. The 6" wide Pressure-Sensitive RUSS is used horizontally at the base of walls, curbs, etc., in conjunction with 2" diameter Seam Fastening Plates below the TPO deck membrane for additional membrane securement.
 - 1. 6" wide Pressure-Sensitive RUSS is used horizontally or vertically at the base of walls, curbs, etc., in conjunction with PiranhaFastening Plates below the TPO deck membrane for additional membrane securement.

2.6 METAL EDGING AND MEMBRANE TERMINATIONS

- A. General: All metal edging s shall be tested and meet ANSI/SPRI ES-1 standards and comply with International Building Code.
- B. Coping/fascia:
 - 1. SecurEdge 400: ANSI/SPRI ES-1 certified coping or fascia, snap-on edge system consisting of a 22 gauge galvanized metal water dam and .040" thick aluminum, Kynar 500 finish or 24 gauge steel, Kynar 500 finish. Metal fascia color shall be as selected by the Architect from manufacturer's full range of available color options.
 - 2. SecurEdge 4000: ANSI/SPRI ES-1 certified metal fascia system with a 20 gauge steel retainer bar and .040" thick aluminum, Kynar 500 or 24 gauge steel, Kynar 500 finish fascia. Metal fascia color shall be as selected by the Architect from manufacturer's full range of available color options.
- C. 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.

2.7 WALKWAYS

- A. 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.

2.8 AIR AND VAPOR BARRIER

- 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 100' and the product is applied after priming an acceptable substrate with CCW 702, 702-LV, Cav-Grip or Cav-Grip III primer.

2.9 ACCESSORIES

- A. Flexible flashing: B.O.D: "Sure-Weld TPO Non-Reinforced Flashing".
- B. Pre-formed flashings for pipes 3/4" (19.0 mm) to 8" (203.2 mm) in diameter: B.O.D: "Sure-Weld Pipe Seals".
- C. Sealant pockets: B.O.D: "Sure-Weld TPO Molded Sealant Pockets".
- D. Outside corner seals: B.O.D: "Sure-Weld TPO Outside Corners".
- E. Inside corner seals: B.O.D: "Sure-Weld TPO Inside Corners".

PART 3 - EXECUTION

3.1 GENERAL

- A. Comply with the manufacturer's published instructions for the installation of the membrane roofing system including proper substrate preparation, jobsite considerations and weather restrictions.
- B. Position sheets to accommodate contours of the roof deck and shingle splices to avoid bucking water.

3.2 VAPOR RETARDERS

- A. In the generally temperate climate of the United States, during the winter months, water vapor flows upward from a heated, more humid interior toward a colder, drier exterior. Vapor retarders are more commonly required in northern climates than in southern regions, where downward vapor pressure may be expected and the roofing membrane itself becomes the vapor retarder.
- B. On cold storage/freezer facilities, the perimeter details must be selected to provide an air seal and prevent outside air from infiltrating and condensing within the roofing assembly.
- C. Consult the latest publications by ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.) and NRCA (National Roofing Contractors Association) for specific information.
- D. If insulation is to be adhered to the vapor retarder with FAST or Flexible FAST Adhesive, the 725TR vapor retarder must be compatible and shall be fully adhered to the substrate. Available products include Carlisle supplied "peel and stick" rubberized asphalt membrane with compatible film coating (Carlisle VapAir Seal 725TR Air and Vapor Barrier), and spray or roller applied butyl coatings. Installation requirements for Carlisle's VapAir Seal 725TR Air and Vapor Barrier are identified in Carlisle published specification.
- E. VapAir Seal 725TR Installation:
 - 1. Surface Preparation: Concrete shall be in place for 7 days minimum and the substrate must be dry. The surface shall have a smooth finish and be free of voids, spalled areas, sharp protrusions, loose aggregate, laitance and form release agents. In the event of rain, concrete must be allowed to dry before primer is applied.
 - 2. Primer: Surfaces to receive Carlisle VapAir Seal 725TR Air and Vapor Barrier must be clean and dry. Prime with CCW 702 or 702LV or Cav-Grip III Primer. Apply Primer by spray, brush or with a long nap roller at the applicable coverage rate noted above. At 75° F allow primer to dry 1 hour minimum. Primer has a satisfactory cure when it will not transfer when touched. Prime only areas to be waterproofed the same day. Re-prime if area becomes dirty.
 - 3. Application: Apply Carlisle VapAir Seal 725TR Air and Vapor Barrier from low to high point, in a shingle fashion, so that laps will shed water. Overlap all edges at least 2-1/2". End laps shall be staggered. Place membrane carefully so as to avoid wrinkles and fishmouths. Immediately after installation, roll with a 150 pound segmented steel roller.
 - 4. Insulation Installation: Ensure surface of Carlisle VapAir Seal 725TR Air and Vapor Barrier is dry prior to installing insulation. Place insulation over the surface and mechanically fasten to the roof deck or adhere to the vapor barrier with FAST or Flexible FAST Adhesive in accordance with this Carlisle Specification.
- F. For metal decks, VapAir Seal MD Air and Vapor Barrier is specifically designed for direct application to fluted steel decks. It may also be used in conjunction with either Carlisle's CAV-GRIP III on vertical wall surfaces, such as structural concrete, gypsum, Securock, DensDeck Prime and plywood substrates.

3.3 INSULATION PLACEMENT AND ATTACHMENT

- A. Install insulation or membrane underlayment over the substrate with boards butted tightly together with no joints or gaps greater than 1/4 inch. Stagger joints both horizontally and vertically if multiple layers are provided.
- B. Secure insulation to the substrate with the required Carlisle fasteners and RhinoBond or Isoweld TPO Welding Plate in accordance with manufacturers specifications.
 - 1. Note: Depending on building code, wind loads, or air / vapor design criteria, additional insulation attachment may be required and clarified by membrane manufacture.

3.4 INDUCTION TOOL CALIBRATION

- A. Prior to proceeding with membrane attachment to the plate, the RhinoBond or Isoweld Induction Tool must be calibrated. Follow calibration process as published by manufacture with the specified insulation thickness and type and specified membrane thickness.

3.5 MEMBRANE PLACEMENT AND INDUCTION WELDING

- A. After placement of insulation on substrate, secure the insulation at a rate of six HP-X Fasteners and RhinoBond or Isoweld Plates per 4' x 8' board in the designated field and eight HP-X Fasteners and RhinoBond or Isoweld Plates around the perimeter. Refer to appropriate Carlisle detail for patterns and depth of perimeter area.
 - 1. Note: Avoiding fastener overdrive to prevent plate from deforming.
- B. Place Sure-Weld membrane over the appropriate RhinoBond or Isoweld Plates and allow membrane to relax.
- C. Place RhinoBond Induction Tool over the RhinoBond TPO Welding Plate, under the roofing membrane.
 - 1. OR
 - 2. Place the Isoweld Induction Tool over the Isoweld TPO Welding Plate, until the acoustic search mode signals the inductor is properly positioned.
- D. Activate induction welding tool and leave in place until heating cycle is complete.
- E. Immediately place Magnet on the membrane over the plate and leave in place for at least 60 seconds.
- F. Resume process ensuring membrane is attached to all plates.
- G. Note: Additional securement must be provided at the perimeter of each roof level, roof section, expansion joint, curb flashing, skylight, interior wall, penthouse, etc., at any inside angle change where slope exceeds 2" in one horizon-tal foot, and at other penetrations in accordance with membrane manufacture's published details.

3.6 MEMBRANE HOT AIR WELDING PROCEDURES

- A. (Note: When specifying TPO with APEEL Protective Film keep statement below.)
- B. APEEL Protective Film should be removed from within areas that are to be heat-welded together. In areas that do not require heat welding, the APEEL Protective Film can be left in place for up to 90 days.
- C. Hot air weld the Sure-Weld 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 immediately after welder crossed the membrane step-off to ensure a continuous hot air welded seam.
 - 1. Note: When using 60-mil thick or thicker membrane, all splice intersections shall be overlaid with Sure-Weld non-reinforced flashing or TPO T-Joint covers.
- D. Probe all seams once the hot air welds have thoroughly cooled (approximately 30 minutes).
- E. Repair all seam deficiencies the same day they are discovered.

- F. 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.

3.7 FLASHING

- A. Flashing of parapets, curbs, expansion joints and other parts of the roof must be performed using Sure-Weld reinforced membrane. Sure-Weld non-reinforced membrane can be used for flashing pipe penetrations, Sealant Pockets, scuppers, as well as inside and outside corners when the use of pre-fabricated 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.
- C. When APEEL Protective Film is utilized on TPO, remove and discard the APEEL Protective Film after the installation of the entire TPO Roofing System is complete.

3.8 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 specifier's drawing.
- B. Hot air weld walkway material to the membrane or install concrete pavers, loose laid over an approved protection sheet in accordance with the manufacturer's specifications.

3.9 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. Complete an acceptable membrane seal in accordance with the manufacturer's requirements.

3.10 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 076200
SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 SUMMARY

- A. Furnish and install the following:
 - 1. Aluminum counterflashing, header and base flashing, and as additionally indicated on the Drawings.
 - 2. Sealant in conjunction with sheet metal work specified herein.

1.2 RELATED REQUIREMENTS

- A. Section 042000 - UNIT MASONRY: Installation of flashing at masonry infill.
- B. Section 061000 - ROUGH CARPENTRY: Wood blocking, nailers.
- C. Section 079200 - JOINT SEALANTS: Requirements for sealant and backing materials.
- D. Flashing sleeves and collars for mechanical and electrical items protruding through roofing: By respective trade sections furnishing same.

1.3 REFERENCES

- A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 014200 - REFERENCES. The standards referenced herein are included to establish recognized minimum quality only. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern. Equivalent quality and testing standards will be acceptable, subject to their timely submission, review and acceptance by the Architect.
 - 1. ASTM A 167 - Specification for Stainless and Heat Resisting Chromium-Nickel Steel Plate, Sheet and Strip.
 - 2. ASTM A 308 - Specification for Steel Sheet, Cold Rolled, Long Terne Coated.
 - 3. FS QQ-S-766D - Steel Plates, Sheets and Strip, Corrosion Resisting.
 - 4. SMACNA - Architectural Sheet Metal Manual 7th Edition (January 2012), referred to herein as "Sheet Metal Manual".

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the installation of flashings and sheet metal work with the various trades responsible for installing interfacing materials, and install the work at appropriate times so as not to delay the progress of related work

1.5 SUBMITTALS

- A. Information and Review Submittals: Submit the following under provisions of Section 013000 - ADMINISTRATIVE REQUIREMENTS:
 - 1. Literature: Manufacturer's data sheets for each metal type and accessories furnished hereunder, include material specifications, performance data, physical properties and finishes.
 - 2. Certification: Provide certifications that materials and systems comply with the specified requirements for the use indicated.
 - 3. Shop drawings:
 - a. Fully dimensioned large scale design details showing material profiles, splices, flashing terminations and other jointing details, fastening methods and installation details. Indicate material type, sizes, and weights or gages. Indicate extent of adjacent work specified under other Sections of the Specifications.
 - b. Fully detail methods of relieving stresses due to thermal movement, including sealing of expansion seams.
 - c. All details bearing dimensions of actual measurements taken at the project.
 - 4. Selection Samples:

- a. Metal sample chips, indicating Manufacturer's full range of finish colors for factory finishes available for selection by Architect.
 - b. Manufacturer's sample boards for sealant colors.
 - 5. Verification Samples:
 - a. 12 inch long samples of formed fascia, gutters and downspouts.
 - B. Closeout Submittals: Submit the following under provisions of Section 017800 - CLOSEOUT SUBMITTALS.
 - 1. Manufacturer's warranties: Include coverage of materials and installation and resultant damage from failure of installation to resist penetration of moisture.
- 1.6 QUALITY ASSURANCE
- A. Company specializing in fabrication and installation of sheet metal flashing work with minimum 5 years documented experience.
 - B. Flashing and sheet metal applicator, with a minimum of 5 years documented experience demonstrating previously successful work of the type specified herein, and approved by product manufacturer.
- 1.7 DELIVERY, STORAGE AND HANDLING
- A. Store preformed and prefinished material to prevent twisting, bending, or abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.
 - B. Prevent contact with materials during storage which may cause discoloration, staining, or damage.
- 1.8 WARRANTY
- A. Provide the following warranties under provisions of Section 017800 - CLOSEOUT SUBMITTALS.
- 1.9 EXTRA MATERIALS
- A. Provide sufficient quantity of each color finish coat material, for field touch-up work after erection, and pack the additional coating materials with the components to be furnished hereunder.
 - B. Clearly label and package extra materials securely to prevent damage.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Aluminum: ASTM B209 (ASTM B209M); 20 gage, (0.032 inch) (0.81 mm) thick; anodized finish of color as selected.
 - 1. Exposed to weather flashings and trim: 0.050 inch thick.
 - a. Base flashing, 22 gage (0.031 inch) thick.
 - b. Header flashing, 22 gage (0.031 inch) thick.
 - 2. Clear Anodized Finish: AAMA 611 AA-M12C22A41 Class I clear anodic coating not less than 0.7 mils (0.018 mm) thick

2.2 ACCESSORIES

- A. Flashing cement: Trowel grade, composed of selected asphalt, solvents, and non-asbestos fillers, conforming to FS SS-C-153 Type 1, ASTM D 2822, Type 1 and ASTM D 4586, Type 1 (Non-asbestos) as manufactured by Karnak Chemical Corporation, product N^o. 19 "Flashing Cement", or equal as manufactured by Koch Materials Company, J & P Petroleum Products Company or other approved manufacturer.
- B. Joint Sealer, unless otherwise specified in Section 079200: Low modulus single component gun-grade polyurethane sealant, non-sagging, conforming to FS TT-S-000227E, Type II, Class A, and ASTM C 920, Type S, Class 12-1/2, Grade NS, use NT,M, A and O with a minimum movement capability of ± 25 percent, equal to the following:
 - 1. Mameco International, Inc., product "Vulkem 116".

2. Sika Corp., Lyndhurst NJ; product, "Sikaflex".
3. Sonneborn Building Products Inc., Minneapolis MN.; product, "Sonolastic NP1".
4. Tremco, Beachwood OH.; product, "Dymonic".
5. Pecora Corporation, Harleysville PA.; product "Dynatrol I".

- C. Solder: For Stainless Steel: ASTM B 32, Grade Sn60, with acid flux of type recommended by stainless-steel sheet manufacturer.

2.3 FLASHING FABRICATION

- A. Form flashings as required, or to profiles indicated on the Drawings, to protect materials from physical damage and shed water.
- B. Form sections square and accurate to profile, in maximum possible lengths, free from distortion or defects detrimental to appearance or performance. To the greatest extent applicable, fabricate sheet metal components in shop, and thoroughly clean all joints on both sides of the sheet metal work.
- C. Fabricate cleats and starter strips of same material as sheet.
- D. Form pieces in longest practical lengths, with flat lock seams. Hem exposed edges on underside 1/4 inch, miter and seam corners.
- E. Fabricate corners from one piece with minimum 18 inch long legs, solder for rigidity, seal with sealant.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify roof openings, curbs, pipes, sleeves, ducts, or vents through roof are solidly set, cant strips and reglets in place and nailing strips located.
- B. Beginning of work shall constitute acceptance of the conditions of the surfaces to which this work is to be applied.

3.2 PREPARATION

- A. Field measure site conditions prior to fabrication.
- B. Install starter and edge strips, and cleats before starting installation.
- C. Install surface mounted reglets true to lines and levels. Seal top of reglets with sealant.
- D. Secure flashings in place using concealed fasteners. Use exposed fasteners only in locations where approved by Architect.
- E. Cleat and seam all joints. Apply plastic cement compound between metal flashings and felt flashings, asphalt shingle roofing or asphalt roll roofing.
- F. Fit flashings tight in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles.
- G. During the installation of work of this Section, protect the work of other trades against undue soilage and damage by the exercise of reasonable care and precautions. Repair or replace any work so damaged and soiled.

3.3 FLASHING INSTALLATION

- A. Except as otherwise shown on the reviewed shop drawings or specified herein, the workmanship of sheet metal work, method for forming joints anchoring, cleating, provisions for thermal movement, shall conform to the standard details and recommendations of the sheet metal producer and those of producer organizations and research institutions and associations concerning the sheet metal used, in addition to the standards and details set forth in the referenced materials specified this Section.
- B. Face nailing will not be permitted, concealed cleating or other concealed method must be used to attach sheet metal work to structure.

- C. Ensure that fastenings do not exceed 8 inches on centers. Use flat head fasteners throughout, and seal all fastener heads after installation thereof.
- D. Fill all slip joints and overlapping surfaces in the assembly with specified sealant material, removing all excess sealant material from the prefinished surfaces immediately, to prevent staining the finish.

3.4 INSTALLATION - HEADER FLASHING

- A. Install specified flashing at window heads, piping, vents and all other projections from vertical surfaces where rain water may accumulate. Flashing shall be of continuous length for full width of window head, joints in flashing is not acceptable. Flashing shall extend behind air infiltration barrier a minimum of 3 inches up the wall.

3.5 CLEANING

- A. Daily clean work areas by sweeping and disposing of debris.
- B. Upon completion of the work of this Section in any given area, remove tools, equipment and all rubbish and debris from the work area; leave area in broom-clean condition.

END OF SECTION

SECTION 078100
APPLIED FIREPROOFING

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Patch existing fireproofing disturbed or otherwise damaged by the Work.
 - 1. The General Contractor shall be responsible for typical patching and repair of cementitious fire proofing materials made necessary by the normal activities of general and sub-contract construction. Where the scope of patching and repair of such materials exceeds typical expectations the General Contractor shall prepare and submit a Change Request Proposal (CRP) that identifies the reason for the request, the total cost of remediation, and a cost itemization of the labor and materials involved in it. Acceptance of the CRP shall be required prior to execution of the patching and repair Work.
- B. Preparation of fireproofing for application of exposed finish specified elsewhere.

1.2 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract and Division 01 Specification Sections apply to this Section.
- B. Section 016000 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- C. Section 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements for construction and demolition recycling.
- D. Section 017329 - CUTTING AND PATCHING: Procedural and administrative requirements for cutting and patching.
- E. Section 017000 - EXECUTION AND CLOSEOUT REQUIREMENTS : Waste management and recycling during final cleaning.
- F. Division 5 - STRUCTURAL.

1.3 REFERENCE STANDARDS

- A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 014200 - REFERENCES. The standards referenced herein are included to establish recognized minimum quality only. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern. Equivalent quality and testing standards will be acceptable, subject to their timely submission, review and acceptance by the Architect.
 - 1. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2018.
 - 2. ASTM E119 - Fire Tests of Building Construction and Materials.
 - 3. ASTM E605/E605M - Standard Test Methods for Thickness and Density of Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members; 1993, with Editorial Revision (2015).
 - 4. ASTM E736/E736M - Standard Test Method for Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members; 2017.
 - 5. ASTM E759/E759M - Standard Test Method for Effect of Deflection on Sprayed Fire-Resistive Material Applied to Structural Members; 1992, with Editorial Revision (2015).
 - 6. ASTM E760/E760M - Standard Test Method for Effect of Impact on Bonding of Sprayed Fire-Resistive Material Applied to Structural Members; 1992, with Editorial Revision (2015).
 - 7. ASTM E761/E761M - Standard Test Method for Compressive Strength of Sprayed Fire-Resistive Material Applied to Structural Members; 1992, with Editorial Revision (2015).

8. ASTM E859/E859M - Standard Test Method for Air Erosion of Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members; 1993, with Editorial Revision (2015).
 9. ASTM E937/E937M - Standard Test Method for Corrosion of Steel by Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members; 1993, with Editorial Revision (2015).
 10. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015.
 11. UL (FRD) - Fire Resistance Directory; Current Edition.
- B. Definitions: SFRM (Sprayed Fire-Resistant Materials) is spray-applied fireproofing as specified under this Section and defined under the International Building Code.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. General: Coordinate the work of this Section with the respective trades responsible for installing interfacing and adjoining work for proper sequence of installation, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work. Coordinate with placement of ceiling hanger tabs, mechanical component hangers, and electrical components.
- B. Sequencing:
1. The spray-applied fire resistive material shall only be applied to steel deck, which has been fabricated and erected in accordance with the criteria set forth by the Steel Deck Institute.
 2. The application of spray-applied fire resistive material to the underside of roof deck shall not commence until the roof is completely installed and tight, all penthouses are complete, all mechanical units have been placed, and construction roof traffic has ceased.
 - a. Fire protection shall not be applied to steel floor decks prior to the completion of concrete work on that deck.
 - b. When occasional roof traffic is anticipated, as in the case of periodic maintenance, roofing pavers shall be installed as a walkway to distribute loads.
- C. Scheduling: The installation of ducts, piping, conduit or other suspended equipment shall not take place until the application of sprayed fire protection is complete in an area.

1.5 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittals procedures.
- B. Product Data: Manufacturer's product data sheets, specifications, performance data, physical properties and limitations of fireproofing.
- C. Test and Evaluation Reports:
1. Bond strength of fireproofing: ASTM E 72, tested to provide minimum bond strength twenty times weight of fireproofing materials.
 2. Fire test reports of fireproofing application to substrate materials similar to project conditions.
 3. Reports from reputable independent testing agencies, of product proposed for use, which indicate conformance with ASTM E 119 and ASTM E 84
- D. Manufacturer's Instructions and typical details: Indicate special application procedures or conditions.
- E. Closeout Submittals: Submit the following under provisions of Section 017800 - Closeout Submittals.
1. Certificates: Installers certificate stating that sprayed fireproofing has been completed in full accordance with requirements to provide necessary fire resistance ratings.
 2. Record Documentation: Installer's Field Reports stating environmental conditions during the installation of fireproofing materials, include temperature and humidity conditions.
 3. Bonds and Warranty Documentation:

- a. Manufacturer's Warranties and Guarantees as specified elsewhere herein this Section.

1.6 QUALITY ASSURANCE

- A. General: Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.
- B. Sole Source: Obtain products required for the Work of this Section from a single manufacturer, or from manufacturers recommended by the prime manufacturer of fireproofing.
- C. Qualifications:
 - 1. Installer/Applicator: Minimum of 3 years documented experience demonstrating previously successful work of the type specified herein, and approved by product manufacturer.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Delivery and Acceptance Requirements:
 - 1. Do not deliver items to the site, until all specified submittals have been submitted to, and approved by, the Architect.
 - 2. Deliver materials, factory proportioned and mixed, in original, unopened packages bearing the name of the product, manufacturer's name, plant identification, lot number and Underwriter's Laboratories, Inc. label.
- B. Storage and Handling Requirements:
 - 1. Store and handle materials following manufacturer's recommended procedures, and in accordance with material safety data sheets.
 - 2. Store all materials in an elevated dry location, protected by waterproof coverings.
 - 3. Protect materials from damage due to moisture, direct sunlight, excessive temperatures, surface contamination, corrosion and damage from construction operations and other causes.
- C. Damaged material: Remove any damaged or contaminated materials from job site immediately, including materials in broken packages, packages containing water marks, or show other evidence of damage.

1.8 FIELD CONDITIONS

- A. Do not apply fireproofing when temperature of substrate material and surrounding air is below 40 degrees F (4 degrees C) or when temperature is predicted to be below said temperature for 24 hours after application.
- B. Provide ventilation in areas to receive fireproofing during application and 24 hours afterward, to dry applied material.
- C. Do not allow roof traffic during installation of roof fireproofing and drying period.

1.9 WARRANTY

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.
- B. Special Warranty: Provide 2 year warranty which shall include failure of fireproofing, including: cracking, checking, dusting, flaking, spalling, separation and blistering. Failure to provide such performance will require re-installation to repair to satisfaction of Owner at no additional cost.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers for Sprayed-On Fireproofing:
 - 1. AD/Carboline; Fireproofing Products Division of RPM Inc.; St. Lous, MO ("AD/Carboline").

2.2 DESCRIPTION

- A. General: Spray applied fireproofing, factory proportioned and mixed meeting the following requirements:

1. Sprayed fireproofing materials (SFRM) shall be free of all forms of asbestos, including actinolite, amosite, anthophyllite, chrysotile, crocidolite and tremolite. Material manufacturer shall provide certification of such upon request.
 2. Fireproofing materials shall not be subject to losses from finished application by sifting, flaking or dusting.
 3. Fireproofing shall not deform more than 10 percent under 500 pound per square foot compressive forces in accordance with ASTM E 761.
 4. Bare, shop-coated, and galvanized steel sheets with the fireproofing applied shall be kept at 90 degrees Fahrenheit and 70 percent relative humidity for 240 hours without evidence of corrosion of steel, tested in accordance with ASTM E 937.
 5. Corrosion Resistance: When tested in accordance with ASTM E937, the material shall not promote corrosion of steel.
 6. Noncombustibility: When tested, the material shall be noncombustible.
 7. Surface Burning Characteristics: When tested in accordance with ASTM E84, the material shall exhibit the following surface burning characteristics:
 - a. Flame Spread 10
 - b. Smoke Developed 0
- B. Regulatory Requirements:
1. Provide under Section 014000 - QUALITY REQUIREMENTS: Certification by an independent testing laboratory acceptable to the Owner, that materials, dry densities, thickness, and application procedures satisfy the requirements of the governing laws, building code, and UL requirements, with respect to the minimum protection requirements specified herein when tested in accordance with ASTM E 119.

2.3 PERFORMANCE/DESIGN CRITERIA

- A. Materials, procedures for application, dry densities, and thicknesses necessary to provide the required protection shall be tested and rated by UL in accordance with the procedures of UL 263 (ASTM E119) for the uses indicated
- B. Fire ratings interpolated or extrapolated from actual test data will not be acceptable. Provide evidence prior to application that proposed materials, installation methods and materials have been approved by all authorities having jurisdiction.
- C. Thickness and density: Thickness and dry density of fire protection material shall be according to the manufacturer's data and UL requirements to provide fire resistance ratings as designated on the Drawings.

2.4 MATERIALS

- A. Spray applied fireproofing Type B - "Medium Density":
 1. Acceptable products:
 - a. Basis of Design: AD/Carboline, product: "5MD with Carboline Accelerator SDS".
 2. Density: When tested in accordance with ASTM E605, the material shall meet the minimum individual and average density values as listed in the appropriate UL/UC design or as required by the authority having jurisdiction, or shall have a minimum average of 22 pcf (pounds per cubic foot).
 3. Cohesion/Adhesion (bond strength): When tested in accordance with ASTM E736, the material applied over uncoated or galvanized steel shall have an minimum bond strength of 430 psf (pounds per square foot) [1913N].
 4. Compressive Strength: When tested in accordance with ASTM E761, the material shall not deform more than 10 percent when subjected to a crushing force of 7,344 psf (pounds per square foot).
- B. Potable water shall be used for the application of sprayed fireproofing materials.
- C. Adhesive: Bonding adhesive for fibrous materials as recommended and supplied by the fireproofing material manufacturer. Adhesive may be an integral part of the material or applied separately to surface receiving fireproofing material.

- D. Sealer:
 - 1. AD/Carboline, product: "Carboguard 1390".
- E. Mold Inhibitor: Mold inhibitor shall be added to fireproofing materials in accordance with manufacturer's instructions.
- F. Potable water shall be used for the application of sprayed fireproofing materials.
- G. Adhesive:
 - 1. Bonding adhesive for fibrous materials as recommended and supplied by the fireproofing material manufacturer. Adhesive may be an integral part of the material or applied separately to surface receiving fireproofing material.
 - 2. Sealer:
 - a. AD/Carboline, product: "Carboguard 1390".
 - b. W.R. Grace & Company: product as recommended by manufacturer.
 - c. Isolatek International, product: "Bond-Seal".
 - d. Southwest, product as recommended by manufacturer.
 - 3. Mold Inhibitor: Mold inhibitor shall be added to fireproofing materials in accordance with manufacturer's instructions.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Inspect all surfaces and verify that they are in proper condition to receive the work of this Section.
 - 1. Inspect all surfaces and verify that they are in proper acceptance of existing substrate and site conditions.
 - a. Contact fireproofing manufacturer for procedures on handling primed / painted steel.
 - b. Ensure clips, hangers, supports, sleeves and other attachments to the substrate are placed by others prior to the application of spray-applied fire resistive materials.
 - 2. Beginning of installation means acceptance of existing substrate and project conditions.
- B. Verify that projections have been removed where fireproofing will be exposed to view as a finish material.

3.2 PREPARATION

- A. Close and seal ductwork in areas where fireproofing is being applied.
- B. Provide temporary enclosures to prevent spray from contaminating air.
- C. Protection of In-situ Conditions: Protect adjacent surfaces and equipment from damage by overspray and dusting. Mask adjacent work as required. Clean, or repair all existing materials which are soiled or otherwise damaged by Work of this Section, to match original profiles and finishes. Existing materials and finishes which cannot be cleaned, or repaired shall be removed and replaced with new work to match existing.
- D. Surface Preparation:
 - 1. Clean substrate of dirt, dust, grease, oil, loose material, or other matter which may affect bond of fireproofing.
 - 2. Remove incompatible materials which affect bond by scraping, brushing, scrubbing, or sandblasting. Repair or replace any work so damaged and soiled.

3.3 MIXING AND APPLICATION

- A. Mixing shall conform to manufacturer's written instructions.
- B. Materials and equipment shall be as approved by the materials manufacturer. Application shall be by licensed manufacturer's applicators. Procedures shall be in strict accordance with said manufacturer's directions and specifications. Only experienced, skilled mechanics approved by the materials manufacturer shall be allowed to place the materials. A qualified manufacturer's representative shall be present for initial application to guide and assist applicator's personnel.

- C. Work shall comply with applicable UL standards in addition to the requirements imposed by the applicable laws and codes, for the indicated ratings, including local pollution control regulations.
- D. Sprayed-on fireproofing shall be applied in the exact manner described in the certificates submitted to prove compliance with specified protection requirements. The fireproofing applicator shall be responsible for providing a controlled application of fireproofing material so that uniform quantity and thickness is maintained.
- E. After completion of fireproofing work, equipment shall be removed and all surrounding wall and floor areas cleaned of deposits of sprayed-on fireproofing materials. Where hangers and other surfaces not requiring fireproofing have been sprayed unavoidably, the sprayed material shall be removed and the surfaces made clean.

3.4 REPAIR

- A. Patch all areas of testing and any area where fireproofing has been damaged or removed during construction.

3.5 FIELD QUALITY CONTROL

- A. Perform field inspection and testing in accordance with Section 014000 - Quality Requirements.
- B. Ensure that applied fireproofing remains exposed to view until verification inspections and testing is made and approval of applied fireproofing is obtained. All costs for removal and replacement of prematurely installed materials to allow inspection of fireproofing shall be borne by the Contractor.
- C. Inspection and testing shall verify that applied thickness and density meets manufacturer's tested requirement standards for required fire-resistance ratings.
 - 1. Where samples fail to meet thickness, quality, or dry density requirements, further sampling and testing will be required in the area of deficient sample. If such further testing indicates a deficient area, correction shall be made by the application of additional material or removal and replacement of faulty material.
- D. Ensure that actual thicknesses, densities, and bond strengths meet requirements for specified ratings and requirements of authorities having jurisdiction (AHJ).

3.6 CLEANING

- A. Daily clean work areas by sweeping and disposing of debris. Place waste material in suitable bags or containers, and remove from site.
- B. Upon completion of the work of this Section in any given area, clean walls, floors (including bare concrete slabs) and surrounding surfaces of overspray and drippings. Remove tools, equipment and all rubbish and debris from the work area; leave area in broom-clean condition.

END OF SECTION

**SECTION 078400
FIRESTOPPING**

PART 1 - GENERAL

1.1 SUMMARY

- A. Furnish and install fireproof firestopping, firesafing materials, smoke seals and related accessories required for this Project for all penetrations through fire resistance rated construction, including, but not limited to, penetrations for plumbing, fire suppression, heating, ventilating and air conditioning, electrical systems, and specialized equipment.
 - 1. Fire resistance rated construction requiring firestopping includes, but is not limited to rated floors and roofs, rated partitions, smoke barriers, smoke partitions, partitions in rated corridors, passageways and stairs, shaft partitions, shaft wall (vertical and horizontal), area separation fire walls, party wall systems, and temporary fire resistant rated partitions and barriers.
 - 2. Provide removable temporary firestopping (pillows) as required to maintain fire integrity prior to Owner's final acceptance, to permit installation of electrical, telephone, data and sound system wiring. Replace temporary firestopping with permanent, after wiring systems are completed.
- B. Furnish and install firestopping/smoke seals at construction joints occurring at tops of fire resistance rated partitions, smoke partitions, and temporary partitions between top of partition and underside of deck above.
- C. Furnish and install all firestopping, firesafing, and smoke seals where required by applicable codes and as additionally required by authorities having jurisdiction at no additional cost to the Owner.

1.2 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract and Division 01 Specification Sections apply to this Section.
- B. Section 016000 - Product Requirements: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- C. Section 017419 - Construction Waste Management and Disposal: Procedural and administrative requirements for construction and demolition recycling.

1.3 REFERENCES

- A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 014200 - References. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.
 - 2. ASTM C612 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation.
 - 3. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
 - 4. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
 - 5. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems; 2013a (Reapproved 2017).
 - 6. UL 1479 - Standard for Fire Tests of Penetration Firestops.

1.4 PERFORMANCE REQUIREMENTS

- A. Provide materials and work to conform to Building Code Requirements in fire resistant wall assemblies.

- B. Manufacturer's Certified Product Test Requirements:
 - 1. All firestop/smokeseal material shall be tested by a recognized, independent testing agency and shall conform to both Flame (F-rating) and Temperature (T-rating) requirements of ASTM E814.
 - 2. Conform to UL Fire Hazard Classification Requirements.
 - 3. Tested and classified non-combustible per ASTM E84.
- C. Firestops in place shall be of sufficient thickness, width, and density to provide a fire resistance rating at least equal to the wall, or partition construction into which it is installed.
- D. Non-Combustible Dams: Construct non-combustible dams:
 - 1. As necessary to achieve fire rating as tested and rated.
 - 2. In conformance with installation requirements for type of wall, and partition construction.
 - 3. As recommended by firestop/smokeseal manufacturer.
- E. Combustible damming materials, if used, must be removed after proper curing.

1.5 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
 - 1. Product Data: Manufacturer's product data sheets, specifications, performance data, and physical properties.
 - a. Indicate requirements for manufacturer's descriptive data for products and related materials with FM, UL or Warnock-Hersey illustrations showing systems and approval of materials in systems.
 - 2. Certificates: Manufacturer's written certification stating that firestopping materials, meet or exceed the requirements specified under this Section and that all fire-resistive requirements for the indicated combustibility, Flame (F-rating) and Temperature (T-rating) Ratings have been met.
 - 3. Manufacturer's installation instructions.
 - 4. Test Reports: Submit fire test reports from recognized, independent testing agent(s) indicating the following:
 - a. Fire test report of firestop material applied to substrate and penetration materials similar to project conditions. Tests to indicate both Flame (F-rating) and Temperature (T-rating) Ratings.
 - b. Test reports of products to be used shall indicate conformance to ASTM E-814.
 - c. Include test report for each type and quantity of penetrant through each type of wall or floor construction.
 - 5. On-Site Sample Installation to be Included in Work: Minimum (15) fifteen days prior to application in any area, provide samples of firestop and smoke seal materials and installation in accordance with the following requirements.
 - a. Apply one sample of appropriate firestop and smoke seal material for each different penetration and fire rating required for the work.
 - b. Sample areas will comply with thickness, fire resistance ratings, and finished appearance of the project and applicable fire code.
 - c. Acceptance samples will constitute standard of acceptance for method of application, thickness, and finished appearance for firestop and smoke seal application. The sample(s) shall remain visible during completion of the work and shall remain as part of the completed work.
 - 6. Shop drawings indicating requirements for penetrations in wall/deck intersections, change of planes, control joints, expansion joints and blank openings.

1.6 QUALITY ASSURANCE

- A. General: Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.
- B. Reference IBC Chapter 17 - Special Inspection.

- C. Sole Source: Obtain firestop and smoke seal products from a single manufacturer, except as otherwise approved by the Architect.
- D. Environmental Requirements for Volatile Chemicals: Use firestopping caulks that comply with the following limits for VOC content:
 - 1. Firestopping caulks: VOC not more than 250 g/L.
- E. Qualifications:
 - 1. Installer: a specialized subcontractor having not less than 3 years documented experience demonstrating previously successful work of the type specified herein.
 - a. The manufacturer of the firestop material shall submit written certification that the firm to be used for the firestop products has been trained in the application of the products by the manufacturer.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Deliver and store firestopping materials in original, sealed, packages showing manufacturer's identification and date of packaging.
- B. Store and handle materials following manufacturer's recommended procedures, and in accordance with material safety data sheets.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering similar products include the following, or approved equal:
 - 1. Specified Technologies, Inc., Fort Lauderdale, FL.
 - 2. Roxul, Inc.

2.2 REGULATORY REQUIREMENTS

- A. Conform to applicable code for fire resistance ratings and surface burning characteristics.
- B. Obtain certificate of compliance from authority having jurisdiction indicating approval of combustibility.

2.3 MATERIALS

- A. Furnish and install fire rated, through-wall cable raceways equal to Specified Technologies, Inc , product: "E-Z PATH", consisting of the following:
 - 1. Shell composition: 0.059 inch galvanized steel.
 - 2. Cable loading area: 6 square inches, (nominal).
 - 3. Allowable cable fill: 100 percent visual.
 - 4. Fire resistance ratings: 1 and 2 hour.
 - 5. Expansion begins: 350° F (176° C).
 - 6. Volume expansion: 800 percent.
 - 7. Sample cable volume: (CAT 5): 120 (nominal).
 - 8. In-service temperature: 120° F (49° C).
- B. Firestop Mortar: Asbestos free, cementitious mortar, U.L. classified as a "fill, void, or cavity material" for through penetration firestop system when tested in accordance with ASTM E814/UL1479.
 - 1. Acceptable products, or approved equal:
 - a. Specified Technologies, Inc., product "Spec Seal Mortar".
- C. Silicone Firestop Sealant: Single component, non-combustible silicone elastomer firestop sealant, U.L. classified as a "fill, void, or cavity material" for through penetration firestop system when tested in accordance with ASTM E814/UL1479.
 - 1. Acceptable products, or approved equal:
 - a. Specified Technologies, Inc., product "Spec Seal Pensil 300 Sealant (gun grade)" or "Spec Seal Pensil 300SL" (Self Leveling).

2. Sealants will not dissolve in water.
- D. Intumescent Firestop Sealant and Caulks: Acrylic based, water resistant sealant, which will not re-emulsify after drying.
 1. Acceptable products, or approved equal:
 - a. Specified Technologies, Inc., product "Spec Seal Triple-S Sealant".
- E. Firestop Putty: Sticks or pads.
 1. Acceptable products, or approved equal:
 - a. Specified Technologies, Inc., product "Spec Seal Putty Bars and Pads".
- F. Firestop Collars: Pre-manufactured fire protective pipe sleeve, UL classified as "fill, void, or cavity material" for through penetration firestop system when tested in accordance with ASTM E814/UL1479.
 1. Provide separated (two piece) firestop collar for application when plastic pipe system is already in place. Provide non-separated firestop collar for application prior to installation of plastic pipe system.
 2. Acceptable products, or approved equal:
 - a. Specified Technologies, Inc., product "Spec Seal Collars".
- G. Firestop Pillows: UL Classified as "fill, void, or cavity material" for through penetration firestop system when tested in accordance with ASTM E814/UL1479.
 1. Acceptable products, or approved equal:
 - a. Specified Technologies, Inc., product "Spec Seal Pillows".
- H. Wrap Strips:
 1. Acceptable products, or approved equal:
 - a. Specified Technologies, Inc., product "Spec Seal Wrap Strip".
- I. Firesafing Insulation: Mineral wool fiber/ceramic wool non-combustible insulation conforming to ASTM C665, Type 1, ASTM C612, and ASTM C553 with a minimum density of 4 pounds per cubic foot.
 1. Flame Spread Classification: Material shall be classified non-combustible per ASTM E814.
 2. Recycled content of slag:: Use maximum available percentage of material (slag). Mineral wool insulation products incorporated into the work shall contain not less than 75 percent of recycled material (slag) by weight.
 3. Acceptable products include:
 - a. Roxul, Inc., product "Roxul Safe".
 4. Accessories: Provide galvanized steel safing clips as required for installation of insulation.
- J. Elastomeric Firestopping: Non halogenated latex based elastomeric coating applied by airless spray.
 1. Acceptable products, or approved equal:
 - a. Specified Technologies, Inc., product "Spec Seal Elastomeric Firestop Spray".

2.4 ACCESSORIES

- A. Forming and damming materials: Mineral fiberboard or other type as recommended by firestopping manufacturer.
- B. Primer, sealant and solvents: As recommended by manufacturer.
- C. Woven wire mesh: Galvanized 20 gage woven wire mesh "chicken wire" or "poultry fencing", 1 inch spacing.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Inspect areas and conditions where firestops are to be installed and notify the Architect of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.

1. Beginning of installation means acceptance of existing substrate and project conditions.

3.2 PREPARATION

- A. Surface to receive firestops shall be free of dirt, dust, grease, oil, form release agents, or other matter that would impair the bond of the firestop material to the substrate or penetrating item(s).
- B. Voids and cracks in substrate shall be filled and unnecessary projection removed prior to installation of firestops.
- C. All penetrating items shall be permanently installed prior to firestop installation.
- D. Substrate shall be frost, free and, when applicable, dry.

3.3 INSTALLATION

- A. General
 1. Installation of firestops shall be performed by applicators/installers qualified and trained by the manufacturer. Installation shall be performed in strict accordance with manufacturer's detailed installation procedures.
 2. Apply firestops in accordance with fire test reports, fire resistance requirements, acceptable sample installations, and manufacturer's recommendations. Meet building code requirements.
 3. Coordinate with plumbing, mechanical, electrical, and other trades to assure that all pipe, conduit, cable, and other items which penetrate fire rated construction have been permanently installed prior to installation of firestops. Schedule and sequence the work to assure that partitions and other construction which would conceal penetrations are not erected prior to the installation of firestops.
 - a. Ensure that all firestopping is inspected prior to installation of suspended ceilings or concealed by other finished materials.
- B. Dam Construction:
 1. Install dams when required to properly contain firestopping materials within openings and as required to achieve required fire resistance rating. Combustible damming material must be removed after appropriate curing. Incombustible damming material may be left as a permanent component of the firestop system.
 2. Placement of dams shall not interfere with function or adversely affect the appearance of adjacent construction.
- C. Installation of Single Component Silicone Firestop:
 1. Apply with manual or powered caulking gun.
 2. Apply minimum 1/2 inch thickness for 2 hour rating. Apply 1/2 inch to both sides of wall penetrations.
 3. Use incombustible insulation as required to achieve fire resistance rating.
 4. Surface of gun grade silicone firestop may be tooled using clean, potable water.
 5. Clean excess material off of adjacent surfaces and tools within 10 minutes using either water or Xylol where the use of such would not be hazardous.
- D. Installation of Cementitious Firestop Mortar:
 1. Add dry powder to water and mix with mechanical mixer or hand mixing tools as recommended by firestop mortar manufacturer. Allow a average mixing time is 3 minutes and provide a average wet density of 70 pounds per cubic foot, plus or minus 5 PCF.
 2. Do not apply if ambient or substrate temperature is less than 35 degrees Fahrenheit during 24 hours after application.
 3. Wet all surfaces prior to application of firestop mortar.
 4. Mortar may be hand applied or pumped into the opening.
 5. Exposed surfaces shall be finished using conventional plastering tools prior to curing.

6. When installation around layered cables, it is recommended to increase the fluidity of the firestop mortar to provide a better fill around the cables. Vibrate or move the cables slightly to prevent voids from forming between the cables.
 7. Allow 48 hours for initial cure prior to form removal. For full cure allow 27 days.
 8. Wet material may be cleaned with water. Dry material may require scraping or chipping.
- E. Installation of Firestop Collars, (Plastic Pipe Only):
1. Firestop collars may be surface mounted to a slab or wall or imbedded in Firestop Mortar to a maximum depth of 2 inches.
 2. For wall penetrations with ABS pipe firestop collars must be installed on both sides of the penetration to provide a 2 hour F and T Rating. All other applications required installation on one side only to provide a 2 hour F and T Rating.
- F. Installation of Firesafing Insulation:
1. Install firestopping safing insulation on safing clips spaced as needed between each stud, leaving no voids. Secure safing clips to slab using fasteners recommended by insulation manufacturer. Install sealant over mineral wool in accordance with test requirements.
- G. Conclusion of Work Day: Wherever work is performed in areas which abut or are adjacent to Owner occupied areas, at the conclusion of the work day ensure that all penetrations and perimeter construction joints are firestopped and that there are no openings, penetrations or construction joints left unprotected.
- H. Firestopping for cabling shall use through wall or through floor adjustable fire rated pathway device equal to Specified Technologies, Inc. "EZ-PATH - Series 44".

3.4 LABELING

- A. Identify through-penetration firestop systems with pressure-sensitive, self-adhesive, preprinted vinyl labels. Attach labels permanently to surfaces of penetrated construction on both sides of each firestop system installation where labels will be visible to anyone seeking to remove penetrating items or firestop systems.
1. Include the following information on labels:
WARNING: Through-Penetration Firestop System-Do Not Disturb.
Notify Facility Manager of Any Damage.
 - Contractor's name, address, and phone number.
 - Through-penetration firestop systems designation of applicable testing and inspecting agency.
 - Date of installation.
 - Through-penetration firestop systems manufacturer's name.
 - Installer's name.

3.5 FIELD QUALITY CONTROL

- A. Inspector: Owner will engage a qualified independent inspecting agency to inspect through-penetration firestop systems and to prepare test reports.
1. Inspector will state in each report whether inspected through-penetration firestop systems comply with or deviate from requirements.
- B. Reference IBC - Chapter 17 Special Inspection Requirement.
- C. Proceed with enclosing through-penetration firestop systems with other construction only after inspection reports are issued.
- D. Where deficiencies are found, repair or replace through-penetration firestop systems so they comply with requirements.

3.6 SCHEDULE

- A. General: Typical penetrations are indicated below with list of standard firestopping/smokeseal approaches. Actual firestopping materials and combination of materials will vary with size of penetration and with individual firestopping manufacturer's approved UL Design System

Requirements. Use only UL Design System materials for each penetration *that best matches type of wall construction, i.e, steel stud/gypsum board or masonry/concrete.*

1. Where penetrations occur for which no listed UL or WH Design System test exists, obtain from the firestop system manufacturer an engineered system acceptable to the authorities having jurisdiction for firestopping such penetrations. Engineered system from manufacturer shall include a detail drawing showing the engineered system and shall contain no disclaimers.
- B. Single metal pipe (non-insulated) and conduit penetrations through walls:
 1. Masonry and concrete walls only: Firestop mortar and putty.
 2. Intumescent firestop sealant over firesafing insulation.
 3. Intumescent firestop sealant with wrap strips.
- C. Multiple metal pipe and conduit penetrations through walls:
 1. Firestop mortar and putty.
 2. Through masonry walls only: Firestop pillows with woven wire mesh.
 3. Silicone Firestop sealant over firesafing insulation.
- D. Insulated metal pipe penetrations (single and multiple) through walls:
 1. Firestop mortar with wrap strips.
 2. Intumescent firestop sealant over firesafing insulation.
 3. Intumescent firestop sealant over firesafing insulation and Wrap strips.
 4. Multiple penetrations through masonry walls only: Firestop pillows with woven wire mesh.
- E. Duct penetrations through walls:
 1. Rectangular and square ducts: Intumescent firestop sealant over firesafing insulation, and steel flanges provided by duct installer.
 2. Round ducts: Intumescent firestop sealant over firesafing insulation.
- F. Combustible plastic pipe and conduit penetrations through walls:
 1. Intumescent firestop sealant over firesafing insulation.
 2. Intumescent firestop sealant with firestop collars.
- G. Cable penetrations through walls:
 1. Silicone firestop sealant over firesafing insulation.
 2. Intumescent firestop sealant over firesafing insulation.
 3. Single penetrations only: Firestop putty.
 4. Electrical boxes: Firestop pads.
 5. Firestop putty over firesafing insulation.
- H. Cable tray penetrations:
 1. Floors only: Firestop mortar.
 2. Firestop pillows with woven wire mesh containment, and Firestop putty, sticks or pads for filling voids.
 3. Firestop pillows with woven wire mesh containment, and Firestop mortar at perimeter and firestop putty, sticks or pads for filling voids.
- I. Blank openings:
 1. Firestop mortar.
 2. Silicone firestop sealant over firesafing insulation.
- J. Fire rated joints:
 1. Silicone firestop sealant over backer rod or bond breaker.
- K. Floor to curtain wall assemblies:
 1. Silicone firestop sealant/mastic over firesafing insulation.
- L. Construction joints at head of wall/floor assemblies:
 1. Silicone firestop sealant/mastic over firesafing insulation.
 2. Elastomeric spray over firesafing insulation.

- M. Smoke barrier sealant for dampers, fire door frames:
 - 1. Silicone firestop sealant.
 - N. Temporary sealing of openings and penetrations:
 - 1. Firestop putty, sticks or pads.
 - 2. Firestop pillows.
- 3.7 CLEANING
- A. Clean adjacent surfaces of firestopping materials.

END OF SECTION

SECTION 079200
JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

- A. General: The work of this Section consists of sealants and backing materials where shown on the Drawings, as specified herein, and as required for a complete and proper installation.
 - 1. This Section specifies general requirements, definition of joint sealer types, and application requirements for sealant work specified within other individual specification sections.
- B. Prepare sealant substrate surfaces, including removal of existing sealant and backing, and thorough cleaning of joints.
- C. Furnish and install sealant and backing materials.

1.2 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract and Division 01 Specification Sections apply to this Section.
- B. Section 016000 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- C. Section 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements for construction and demolition recycling.

1.3 REFERENCE STANDARDS

- A. ASTM C834 - Standard Specification for Latex Sealants.
- B. ASTM C920 - Standard Specification for Elastomeric Joint Sealants.
- C. ASTM C1330 - Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants.
- D. FS TT-S-00230C - Sealing Compound: Elastomeric Type, Single Component.
- E. FS TT-S-001543A – Sealing Compounds: Silicone Rubber Base (For Caulking, Sealing, and Glazing in Buildings and Other Structures).
- F. 21 CFR 177.2600 - Rubber Articles Intended for Repeated Use.

1.4 SUBMITTALS

- A. Information and Review Submittals: Submit the following under provisions of Section 013000 - ADMINISTRATIVE REQUIREMENTS:
 - 1. Product Data: Manufacturer's product data sheets, specifications, performance data, chemical and physical properties and installation instructions for each item furnished hereunder.
 - 2. Selection Samples: Sample card indicating Manufacturer's full range of colors available for selection by Architect.
 - 3. Verification Samples: 12 inch long samples of sealant for verification of color, installed where directed by Architect.
 - 4. Certificates: Manufacturer's certification that the Products supplied meet or exceed specified requirements.
 - 5. Test and Evaluation Reports:
 - a. Test reports from sealant manufacturer indicating that sealant proposed for use have been tested for compatibility and adhesion with actual samples of substrates to be used on this project. Include sealant manufacturer's interpretation of test results, and recommendations for primers and substrate preparation specific to this Project.
- B. Closeout Submittals: Submit the following under provisions of Section 017800 - CLOSEOUT SUBMITTALS.

1. Bonds and Warranty Documentation: Manufacturer's standard Warranties and Guarantees.

1.5 QUALITY ASSURANCE

- A. General: Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.
- B. Sole Source: Provide sealants from a single manufacturer for all work of this Section to the greatest extent possible. Each individual type of sealant installed in the Work shall be from a single manufacturer.
- C. Qualifications:
 1. Installer/Applicator: Minimum of 3 years documented experience demonstrating previously successful work of the type specified herein.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Specified Manufacturers and Products: To establish a standard of quality, design and function desired, Drawings and specifications have been based on the products specified under this section for each individual sealant type, for the applications scheduled at the end of Section, and as may be additionally identified on the Drawings.
- B. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 1. BASF Construction Chemicals, Shakopee, MN.
 2. Dow Corning Corporation, Midland, MI.
 3. Momentive Performance Materials (GE Silicones), Waterford, NY.
 4. Pecora Corporation, Harleysville, PA.
 5. Sika Corp, Lyndhurst, NJ.
 6. STS Coatings, Inc., Comfort, TX.
 7. Tremco, Inc., Beachwood, OH.
 8. United States Gypsum Company (USG), Chicago, IL.
 9. York Manufacturing, Inc., Sanford, ME.

2.2 SEALANT MATERIALS

- A. Sealant Materials, General Requirements:
 1. Only use sealant and primers that comply with the following limits for VOC content:
 - a. Architectural Sealants: 250 g/L.
 - b. Roofing Sealants: 420 g/L.
 - c. Roadway Sealants: 250 g/L.
 - d. Sealant primer: 250 g/L.
 2. Sealants containing aromatic solvents, fibrous talc, formaldehyde, halogenated solvents, mercury, lead, cadmium, chromium and their compounds, are not permitted.
- B. Joint Sealer Type AA (Acrylic Acoustical): One component acrylic latex, permanently elastic, non-staining, non-shrinking, non-migrating and paintable.
 1. Pecora, product "AC-20 FTR".
 2. Tremco, product "Tremco Acoustical/Curtainwall Sealant".
 3. USG, product USG Sheetrock Brand "Acoustical Sealant".
- C. Joint Sealer Type AP (Acrylic Painters Caulk): One component acrylic latex caulking compound, conforming to FS 19-TP-21M and ASTM C834 Type P, Grade NF, paintable within 24 hours after application, with a minimum movement capability of ± 12.5 percent, equal to one of the following:
 1. BASF, product, "MasterSeal NP 520".
 2. Bostik, product, "Chem-Calk 600".

3. Pecora, product "AC-20+Silicone".
 4. Tremco, product, "Tremflex 834".
- D. Joint Sealer Type SC (Silicone, General Construction): One-part medium modulus, natural cure, synthetic sealant, having a useful life expectancy of at least 20 years, conforming to ASTM C920, Type S, NS, Class 50, use NT, A, G, M, O with a minimum movement capability of ± 50 percent, equal to the following:
1. Dow Corning, product, "Dowsil 791".
 2. GE Silicones, product, "SCS2000 Silpruf".
 3. Pecora, product, "895 NST".
 4. Sika, product, "SikaSil WS-295".
 5. Tremco, product, "Spectrem 2".
- E. Joint Sealer Type SE (Silicone, Waterproofing): One-part low modulus, moisture curing, synthetic rubber sealant, having a useful life expectancy of at least 20 years, conforming to ASTM C920, Type S, NS, Class 50 Use A, G, M, O, FS TT-S-001543A, Type Non-Sag, Class A with a minimum movement capability of +100 percent and -50 percent, equal to the following:
1. Dow Corning, product, "Dowsil 790".
 2. GE Silicones, product, "SCS2700 SilPruf LM".
 3. Sika, product "SikaSil WS-290".
 4. Tremco, product "Spectrem 1".
- F. Joint Sealer Type SF-2 (Silicone, Food contact/Clean Room): 100% silicone polymer, neutral alkoxy cure system, conforming to ISO 11600-F&G- 25LM, equal to the following:
1. Dow Corning Corporation, Midland, MI, product: "798 Clean Room Silicone".
 2. EverBuild, (a Sika Corporation Company) Lyndhurst, NJ, product: "Everflex 565 Clean Room Silicone C3".
- G. Joint Sealer Type SM (Silicone, Mildew-Resistant): USDA approved one component acetoxo silicone rubber, mildew resistant, acceptable to local health officials, conforming to U.S. Food and Drug Administration regulation 21 CFR 177.2600, FS TT-S-001543A, Type Non-Sag, Class A, and FS TT-S-00230C, Type II, Class A and ASTM C920, Type S, Class 50, Grade NS, use NT,G and A with a minimum movement capability of ± 25 percent, and a Shore A hardness of 20, equal to the following:
1. Dow Corning, product "Dowsil 786".
 2. GE Silicones, product "SCS 1700 Sanitary".
 3. Pecora, product "898 NST".
 4. Tremco, product "Tremsil 200".
- H. Joint Sealer Type SP (Silicone, Paintable All Purpose): One-component, medium modulus, pre-pigmented, neutral cure elastomeric silicone sealant, or silyl-terminated polyether (hybrid) sealant, conforming to ASTM C920, Type S, Grade NS, Class 50, Use NT, G, A, and O. Paintable after manufacturer's recommended cure time.
1. Dow Corning, product "Dowsil 756 SMS Building Sealant".
 2. GE Silicones, product "SCS7000".
 3. Pecora, product "Dynatrol I-XL Hybrid".
- I. Pick-proof caulking at all Pysch. Exam Rooms and all other spaces deemed "secured" areas:
1. Basis of Design; Dyna-Poxy EP-1200; High abrasion resistant/tamperproof two-part, high-solids, highmodulus epoxy resin compound.

2.3 ACCESSORIES

- A. Compressible Joint Bead Back-Up: Compressible closed cell polyethylene, extruded polyolefin or polyurethane foam rod complying with ASTM C1330, Type C, 1/3 greater in diameter than width of joint. Shape and size of compressible back-up shall be as recommended by manufacturer for the specific condition used. Provide one of the following, or equal.
1. Construction Foam Products (Division of Nomaco, Inc.), Zebulon, NC, product "HBR Closed Cell".

2. Industrial Thermo Polymers Ltd., Brampton, Ontario CN, product "ITP Standard Backer Rod".
 3. BASF Construction Chemicals (Sonneborn), Shakopee MN, product "Sonolastic Closed Cell Backer Rod".
 4. W.R. Meadows Inc., Hampshire, IL, product "Sealtight Kool-Rod".
- B. Primers: Furnish and install joint primers of the types, and to the extent, recommended by the respective sealant manufacturers for the specific joint materials and joint function.
- C. Bond-Breaker Tape, and Temporary Masking Tape: Of types as recommended by the manufacturer of the specific sealant and caulking material used at each application, and completely free from contaminants which would adversely affect the sealant and caulking materials.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Conform to SWRI requirements, and sealant manufacturer's written requirements for installation.
- B. Install joint bead back-up in all joints in excess of 5/8-inch depth, and joints that have no back-up therein, placing the joint bead in the joint in a manner that will assure a constant depth 1/8 inch greater than the sealant and caulking material depth tolerances.
1. Set beads into joints continuously, by slightly stretching during placement, to permit compression against sides of joint, without surface wrinkles or buckles.
 2. Do not stretch back-up material into joints.
- C. Install bond breaker in joints where shown in the Drawings and wherever recommended by the sealant manufacturer to prevent bond of the sealant to surfaces where such bond might impair the Work.
- D. Apply masking tape or other precautions to prevent migration or spillage of materials onto adjoining surfaces.
- E. Apply urethane sealant and latex caulking materials into joints in accordance with manufacturer's instructions, using mechanical or power caulking gun equipped with nozzle of appropriate size, with sufficient pressure to completely fill the joints.
1. The depth of sealant and caulking materials shall be in accordance with manufacturer's recommendations for the specific joint function, but in no case exceed 1/2-inch in depth, nor less than 1/4-inch, regardless of the joint width.
 2. Maintain the outer edge of the sealant and caulking materials, where side faces of joints are in the same plane, back 1/8-inch from the faces.
 3. Apply sealant in continuous beads without open joints, voids or air pockets so as to provide a watertight and airtight seal for the entire joint length.
 4. After placement of the sealant and caulking materials, concave-tool the surfaces to uniform density, using a water-wet tool. Do not use detergents or soapy water for the tooling operations.
 5. Remove the temporary masking tape immediately after tooling, and before the sealant or caulking material has taken initial set.

3.2 SCHEDULE

- A. General: Seal joints seams, and intersections between dissimilar materials.
1. Colors for Sealant Types "SC", "SE", "SP" and "SM": As selected by the Architect from manufacturer's standard colors.
 2. Color for Sealant Types "AA" and "AP": White.
 3. In concealed installations and in partially or fully exposed installations, where so approved by the Architect, standard gray or black sealant may be used.
- B. Interior Joints: Listed by primary building material abutting sealant joints.
1. **Gypsum Board:**

	<u>Joint Condition</u>	<u>Sealant Type</u>
	a. Gypsum board to metal or wood trim:	AP or SP
	b. Gypsum board to abutting surfaces at exposed tops and bottoms partitions and walls:	AA
	c. Gypsum board to masonry:	SC
	d. Gypsum board to interior door and window frames, penetrating conduits and piping, light-fixtures, electrical cover plates, building specialty items, ductwork, grilles, supply diffusers, faucets, piping, escutcheon plates and similar items:	AP or SP
	e. Gypsum board to plumbing fixtures:	SM
2.	Architectural Millwork and Casework:	
	<u>Joint Condition</u>	<u>Sealant Type</u>
	a. Casework to abutting materials, kitchens, toilet rooms and similar "wet spaces": SM	
	b. Casework to abutting surfaces (except in "wet" spaces):	AP or SP
	c. Countertops to abutting wall surfaces and to abutting casework:	SM
	d. Countertops to plumbing fixtures and fittings:	SM
3.	Interior Metal:	
	<u>Joint Condition</u>	<u>Sealant Type</u>
	a. Metal to metal:	SC
4.	Interior Floor Drains:	
	<u>Joint Condition</u>	<u>Sealant Type</u>
	a. Floor drains to concrete slab:	SE
	b. Floor drains to resilient sheet flooring:	SE
5.	Acoustical Ceilings:	
	<u>Joint Condition</u>	<u>Sealant Type</u>
	a. Acoustical ceiling edge angle to wall surface or SP	AP
6.	Tile:	
	<u>Joint Condition</u>	<u>Sealant Type</u>
	a. Tile to tile vertical, and horizontal non-traffic joints:	SM
7.	Sanitary Plastic Wall Panels to Abutting Surfaces:	
	<u>Joint Condition</u>	<u>Sealant Type</u>
	a. Sanitary plastic panels to abutting materials: SM	
8.	Interior Wood:	
	<u>Joint Condition</u>	<u>Sealant Type</u>
	a. Wood to wood (natural or stained finishes)	SC or SP
	b. Wood to wood (painted opaque finishes)	AP or SC or SP
	c. Wood to metal	SC or SP
	d. Wood base to wall surfaces	SC or SP

END OF SECTION

SECTION 081113
HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Furnish the following products to be installed under the designated Sections:
 - 1. Flush UL-Labeled and non-labeled steel doors, complete with internal reinforcing, hardware cut-outs; and provided with glazing openings, where so indicated; installed by Section 062000 - FINISH CARPENTRY.
 - 2. Hollow metal frames for doors, UL-Labeled and non-labeled, complete with internal reinforcing; installed under Section 061000 - ROUGH CARPENTRY.
 - 3. Glazing beads, loosely attached to hollow metal frames and doors, where so indicated, for removal and permanent installation during glazing operations; installed by: Section 088000 - GLAZING.

1.2 RELATED REQUIREMENTS

- A. Section 061000 - ROUGH CARPENTRY:
 - 1. Wood blocking, and nailers.
 - 2. Installation of hollow metal door frames.
- B. Section 062000 - FINISH CARPENTRY: Installation of doors and hardware.
- C. Section 079200 - JOINT SEALANTS: Requirements for sealants and backing materials.
- D. Section 088000 - GLAZING: Furnishing and installing glass located in doors and frames.
- E. Section 092900 - GYPSUM BOARD: Gypsum grout fill for hollow metal frames occurring in gypsum drywall assemblies.
- F. Section 099100 - PAINTING: Applied finish coatings.
- G. Building-in of frame anchors to wall and partition construction: By trade responsible for wall and partition erection.

1.3 REFERENCES

- A. Reference Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 014200 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. ANSI A 117.1 - Specifications for Making Buildings and Facilities Accessible to and Usable by Physically Handicapped People.
 - 2. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames, Frame Anchors and Hardware Reinforcing.
 - 3. ANSI/SDI A250.8 - R2008 (formerly SDI 100) - Recommended Specifications for Standard Steel Doors and Frames.
 - 4. ANSI/SDI A250.11 - Recommended Erection Instructions for Steel Frames.
 - 5. SDI 111 Series (111A-111F): Recommended Details, Steel Doors and Frames.
 - 6. SDI 117-93: Manufacturing Tolerances for Standard Steel Doors and Frames.
 - 7. NFPA publication 80 - Fire Doors and Windows.
 - 8. NFPA publication 105 - Standard for the Installation of Smoke Door Assemblies.
 - 9. UL publication 10B - Fire Tests of Door Assemblies.
 - 10. UL publication 10C - Positive Pressure Fire Tests of Door Assemblies.
 - 11. UL 1784 - Air Leakage Tests of Door Assemblies.
 - 12. All applicable federal, state and municipal codes, laws and regulations for exits.
 - 13. ABAAS Architectural Barrier Act Accessibility Standard; PLUS V.A. Standard PG-18-13.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:

1. General: Coordinate the work of this Section with the respective trades responsible for installing anchorages furnished by this Section; make arrangements for delivery, receipt and installation of inserts and anchorages to prevent delay of the Work.
2. Coordinate the work of this Section with the respective trades responsible for furnishing hardware and installing doors and frames.
3. Ensure that the work performed hereunder is coordinated with issued templates authorized by the hardware supplier.
4. Do not fabricate doors or frames before receiving a copy of the approved hardware schedule, submitted by the hardware supplier, reviewed by the Contractor and accepted by the Architect. Verify that issued templates are coordinated with the approved schedule; immediately notify the Architect, in writing, of any conflicts.

1.5 SUBMITTALS

- A. Information and Review Submittals: Submit the following under provisions of Section 013000 - ADMINISTRATIVE REQUIREMENTS:
 1. Product Data: Manufacturer's product data sheets, specifications, for doors, frames and shop applied finishes.
 2. Shop Drawings:
 - a. Door and Frame Schedule: A complete schedule coordinated with the door and frame schedule contained in the Contract Drawings.
 - b. Large scale details of each type door and frame construction, indicating all gages, reinforcing, and anchorage.
 - c. Indicated cutouts for glazing.
 3. Certificates: Manufacturer's written certification stating that doors, frames, and all related items to be furnished hereunder, meet or exceed the requirements specified under this Section; that specified galvanized and shop priming has been performed; and that all U.L. fire-resistive requirements for the indicated Labels have been met.
- B. Closeout Submittals: Submit the following under provisions of Section 017800 - CLOSEOUT SUBMITTALS.
 1. Bonds and Warranty Documentation: Manufacturer's standard warranty.

1.6 QUALITY ASSURANCE

- A. General: Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.
- B. Sole Source: Obtain doors and frames specified in this Section from a single manufacturer.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Delivery and Acceptance Requirements:
 1. Prior to shipping, identify each frame and door with a removable metal or plastic label which corresponds with door schedule identifying opening number and location.
 2. Do not deliver items to the site, until all specified submittals have been submitted to, and approved by, the Architect.
 3. Deliver doors and frames boxed or crated to provide protection during transit and job storage.
 4. Inspect doors and frames upon delivery for damage. Minor damage may be repaired provided the refinished items are equal in respects to new work and acceptable to the Architect; otherwise remove and replace damaged items.
- B. Storage and Handling Requirements:
 1. Store and handle materials following manufacturer's recommended procedures.
 2. Store doors and frames at the building site upright and under cover. Place the units on wood dunnage and cover in a manner that will prevent rust and damage.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers:
 - 1. Basis of Design: Curries Company (A Division of Assa Abloy Group Company), Mason City, IA. No substitutions will be accepted.

2.2 DESCRIPTION

- A. Regulatory Requirements:
 - 1. Fire rated door construction shall conform to UL publications 10B and 10C.
 - 2. Install fire rated door assemblies in compliance with NFPA 80.
 - 3. Corridor door assemblies shall be tested and listed per UL 1784.

2.3 DOORS

- A. General: Refer to the Drawings for design of doors, sizes, glazing cut-outs in doors, and details.
- B. Construction: Full flush commercial type, 1-3/4 inches thick, unless noted otherwise, meeting or exceeding the materials, gages, construction, and testing requirements of the referenced ANSI and SDI publications.
- C. Interior Door Core Construction: Manufacturer's standard 99-pound (basis weight) kraft-paper honeycomb, polystyrene, polyurethane, polyisocyanurate, mineral-board, or vertical steel-stiffener core.
 - 1. Interior Fire Door Core: As required to provide fire-protection and temperature-rise ratings indicated.
- D. Interior Doors:
 - 1. Interior Doors 1-3/4 inch thick (44.4 mm): ANSI 250.8, Level 2, Model 1 (Full Flush), ANSI A250.4 Physical Performance Level B, (Heavy Duty) having 18-gage, minimum 0.042 inch (1.0 mm) steel faces, with a minimum STC rating of 32.
 - 2. Hardware reinforcing:
 - a. Hinges: 7 gage, minimum 0.167 inch (4.2 mm) thick.
 - b. Closers: Box/channel-shape reinforcing, 12 gage, minimum 0.093 inch (2.3 mm) thick.
 - c. Locks: Box/channel-shape reinforcing,
 - d. Mortise locks: 14 gage, minimum 0.067 inch (1.6 mm) thick.
 - e. Kick plates: 18 gage, minimum 0.042 inch (1.0 mm) thick.
 - f. All other hardware: 14 gage, minimum 0.067 inch (1.6 mm) thick.
 - g. Locations for reinforcing shall be determined from information and templates provided under Section 087100 - DOOR HARDWARE.
- E. Visible edge seams: weld edge seams and finish for seamless appearance (Model 2).

2.4 HOLLOW METAL FRAMES

- A. General: Refer to the Drawings for various types of frames, sizes, and profiles, UL fire-resistive Label frames, and other characteristics of frames and related items.
 - 1. Frame type (all frames), non rated frames and fire-resistance rated frames: Shop welded frames with mitered joints arc-welded, reinforced and ground smooth.
- B. Materials for frames, reinforcement, anchors, anchor clips and related items: commercial grade cold-rolled steel conforming to ASTM A109 or commercial grade hot-rolled and pickled steel conforming to ASTM A415.
 - 1. Frame gage:
 - a. Interior frames for Level 2 and 3 doors: 16-gage, 0.053 inch thick (1.3 mm), except as otherwise required for specific U.L. Label.
 - 2. Reinforcing channels within frames, except where structural steel channels are indicated, and except where U.L. Label requirements prohibit same: 12 gage.

3. Hinge reinforcement: 7 gage, minimum 0.167 inch (4.2 mm) thick.
 4. Lock and strike reinforcement: 12 gage, minimum 0.093 inch (2.3 mm) thick.
 5. Door closer reinforcement: 12 gage, minimum 0.093 inch (2.3 mm) thick.
 6. Floor clips: 16 gage, minimum 0.053 inch (1.3 mm) thick.
 7. Splice plates or channels: same gage as door frame.
 8. Removable Glazing stops: Rectangular channel sections, not less than 20-gage, 0.032 inch thick (0.8 mm) steel; pre-drilled and loosely attached within the glazing cut-outs with countersunk tamper-resistant stainless steel screws; sized to properly accommodate the designated thicknesses of glass and glazing materials; and external edges set flush with, or slightly behind, door face. Modify glazing stops for UL Label doors to conform with UL fire rating requirements.
 9. Mortar guards: 26 gage, minimum 0.016 inch (0.4 mm) thick.
- C. Frame construction:
1. Fire-rated frame assemblies: Modify specified construction to meet all construction requirements required for fire-resistive rating.
 - a. Affix appropriate UL, FM or Warnock Hersey labels to each rated frame assembly, indicating applicable rating.
 2. Shop-fabricate frames as whole single units per door opening, except when frame size is too large to ship as a single unit. Oversized frames may be shipped in large sections as practicable for field assembly with concealed splice plates or channels.
 - a. Frame corner construction: Shop welded frames with mitered joints arc-welded, reinforced and ground smooth.
 3. Reinforcements, stiffeners, and base angle clips: Welded to interior surfaces of frames to provide a stable base and so as to not interfere with installation of hardware.
 4. Appearance of finished frames: Strong, rigid, completely free from warp and buckle, with miters well-formed and in true alignment, and with surfaces smooth and free from defects of any kind.
 5. Silencer holes: Prepare frames for silencers at non-gasketed doors, coordinate with Section 087100 - DOOR HARDWARE and Hardware Schedule. Provide three single silencers for single doors, and mullions of double doors on strike side. Provide two single silencers on frame head at double doors without mullions.
 6. Glazing beads: Carefully place to properly accommodate the various thicknesses of glass and glazing materials, and loosely-attach to frames with flathead galvanized steel screws through pre-drilled holes having countersunk depressions.
- D. Anchorage:
1. Anchor clips for frames in metal stud partitions: Steel clips, 18-gage (minimum 0.042 inch [1.0 mm] thick), 1-1/2 inch upturned and downturned legs, or equivalent type standard with the manufacturer, contained within the frames, for screw attachment to metal studs under Section 092216 - NON-STRUCTURAL METAL FRAMING.
 2. Anchors for fire-resistive rated frames: Conform to all UL requirements for the specific fire-resistive ratings.
 3. Provide the following number of anchors, clips, or bolts, per jamb:
 - a. For frames 7'-6" in height or less: 3 anchors per jamb.
 - b. For frames 7'-6" in height or less and having doors exceeding 3'-0" feet width, and for cross corridor frames: 4 anchors per jamb.
 - c. For frames greater than 7'-6", up to 10'-0" in height: 4 anchors per jamb.
 - d. For frames greater than 7'-6", up to 10'-0" in height, and having doors exceeding 3'-0" feet width, and for cross corridor frames: 5 anchors per jamb.
 - e. For frames over 10'-0' in height: 5 anchors per jamb.

2.5 FABRICATION

- A. General: Do not fabricate materials until all specified submittals have been submitted to, and approved by, the Architect.

- B. Fabrication Tolerances, Maximum variation for doors and frames: Maximum diagonal distortion 1/16 inch measured with straight edge, corner to corner.

2.6 FINISHES

- A. Preparation: Pressure-sand all surfaces of all doors, frames, accessory items, anchors, and related items, to remove blemishes and foreign matter and provide paint grip. Spot-fill imperfections with metallic filler, and sand smooth. Thoroughly clean the surfaces by applying hot or cold phosphate treatment standard with the manufacturer.
- B. Following cleaning apply one dip or spray coat of rust-inhibitive metallic oxide, zinc chromate, or synthetic resin primer to all surfaces, including those which will be concealed after erection. Bake, or oven dry, the primer at time and temperature recommended by the manufacturer for developing maximum hardness and resistance to abrasion.

2.7 ACCESSORIES

- A. Removable Stops: Rolled steel channel shape.
- B. Astragals for Double Doors: Steel T shaped.
- C. Primer: ANSI A250.10 rust inhibitive type.

PART 3 - EXECUTION

3.1 ERECTION AND INSTALLATION

- A. Installation of frames and doors, including all accessories and related items furnished hereunder, will be performed under Section 061000 - ROUGH CARPENTRY, and Section 062000 - FINISH CARPENTRY.
- B. Section 061000 - ROUGH CARPENTRY shall place frames in correct position within specified tolerances, and provide temporary bracing at locations where frames are indicated to be built-into masonry. Section 042000 - UNIT MASONRY shall build and grout frames into masonry work.
- C. Final installation of loosely-attached glazing stops will be performed under Section 088000 - GLAZING.

END OF SECTION

SECTION 081426
PLASTIC LAMINATE CLAD WOOD DOORS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. High impact resistant plastic laminate clad wood doors; fire rated and non-rated.
 - 1. Stainless Steel Channel Continuous Edge Protection, typical on all swing doors in areas where the door edges may be subject to impact damage, including Corridors, Exam/Treatment Rooms, Storage & Supply Rooms and Utility/Work Rooms. Omit at Offices, Computer Work Rooms, Locker Rooms, Break Rooms, Toilet Rooms and similar locations.

1.2 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract and Division 01 Specification Sections apply to this Section.
- B. Section 016000 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- C. Section 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements for construction and demolition recycling.
- D. Section 081113 - HOLLOW METAL DOORS AND FRAMES.
- E. Division 08 - FINISH HARDWARE.

1.3 REFERENCES

- A. ASTM D4060 - Standard Test Method of Abrasion Resistance of Organic Coatings by the Taber Abraser; 2007.
- B. ASTM D4226 - Standard Test Methods for Impact Resistance of Rigid Poly(Vinyl Chloride) (PVC) Building Products; 2005.
- C. AWI/AWMAC (QSI) - Architectural Woodwork Quality Standards Illustrated; Architectural Woodwork Institute and Architectural Woodwork Manufacturers Association of Canada; 2005, 8th Ed., Version 2.0.
- D. ITS (DIR) Directory of Listed Products; Intertek Testing Services NA, Inc.; current edition.
- E. NFPA 80 - Standard for Fire Doors and Fire Windows; National Fire Protection Association' 2007.
- F. NFPA 252 - Standard Standard Methods of fire Tests of Door Assemblies; National Fire Protection Association; 2008.
- G. UBC Std 7-2, Part II - Test Standard for Smoke-and Draft-control Assemblies; International Conference of Buildings Officials; 1997.
- H. UL (BMD) - Building Materials Directory; Underwriters Laboratories Inc.; current edition.
- I. UL 10B - Standard for Fire Tests of Door Assemblies; 2008.
- J. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; 1998.
- K. UL 1784 - Standard for Air Leakage Tests of Door Assemblies; 2001.

1.4 SUBMITTALS

- A. See Section 013000 - ADMINISTRATIVE REQUIREMENTS for submittal procedures.
- B. Product Data: Indicate door core materials and construction; veneer species, type and characteristics.
- C. Specimen warranty.

- D. Shop Drawings: Illustrate door opening criteria, elevations, sizes, types, swings, undercuts required, special beveling, special blocking for hardware, factory machining criteria, factory finishing criteria, identify cutouts for glazing.
- E. Samples: Submit two samples of door construction, 6 by 6 inch in size cut from top corner of door.
- F. Samples: Submit samples of door cladding, 6 x 6 inch in size cut from top corner of door.
- G. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- H. Manufacturer's Installation Instructions: Indicate special installation instructions.
- I. Warranty: Submit manufacturer warranty to ensure forms have been completed in Owner's name and registered with manufacturer.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years of documented experience.
- B. Installed Fire Rated Door Assembly: Conform to NFPA 80 for fire rated class as indicated.
- C. Smoke and Draft Control Doors: In addition to required fire rating, comply with air leakage requirements of UL 1784; with "S" label; if necessary, provide additional gasketing or edge sealing.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Package, deliver and store doors in accordance with specified quality standard.
- B. Accept doors on site in manufacturer's packaging. Inspect for damage.
- C. Do not store in damp or wet areas.

1.7 PROJECT CONDITIONS

- A. Coordinate the work with door opening construction, door frame and door hardware installation.
- B. Do not deliver or install doors until building is enclosed and temperature and relative humidity can be maintained at occupancy levels during the remainder of the construction period.

1.8 WARRANTY

- A. See Section 017800 - CLOSEOUT SUBMITTALS for additional warranty requirements.
- B. Interior Doors: Provide manufacturer's warranty for the full life of the original installation.
- C. Include coverage for warping beyond specified installation tolerances, defective materials, telegraphing core construction, and delamination.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Specified Manufacturer (Basis of Design): To establish a standard of quality, design and function desired, Drawings and specifications have been based on VT Industries; "5-Ply Plastic Laminate".

2.2 DOORS

- A. All Doors:
 - 1. Quality Level: Custom Grade, Extra Heavy Duty performance, in accordance with WDMA I.S.1-A.
 - 2. Plastic Laminate Clad Wood Doors: 5-ply unless otherwise indicated.
- B. Interior Doors: 1-3/4 inches (44 mm) thick unless otherwise indicated; flush construction.
 - 1. Provide solid core doors at all locations.
 - 2. Fire Rated Doors: Tested to ratings indicated on drawings in accordance with International Building Code ("positive pressure"); UL or WH (ITS) labeled without any visible seals when door is open.

3. Smoke and Draft Control Doors: In addition to required fire rating, provide door assemblies tested in accordance with UL 1784 with maximum air leakage of 3.0 cfm per sq ft of door opening at 0.10 inch w.g. pressure at both ambient and elevated temperatures; with "S" label; if necessary, provide additional gasketing or edge sealing.

C. Durability performance

1. Cycle Slam WDMA TM-7, 1990.
2. Face Veneer Wear Index - Abrasion Resistance Testing: 28,000 cycles per ASTM D 4060.
3. Face Veneer Impact Resistance: 86 in/lb per ASTM D 4226.

2.3 DOOR AND PANEL CORES

- A. Non-Rated Solid Core and 20 Minute Rated Doors: Type bonded particleboard core (PC), plies and faces as indicated above.
- B. Fire Rated Doors: Mineral core, Type FD, plies and faces as indicated above; with core blocking as required to provide adequate anchorage of hardware without through-bolting

2.4 DOOR FACINGS

- A. Cross Banding behind High Pressure Laminate Finish: 1 ply.
- B. Crossbanding: 0.125" tempered hardboard.
- C. Vinyl Acrylic Face Veneers: High impact .040" extruded vinyl acrylic.
 1. Color: Integral throughout to prevent discoloration caused by scratching.
 2. Color: As selected from manufacturer's standard palette.
 3. Facing Adhesive: Type I - waterproof.
 4. Door Edges:
 - a. Finish:
 - 1) Edges of door to be PVC-Free high impact resistant engineered finish containing no persistent bio-accumulative toxicants (PBTs).
 - b. Edges shall be covered by manufacturer's "Edge of a Lifetime" Lifetime Limited Warranty against damage, and begins 1 month following original installation.
 - c. Edges are to fully wrap the door vertical stiles to eliminate banded edges thus improving durability and impact resistance.
 - d. Replaceable edges to be 3/4" thick for proper edge and face protection.
 - e. Door edges shall be exclusive of fasteners to improve appearance.
 - f. Edges must be flush with face of door thus eliminating raised edges that could be torn off.
 - g. Edges to include 1/4" radius edges to improve impact deflection. Square or banded edges should not be permitted.
 - h. Edges are to be extruded (not formed) to ensure correct appearance and proper door fit.
 - i. Edges to be provided as part of the construction of the door from single source manufacturer.
 5. Adhesives:
 - a. Crossbanding to core adhesives shall be Type II, urea formaldehyde free I to improve structural integrity of door.
 - b. Door faces are to be applied to the crossbanded core using Type I, urea formaldehyde free adhesives to eliminate delamination.

2.5 ACCESSORIES

- A. Glazing Stops: Rolled steel channel shape, butted corners; prepared for countersink style tamper proof screws.
- B. Astragals for Fire Rated Double Doors: Steel, T shaped, overlapping and recessed at face edge, specifically for double doors.

2.6 DOOR CONSTRUCTION

- A. Fabricate doors in accordance with door quality standard specified.
- B. Cores Constructed with Stiles and Rails:
 - 1. Provide solid blocks at lock edge for hardware reinforcement.
 - 2. Provide solid blocking for other through bolted hardware.
- C. Factory machine doors for hardware other than surface-mounted hardware, in accordance with hardware requirements and dimensions.
- D. Factory fit doors for frame opening dimensions identified on shop drawings, with edge clearances in accordance with specified quality standard.
- E. Provide edge clearances in accordance with AWI Quality Standards Illustrated Section 1700.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that opening sizes and tolerances are acceptable.
- C. Do not install doors in frame openings that are not plumb or are out-of-tolerance for size or alignment.

3.2 INSTALLATION

- A. Install doors in accordance with manufacturer's instructions and specified quality standard.
 - 1. Install fire-rated doors in accordance with NFPA 80 requirements.
- B. Factory-Finished Doors: Do not field cut or trim; if fit or clearance is not correct, replace door.
- C. Use machine tools to cut or drill for hardware.
- D. Coordinate installation of doors with installation of frames and hardware.
- E. Coordinate installation of glazing.

3.3 TOLERANCES

- A. Conform to specified quality standard for fit and clearance tolerances.
- B. Conform to specified quality standard for maximum diagonal distortion.

3.4 ADJUSTING

- A. Adjust doors for smooth and balanced door movement.
- B. Adjust closers for full closure.

3.5 PROTECTION

- A. Protect installed doors from damage by subsequent construction activities until Date of Substantial Completion.
- B. Repair doors damaged by subsequent construction activities in accordance with manufacturer's recommendations.

END OF SECTION

SECTION 083100
ACCESS DOORS AND PANELS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Wall and ceiling access door and frame units.
- B. Tiled wall inlay access panels.

1.2 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract and Division 01 Specification Sections apply to this Section.
- B. Section 016000 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- C. Section 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements for construction and demolition recycling
- D. Section 092900 - GYPSUM BOARD: Openings in GWB partitions and ceilings.
- E. Section 099100 - PAINTING: Field-applied finish.

1.3 REFERENCE STANDARDS

- A. ITS (DIR) - Directory of Listed Products; current edition.
- B. UL (FRD) - Fire Resistance Directory; Current Edition.

1.4 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide sizes, types, finishes, hardware, scheduled locations, and details of adjoining work.
- C. Samples: Submit two access units, 6 by 6 inch (150 by 150 mm) in size illustrating frame configuration.
- D. Manufacturer's Installation Instructions: Indicate installation requirements.
- E. Project Record Documents: Record actual locations of each access unit.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years documented experience.
- B. Conform to applicable code for fire rated access doors. Provide access doors of fire rating equivalent to the fire rated assembly in which they are to be installed.
- C. Provide products listed and labeled by UL or ITS (Warnock Hersey) as suitable for the purpose specified and indicated.

1.6 DELIVERY, STORAGE, AND PROTECTION

- A. Deliver materials to project site in manufacturer's original, unopened undamaged packaging, with identification labels intact.
- B. Store materials in original packaging, protected from exposure to harmful weather conditions, at temperature and humidity conditions recommended by the manufacturer.
- C. Store materials flat.

1.7 PROJECT CONDITIONS

- A. Coordinate the work with other work requiring access doors and the placement of support to receive anchor attachments
- B. Coordinate the work with installation of ceiling systems.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Acudor Products Inc: www.acudor.com <<http://www.acudor.com>>.
- B. Bauco Access Panel Solutions Inc, <<http://www.accesspanelsolutions.com>>
- C. Karp Associates, Inc: www.karpinc.com <<http://www.karpinc.com>>.
- D. Nystrom Building Products, Minneapolis, MN. www.nystrom.com <<http://www.nystrom.com>>.
- E. The William Brothers Corp, <<http://www.williams-brothers.com>>.

2.2 ACCESS PANELS - FOR FIRE RESISTANCE RATED CONSTRUCTION

- A. For fire-resistance rated wall and ceiling surfaces: Standard flush panel door meeting the following requirements:
 - 1. Panel and frame rating: UL "B" label for 90 minutes.
 - 2. Frame type:
 - a. For ceramic tile walls: 16 gage Type 304 stainless steel flanged frame, with flange exposed to view 1 inch or less, equal to:
 - 1) Acudor FW-5050 series
 - 2) Karp KRP-150FR series.
 - 3) Nystrom IT series.
 - 4) Williams WB-FRSS Regular series.
 - b. For gypsum board walls and ceilings: 16 gage galvanized bonderized steel frame, with 22 gage galvanized steel drywall bead.
 - 1) Acudor FW-5050DW
 - 2) Karp KRP-350FR series.
 - 3) Nystrom IW series.
 - 4) Williams WB-FR series.
 - 3. Door: Insulated flush panel door as follows:
 - a. Typical wall types: Flush door, sandwich construction with 2 inch thick mineral wool fiber insulation between two layers of 20 gage galvanized bonderized steel.
 - b. For ceramic tile walls only: Flush door, sandwich construction with 2 inch thick mineral wool fiber insulation between two layers of 20 gage Type 304 stainless steel.
 - 4. Hinge: Flush continuous piano hinge with stainless steel pin.
 - 5. Closer: Spring closer.
 - 6. Latch/lock: Latch bolt operated by (factory prepared to receive, site installed) 1-1/8 inch mortise cylinder lock.
- B. For fire-resistance rated wall surfaces: Medium security type, with flush panel door meeting the following requirements:
 - 1. Panel and frame rating: UL "B" label for 90 minutes.
 - 2. Frame type:
 - a. For gypsum board and veneer plastered walls and ceilings: 14 gage galvanized bonderized steel frame, with 22 gage galvanized steel drywall bead, equal to Nystrom SW series.

2.3 ACCESS PANELS - FOR NON- RATED CONSTRUCTION

- A. For non-rated wall and ceiling surfaces (service and non-public areas): Flush panel door type meeting the following requirements:
 - 1. Frame type:
 - a. For tiled walls: 16 gage Type 304 stainless steel flanged frame, with flange exposed to view 1 inch or less, equal to:
 - 1) Acudor UF-5000 series.
 - 2) Karp DSC-214SM series.
 - 3) Nystrom NT series.

- 4) Williams WB-GP series.
 - b. Gypsum board inlay access panel for walls and ceilings: 16 gage galvanized bonderized steel frame, with 22 gage galvanized steel drywall bead.
 - 1) Basis of Design: Bauco - 18 by 18 inch "Plus II"
 - 2) Acudor DW-5040 series.
 - 3) Karp KDW series.
 - 4) Nystrom NW series.
 - 5) Williams WB-PL series.
 2. Door: Flush panel door as follows:
 - a. Typical all wall types, except tile: 14 gage galvanized bonderized steel.
 - b. For tiled walls: 14 gage type 304 stainless steel.
 3. Hinge:
 - a. Typical: Concealed spring hinge enabling door to open 175 degrees and permit removal of door from frame.
 - b. Panels greater than 24 by 36 inches: Flush continuous piano hinge with stainless steel pin.
 4. Latch/lock: Latch bolt operated by (factory prepared to receive, site installed) 1-1/8 inch mortise cylinder lock.
 - B. For non-rated gypsum board walls and ceilings (Public areas): Recessed door type meeting the following requirements:
 1. Manufacturer's types:
 - a. Acudor DW-5015 series.
 - b. Karp:
 - 1) Walls: Karp RDW series.
 - 2) Ceilings: Karp KATR series.
 - c. Nystrom RW series.
 - d. Williams WB-DW series.
 2. Frame type: 16 gage galvanized bonderized steel frame, with 22 gage galvanized steel drywall bead.
 3. Door: Recessed 16 gage galvanized bonderized steel door. with 22 gage galvanized steel drywall bead.
 4. Hinge: Concealed pivot rod hinge.
 5. Latch/lock: Latch bolt operated by (factory prepared to receive, site installed) 1-1/8 inch mortise cylinder lock.
- 2.4 ANTI-LIGATURE ACCESS PANELS:
 - A. For non-rated and rated wall surfaces: Security type, with flush, welded pan type panel door meeting the following requirements:
 - B. Access doors shall be 20 gage steel, welded pan type.
 - C. Door flange shall be 1 inch wide minimum for embedment in drywall compound.
 - D. Locks shall be mortise slam latch with keyed cylinder.
 - E. All locks shall be keyed alike.
 - F. Acceptable manufacturers/series:
 1. J.L. Industries FDW Series.
 2. Cendrex PF Series. Ligature-resistant pull / lock combination
- 2.5 ACCESSORIES
 - A. Emergency latch release: For all ceiling panels and wall panels accessible from the back which are greater than 18 by 18 inches in size, provide an interior latch release mechanism to permit panel to be opened from back (interior side) of panel.

2.6 FACTORY FINISHING

- A. Panel assemblies fabricated from stainless steel: N°. 4 satin finish.
- B. Panel assemblies fabricated from galvanized bonderized steel: Baked on rust inhibitive gray primer finish.
- C. Panel assemblies fabricated from cold rolled steel: Phosphate dipped with baked on rust inhibitive gray primer finish.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that rough openings are correctly sized and located and proceed with installation only after unsatisfactory conditions have been corrected.
- B. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

3.2 PREPARATION

- A. Maintain temperature and humidity range for the time prior to, during and after installation recommended by the product manufacturer.

3.3 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.
- D. Comply with manufacturer's written instructions for installing high-security access doors and frames.

3.4 CLEANING

- A. Upon completion of installation, clean components and accessories per manufacturer's recommended cleaning methods.

3.5 PROTECTION

- A. Protect installed units after installation from damage from construction operations.
- B. If damage occurs, remove and replace damaged components or entire unit as required to provide unit in its original, undamaged condition.

END OF SECTION

SECTION 083313
COILING COUNTER DOORS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Wood coiling counter doors and operating hardware.

1.2 RELATED REQUIREMENTS

- A. Section 061000 - Rough Carpentry: Rough openings.
- B. Section 079200 - Joint Sealants: Sealing joints between frames and adjacent construction.
- C. Section 087100 - Door Hardware: Cylinder cores and keys.
- D. Section 092116 - Gypsum Board Assemblies: Rough openings.

1.3 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Submit manufacturer's standard literature showing materials and details of construction and finish. Include data on electrical operation.
- C. Shop Drawings: Indicate rough and actual opening dimensions, anchorage methods, hardware locations, and installation details.
- D. Samples: Submit two slats, 4 inch long (102 mm long), illustrating shape, color and finish texture.
- E. Manufacturer's Certificates: Certify products meet or exceed specified requirements.
- F. Manufacturer's Instructions: Indicate installation sequence and installation, adjustment, and alignment procedures.
- G. Operation and Maintenance Data: Indicate modes of operation, lubrication requirements and frequency, and periodic adjustments required.

1.4 QUALITY ASSURANCE

- A. Products Requiring Electrical Connection: Listed and classified by UL (DIR) as suitable for the purpose specified and indicated.
- B. Installer Qualifications: Company specializing in performing Work of this Section with minimum three (3) years and approved by manufacturer.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Coiling Counter Wood Doors:
 - 1. Overhead Door Corporation, 2501 S. State Hwy. 121, Suite 200, Lewisville, TX 75067; Phone (469) 549-7100; E-mail: info@overheaddoor.com.
 - 2. Substitutions: See Section 016000 - Product Requirements.

2.2 COILING COUNTER DOORS

- A. Coiling Counter Wood Doors: 665 Series wood slat curtain.
 - 1. Overhead Door Corporation, Wood Counter Doors with Integral Frames, Series 665.
 - a. Mounting: As indicated on drawings, within prepared opening.
 - b. Provide integral frame and sill of same material and finish.
 - c. Nominal Slat Size: 1-1/2 inch wide by 1/2 inch thick (38 mm wide by 12.7 mm thick).
 - d. Slat Profile: Flat, with long edges rabbeted to interlock forming sight-proof curtain.
 - e. Bottom Rail: Flat, with solid wood profile matching grain and species of slat.
 - f. Bottom Rail Size: 5 inch wide by 1-5/8 inch thick (127 mm wide by 41.3 mm thick)
 - g. Wood Finish: Wood species and finish to be selected by Architect from manufacturer's standard woods and finishes..

- h. Sand sight-exposed wood surfaces to smooth finish.
- i. Interlocking Hardware: Manufacturers standard, concealed within slat and bottom rail profile.
- j. Guides: Manufacturers standard for indicated counter door mounting and operation; same material and finish unless otherwise indicated.
- k. Manual push up operation.
- l. Locking Devices: Deadbolt with thumbturn, mortised into curtain bottom rail on coil side of counter door.
 - 1) Furnish two keys per lock, with cylinders specified in Section 087100.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that opening sizes, tolerances and conditions are acceptable.
- B. Examine conditions of substrates, supports, and other conditions under which this work is to be performed.
- C. Do not proceed until unsatisfactory conditions are fixed.

3.2 INSTALLATION

- A. Install units in accordance with manufacturer's instructions.
- B. Use anchorage devices to securely fasten assembly to wall construction and building framing without distortion or stress.
- C. Securely and rigidly brace components suspended from structure. Secure guides to structural members only.
- D. Fit and align assembly including hardware; level and plumb, to provide smooth operation.

3.3 ADJUSTING

- A. Adjust operating assemblies for smooth and noiseless operation.

3.4 CLEANING

- A. Clean installed components.
- B. Remove labels and visible markings.

END OF SECTION

SECTION 083323
OVERHEAD COILING DOORS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Exterior coiling doors.
- B. Electric operators and control stations.
- C. Motorized coiling door assemblies and shutters, operating hardware, fire-rated, non-fire-rated, and exterior; manually or electrically operated, with all related items including, but not limited to:
 - 1. Insulated steel slat door(s).
 - 2. Tracks.
 - 3. Clip angles.
 - 4. Guides.
 - 5. Electrical operation hardware and mechanisms.
 - 6. Coil housing.
 - 7. Operating control station.
 - 8. Weather seals.
- D. Wiring from electric circuit disconnect to operator to control station.

1.2 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract and Division 01 Specification Sections apply to this Section.
- B. Section 015000 - Temporary Facilities and Controls: Application of protection paper to finished resilient flooring.
- C. Section 016000 - Product Requirements: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- D. Section 017419 - Construction Waste Management and Disposal: Procedural and administrative requirements for construction and demolition recycling.
- E. Section 061000 - Rough Carpentry: Wood blocking for door opening.
- F. Section 055000 - METAL FABRICATIONS: Support framing.
- G. Section 079200 - Joint Sealants: Sealing joints between frames and adjacent construction.
- H. Section 087100 - Door Hardware: Cylinder cores and keys.
- I. Division 26 - Electrical:
 - 1. Conduit from electric circuit to door operator and from door operator to control station.
 - 2. Electrical power wiring and conduit from the building power supply to the motors, and from the motors to the operating control stations.
- J. Section 260583 - Wiring Connections: Power to disconnect.

1.3 REFERENCE STANDARDS

- A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 014200 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
- B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2017.
- C. ITS (DIR) - Directory of Listed Products; current edition.
- D. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.
- E. NEMA ICS 2 - Industrial Control and Systems Controllers, Contactors and Overload Relays Rated 600 Volts; 2000, with Errata (2008).

- F. NEMA MG 1 - Motors and Generators; 2017.
- G. UL (DIR) - Online Certifications Directory; Current Edition.
- H. UL 325 - Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems; Current Edition, Including All Revisions.

1.4 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide general construction, electrical equipment, and component connections and details.
- C. Shop Drawings: For each door provide project specific pertinent dimensioning, anchorage methods, hardware locations, and installation details.
- D. Samples: Submit two slats, 6 inch (152.4 mm) in size illustrating shape, color and finish texture.
- E. Manufacturer's Certifications: Certify products meet or exceed specified requirements.
- F. Maintenance Data: Indicate lubrication requirements and frequency and periodic adjustments required.

1.5 QUALITY ASSURANCE

- A. Products Requiring Electrical Connection: Listed and classified by ITS (DIR), UL (DIR), or testing firm acceptable to authorities having jurisdiction as suitable for purpose specified.

1.6 WARRANTY

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.
- B. Warranty: Manufacturer's limited door and operator system, except the counterbalance spring and finish to be free from defects in materials and workmanship for three (3) years or 20,000 cycles, whichever occurs first.
- C. Warranty: Manufacturer's limited door system warranty for two (2) years for all parts and components.
- D. Finish Warranty: Manufacturer's limited Max Finish Warranty for five (5) years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Overhead Coiling Doors:
 - 1. Overhead Door Corporation, 2501 S. State Hwy. 121, Suite 200, Lewisville, TX 75067; Phone (469) 549-7100; email: info@overheaddoor.com.
 - 2. Substitutions: See Section 016000 - Product Requirements.

2.2 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.
- B. Product: Overhead Door Corporation, Stormtite Insulated Rolling Service Doors, Model 625.
 - 1. Sandwich slat construction with insulated core of foamed-in-place polyurethane insulation; minimum R-value of 7.7 (RSI-value of 1.35).
 - 2. Electric operation.
 - 3. Mounting: Within framed opening.
 - 4. Sound Rating: Through curtain sound rating STC-28 as per ASTM E90.
 - 5. Air Infiltration: Meets ASHRAE 90.1 and IECC 2012/2015 C402.4.3 Air leakage < 1.00 cfm/ft².

2.3 MATERIALS AND COMPONENTS

- 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 two (2) galvanized steel angles minimum thickness 1/8 inch (3 mm) bolted back to back to reinforce curtain in the guides 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.
 4. Steel Slats: Minimum thickness, 24 gauge, 0.025 inch (0.635 mm); ASTM A653/A653M galvanized steel sheet.
 - a. Galvanizing: Minimum G90 (Z275) coating in accordance with ASTM A 653.
 - b. Powder Coat finish: PowerGuard Max powder coat, color as selected by Architect.
- B. Guide Construction: Continuous, of profile to retain door in place with snap-on trim, mounting brackets of same metal.
- C. Hood Enclosure and Trim: Internally reinforced to maintain rigidity and shape.
 1. Galvanized steel, minimum G90, in accordance with ASTM A 653 .
 2. PowerGuard Max powder coat, color to match slats.
- D. Lock Hardware:
 1. Cylindrical Locking Mechanism: Latchset lock cylinder, specified in Section 087100.
 2. For motor operated units, additional lock or latching mechanisms are not required.
- E. 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.

2.4 ELECTRIC OPERATION

- A. Operator, Controls, Actuators, and Safeties: Comply with UL 325; provide products listed by UL (DIR).
 1. Provide interlock switches on motor operated units.
- B. Electric Operators:
 1. Mounting: Side mounted.
 2. Motor Enclosure:
 - a. Exterior Coiling Doors: NEMA MG 1, Type 4; totally enclosed fan cooled (TEFC).
 3. Motor Rating: 1/2 hp (375 W); continuous duty.
 4. Motor Voltage: 115/230 volts, single phase, 60 Hz.
 5. Motor Controller: NEMA ICS 2, full voltage, reversing magnetic motor starter.
 6. Controller Enclosure: NEMA 250, Type 1.
 7. Opening Speed: 12 inches per second (300 mm/sec).
 8. Brake: Adjustable friction clutch type, activated by motor controller.
 9. Manual override in case of power failure.
 10. Refer to Section 260583 for electrical connections.
- C. Control Station: Provide standard three button (Open-Close-Stop) momentary-contact control device for each operator complying with UL 325.
 1. 24 volt circuit.
 2. Surface mounted, at interior door jamb.
 3. Entrapment Protection Devices: Provide sensing devices and safety mechanisms complying with UL 325.
 - a. Primary Device: Provide electric sensing edge, wireless sensing, NEMA 1 photo eye sensors, or NEMA 4X photo eye sensors as required with momentary-contact control device.
- D. Safety Edge: Located at bottom of coiling door, full width, electro-mechanical sensitized type, wired to stop and reverse door direction upon striking object, hollow neoprene covered.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that opening sizes, tolerances and conditions are acceptable.
- B. Examine conditions of substrates, supports, and other conditions under which this work is to be performed.
- C. Do not proceed until unsatisfactory conditions are fixed.

3.2 INSTALLATION

- A. Install units in accordance with manufacturer's instructions.
- B. Use anchorage devices to securely fasten assembly to wall construction and building framing without distortion or stress.
- C. Securely and rigidly brace components suspended from structure. Secure guides to structural members only.
- D. Fit and align assembly including hardware; level and plumb, to provide smooth operation.
- E. Coordinate installation of electrical service with Section 260583.
- F. Complete wiring from disconnect to unit components.
- G. Install enclosure and perimeter trim.

3.3 ADJUSTING

- A. Adjust operating assemblies for smooth and noiseless operation.

3.4 CLEANING

- A. Clean installed components.
- B. Remove labels and visible markings.

END OF SECTION

SECTION 084113

ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

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. This Section includes storefront entrance framing, aluminum entrances, glass and glazing, and door hardware and components.
 - 1. Storefront Framing System.
 - a. Kawneer, Trifab, Versaglaze, 601UT Framing System, 2" x 6" nominal dimension, Thermal, Front Plane.
 - 2. Types of Kawneer Aluminum Entrances include:
 - a. 350 Swing Door; Medium stile, 3-1/2" (89 mm) vertical face dimension, 1-3/4" (44.5 mm) depth, high traffic applications.
- B. Related Sections:
 - 1. 079200 "Joint Sealants"
 - 2. 087000 "Hardware"
 - 3. 088000 "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. General Performance: Aluminum-framed entrance system shall withstand the effects of the following performance requirements without failure due to defective manufacture, fabrication, installation, or other defects in construction.
- B. Aluminum Framed Performance Requirements:
 - 1. Wind Loading: Conform to 2015 Building Code.
 - a. Basic Wind Speed: 120 miles per hour, (three-second-gust).
 - 2. Air Infiltration:
 - a. Entrance Framing: For single acting offset pivot or butt hung entrances in the closed and locked position, the test specimen shall be tested in accordance with ASTM E 283 at a pressure differential of 1.57 psf (75 PA) for single and pairs of doors. A single 3'0" x 7'0" (915 mm x 2134 mm) entrance door and frame shall not exceed 1.0 cfm/ft². A pair of 6'0" x 7'0" (1830 mm x 2134 mm) entrance doors and frame shall not exceed 1.0 cfm/ft².
 - b. Punched Window Framing: Test specimen shall be tested in accordance with ASTM E 283 with interior seal, air leakage rate shall not exceed 0.06cfm/ft² (0.3 l/s x m²) at static air pressure differential of 6.2 psf (300Pa). CSA A440 Fixed Rating,
 - 3. Water Resistance:
 - a. Punched Window Framing: Test specimen shall be tested in accordance with ASTM E 331. There shall be no leakage at a minimum static air pressure differential of 10 psf (479 Pa) as defined in AAMA 501. CSA A440 B5 Rating.
 - 4. Uniform Load:
 - a. Punched Window Framing: A static air design load of 30psf (1436 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 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. CSA A440 C2 Rating.

5. Thermal Transmittance (U-factor):
 - a. Thermal transmittance test results are based upon 1" (25.4 mm) clear high-performance insulating glass (1/4" (e=0.035, #2), 1/2" warm edge spacer and argon fill gas, 1/4"). When tested to AAMA specification 1503, the thermal transmittance (U-factor) shall not be more than (0.28 COG) .38 or project specific [] Btu/hr/ft2/degreeF per AAMA 507 or [] Btu/hr/ft2/degreeF per NFRC 100.
 6. Condensation Resistance Factor (CRF) or Condensation Index (CI):
 - a. CRF when tested to AAMA Specification 1503, the CRF shall not be less than 77 frame and 71 glass (low-e).
 - b. CI when tested to CSA A-440, the CI shall not be less than 68 frame and 65 glass (low-e).
 7. Structural Performance: Corner strength shall be tested per the Kawneer dual moment load test procedure and certified by an independent testing laboratory to ensure weld compliance and corner integrity [Testing procedure and certified test results available upon request].
- C. Environmental Product Declarations (EPD): Shall have a Type III Product-Specific EPD.
- D. Material Ingredient Reporting: Shall have a complete list of chemical ingredients to at least 100ppm (0.01%) that covers 100% of the product, acceptable documentation includes:
1. Manufacturer's inventory with Chemical Abstract Service Registration Number (CASRN or CAS#).
 - a. Kawneer's Material Transparency Summary (MTS).
 2. Cradle to Cradle certification: Either document below is acceptable for this option.
 - a. Cradle to Cradle Certified™ with Material Health section Silver or above.
 - b. Silver Level or above Material Health Certificate.
 3. Red List Free DECLARE label.

1.5 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, and fabrication methods, dimensions of individual components and profiles, hardware, finishes, and installation instructions for each type of aluminum-framed entrance door indicated.
1. Recycled Content:
 - a. Provide documentation that aluminum has a minimum of 50% mixed pre- and post-consumer recycled content with a sample document illustrating project specific information that will be provided after product shipment.
 2. Material Ingredient Reporting:
 - a. Include documentation for material reporting that has a complete list of chemical ingredients to at least 100ppm (0.01%) that covers 100% of the product.
- 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 entrance door 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 entrance doors.
- F. Fabrication Sample: Corner sample consisting of a door stile and rail, of full-size components and showing details of the following:
1. Joinery, including welds.
 2. Glazing.
- 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 fabricating aluminum-framed entrance doors and storefronts 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 entrance door through one source from a single manufacturer.
- D. Product Options: Drawings indicate size, profiles, and dimensional requirements of aluminum-framed entrance doors 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 swing entrance door(s) and punched window(s) indicated, in location(s) shown on Drawings.
- 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 dimensions of aluminum-framed entrance door openings by field measurements before fabrication and indicate field measurements on Shop Drawings.

1.8 WARRANTY

- A. Submit the following warranties under provisions of Section 017800 - CLOSEOUT SUBMITTALS:
- B. Manufacturer's Standard Warranty: Provide written guarantee against defects in material and workmanship for ten (10) years from date of final shipment.
- C. Glass: Provide written warranty for insulated glass units, that they will be free from obstruction of vision as a result of dust or film formation on the internal glass surfaces caused by failure of the hermetic seal due to defects in material and workmanship.
 - 1. Warranty Period shall be for ten (10) years.
- D. Special Finish Warranty, Anodized Finishes: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of anodized finishes within specified warranty period.
 - 1. Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Delta E units when tested in accordance with ASTM D2244.
 - b. Chalking in excess of a No. 8 rating when tested in accordance with ASTM D4214.
 - c. Cracking, peeling, or chipping.
 - 2. Warranty Period: ten (10) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Product: Kawneer Company Inc. No Substitutions will be acceptable.

2.2 MATERIALS

- A. Aluminum Extrusions: Alloy and temper recommended by aluminum-framed entrance door manufacturer for strength, corrosion resistance, and application of required finish.
 - 1. Entrance Framing: Not less than 0.090" (2.3 mm) wall thickness at any location for the main frame and door leaf members.
 - 2. Punch Window Framing: Not less than 0.070" (1.8mm) wall thickness at any location for the main frame.
- B. Fasteners: Aluminum, nonmagnetic stainless steel or other materials to be non-corrosive and compatible with aluminum-framed entrance door 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. Weather Seals:
 - 1. Entrance Framing: Provide weather stripping with integral barrier fin or fins of semi-rigid, polypropylene sheet or polypropylene-coated material. Comply with AAMA 701/702.
 - 2. Punched Window Framing: For sealants within fabricated storefront system, provide permanently elastic, non-shrinking, and non-migrating type recommended by sealant manufacturer for joint size and movement.

2.3 STOREFRONT FRAMING SYSTEM

- A. Storefront Entrance Framing and Punched Window Framing:
 - 1. Basis of Design: Kawneer; "VersaGlaze 601UT, Front Plane Standard Receptor System".
 - 2. Thermally Broken Framing - Kawneer IsoLock™ Thermal Break with a 1/4" (6.4 mm) 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. Non-Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.
- C. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials. Where exposed 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 DOORS

- A. The door stile and rail face dimensions of the 350 entrance door will be as follows:
 - 1. Door: 350.
 - 2. Vertical Stile: 3-1/2" (89 mm).
 - 3. Top Rail: 3-1/2" (89 mm).

4. Bottom Rail: 6-1/2" (166 mm).
5. Optional Bottom Rail.
6. 10" (254 mm).
7. Major portions of the door members to be 0.125" (3.2) nominal in thickness and glazing molding to be 0.05" (1.3) thick.
8. Glazing gaskets shall be either EPDM elastomeric extrusions or a thermoplastic elastomer.
9. Provide adjustable glass jacks to help center the glass in the door opening.

2.5 WINDOWS

- A. Punched, fixed windows.
 1. 6" deep with 2" sightline.
 2. Sizes and configurations as indicated in Drawings.

2.6 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.

2.7 HARDWARE

- A. General: Provide manufacturer's standard hardware fabricated from aluminum, stainless steel, or other corrosion-resistant material compatible with aluminum; designed to smoothly operate, tightly close, and securely lock aluminum-framed entrance doors.
 1. Opening Force Requirements: Egress Doors not more than 15 lbf (67 N) to release the latch and not more than 30 lbf (133 N) to set the door in motion and not more than 15 lbf (67 N) to open the door to its minimum required width.
- B. Standard Hardware:
 1. Weather-stripping:
 - a. Meeting stiles on pairs of doors shall be equipped with an adjustable astragal utilizing wool pile with polymeric fin.
 - b. The door weathering on a single acting offset pivot or butt hung door and frame (single or pairs) shall be comprised of a thermoplastic elastomer weathering on a tubular shape with a semi-rigid polymeric backing.
 2. Hardware: Refer to the Drawings.
 3. Flush pull.

2.8 FABRICATION

- A. Fabricate framing member components that, when assembled, have the following characteristics:
 1. Profiles that are sharp, straight, and free of defects or deformations.
 2. Accurately fitted joints that are 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 that maintain required glazing edge clearances.
 6. Provisions for field replacement glazing.
 7. Fasteners, anchor, and connections devices that are concealed from view to the greatest extent possible.
- B. Mechanically Glazed Framing Members: fabricate for flush glazing without projecting stops.
- C. Aluminum Brake-Metal Work

1. Fabricate and install all extruded aluminum and formed sheet aluminum brake-metal work in conjunction with the aluminum storefront work as detailed and as reasonably required to complete the work including sill extensions, snap trim pieces, closures, coverings, flashings and other miscellaneous extruded and formed brake-metal work in conjunction with Work of this Section.
 - a. Provide extruded shapes wherever possible, reserving formed work for conditions where extrusions are not applicable.
 - b. Provide sheet metal panning not less than 0.060 inch thick.
 - c. Fasten trim clips, at not more than 16 inches on center.
 2. Protect surfaces from marring when forming work. Provide sufficient material thickness with all necessary concealed reinforcement and anchorage to prevent "oil canning" or deformation of the finished work. Material deemed defective by the architect will be replaced at no cost to the Owner.
- D. Fabricate aluminum-framed entrance doors in sizes indicated. Include a complete system for assembling components and anchoring doors.
- E. Fabricate aluminum-framed glass doors that are reglazable without dismantling perimeter framing.
 1. Door corner construction shall consist of mechanical clip fastening, SIGMA deep penetration plug welds and 1-1/8" (29 mm) long fillet welds inside and outside of all four corners. Glazing stops shall be hook-in type with EPDM glazing gaskets reinforced with non-stretchable cord.
 2. Accurately fit and secure joints and corners. Make joints hairline in appearance.
 3. Prepare components with internal reinforcement for door hardware.
 4. Arrange fasteners and attachments to conceal from view.
- F. Weather-stripping: Provide weather-stripping locked into extruded grooves in door panels or frames as indicated on manufacturer's drawings and details.

2.9 ALUMINUM FINISHES

- A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
- B. Factory Finishing:
 1. Kawneer Permanodic™ AA-M10C21A44, AAMA 611, Architectural Class I (0.7 mils minimum) Anodic Coating. (Color #40 Dark Bronze).

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 installation and proper water management.
 1. Masonry Surfaces: Visibly dry and free of excess mortar, sand, and other construction debris.
 2. Wood Blocking: 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 (76.2 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.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. Beginning of installation means acceptance of existing project conditions.

3.2 INSTALLATION

- A. Comply with Drawings, Shop Drawings, and manufacturer's written instructions for installing aluminum-framed entrance doors, hardware, accessories, and other components.
- B. Install aluminum-framed storefront systems and entrance doors so that components are 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.
 - 1. Install entrance doors to produce smooth operation and to produce weathertight enclosure and tight fit at weatherstripping. Adjust weatherstripping contact and hardware movement to produce proper operation.
- C. Set window sill members and door sill thresholds in bed of sealant, as indicated, for weathertight 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 corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.

3.3 FIELD QUALITY CONTROL

- A. Manufacturer's Field Services: Upon Owner's written request, provide periodic site visit by manufacturer's field service representative.
- B. Field Tests:
 - 1. 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.
 - 2. Conduct tests for air infiltration and water penetration with manufacturer's representative present.
 - 3. Tests that do not meet the specified performance requirements and units that have deficiencies shall be corrected as part of the contract amount.
 - 4. Air Infiltration Tests:
 - a. Conduct tests in accordance with ASTM E 783.
 - b. Allowable air infiltration shall not exceed 1.5 times the amount indicated in the performance requirements or 0.09 cfm/ft², whichever is greater.
 - 5. Water Infiltration Tests:
 - a. Conduct tests in accordance with ASTM E 1105.
 - b. 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 (300Pa).

3.4 CLEANING OF STOREFRONT SYSTEMS

- A. Clean all storefront systems promptly after installation, exercising care to avoid damage. Thoroughly clean all metal and glass surfaces free from dirt, handling marks, packing tapes, and foreign matter; remove excess sealant. Remove labels from glass surfaces, and clean and polish same.
- B. Touch-up all scratches, abrasions, and other defects in the prefinished metal surfaces with shop-coat finish material, supplied with the various items to be furnished hereunder.
- C. The manufacturer shall advise the Contractor of protective treatment and other precautions required by him through the remainder of construction to ensure that the work of this Section will be without damage or deterioration at the time of Substantial Completion of the Contract.

3.5 CLEANING OF GLASS

- A. Clean glass surfaces promptly after installation, exercising care to avoid damage to the same. Remove excess sealing compounds, mortar, paint, dirt, and other contaminants.

- B. All exposed edges of sealant and gaskets shall be left smooth, uniform in line, and with edges neatly struck.

3.6 GLASS BREAKAGE

- A. Replace in kind and thickness all glass breakage caused by the work performed under this Section, and bear all costs therefore.
- B. Replace in kind and thickness all glass breakage, caused by other trades, because of negligence or any other reasons, with the costs being borne by the trade at fault, or the Contractor, as applicable.

3.7 PROTECTION

- A. Protect finished metal surfaces from damage during fabrication, shipping, storage, and erection; advise the Contractor of protective treatment and other precautions required through the remainder of construction. Protect installed products from damage until Date of Substantial Completion.

END OF SECTION

SECTION 084243

INTENSIVE CARE UNIT / CRITICAL CARE UNIT ENTRANCES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Packaged units consisting of doors, sidelights, frames, and hardware, manual and automatic open and self-closing with a friction hold-open position, trackless, and full break-out.

1.2 REFERENCE STANDARDS

- A. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2017a.
- B. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- C. ITS (DIR) - Directory of Listed Products; current edition.
- D. NAAMM AMP 500-06 - Metal Finishes Manual; 2006.
- E. UL (DIR) - Online Certifications Directory; Current Edition.

1.3 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's catalog data, detail sheets, and specifications, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
 - 4. Specimen warranty.
- C. Shop Drawings: Prepared specifically for this project; show dimensions of doors, sidelights, details of construction, and interface with other products.
- D. Verification Samples: For each finish product specified, minimum size 6 inches (150 mm) square, representing actual product, color, and patterns.
- E. Operating and Maintenance Data: Operating and maintenance instructions, and parts lists.
- F. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to project site in factory packaging, protected from damage.
- B. Store products in manufacturer's unopened packaging until ready for installation.
- C. Store products under cover and elevated above grade.

1.6 WARRANTY

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective Work within a five year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Intensive Care Unit (ICU)/Critical Care Unit (CCU) Entrances:

1. Stanley Access Technologies; 7200 ICU Series:
www.stanleyaccesstechnologies.com/sle.

2.2 ENTRANCE ASSEMBLIES

- A. Entrance Assemblies: Factory assembled, manually operated, extruded aluminum door and frame with normally-closed but operable sidelights, complete with hardware and operating components.
 1. Door and Sidelight Construction: Heavy duty interlocked extruded aluminum tubular stile and rail sections, through-rod bolted construction with steel corner support at hinge stile of carrier-suspended swinging panels or mechanically fastened corners with welded reinforcing brackets to reduce sag in sliding or breakout mode.
 - a. Door Thickness: 1-3/4 inch (44.5 mm), nominal.
 2. Accessible Door Opening Force: Maximum of 5 pound-force (22.2 N) to fully open door in compliance with ADA Standards and requirements of local authorities having jurisdiction.
 3. Panel Breakout Force: Maximum of 50 pound-force (222 N).
 4. Finish: High performance three-coat flouropolymer (PVDF), AAMA 2605, 50 percent resin; in compliance with NAAMM AMP 500-06.
 - a. Color: As selected by Architect.
- B. Dimensions:
 1. Overall Frame Width (Outside): 96 inches (2,438 mm).
 2. Clear Opening Width: 84.4 inches (2,144 mm), when swinging panels are fully open.
 3. Normal Operation Opening Width: 47.5 inches (1,206.5 mm).
 4. Overall Frame Height: 88 inches (2,235 mm).
 5. Framing Members: Provide manufacturer's standard extruded aluminum framing, reinforced as required to support imposed loads.
 - a. Nominal Sizes: 1-3/4 inch (44.5 mm) wide by 6 inch (152 mm) deep.
 - b. Concealed Fastening: Provide concealed fastening pocket in framing, with continuous flush insert cover extending full length of each framing member.
 6. Stile Design:
 - a. Narrow stile, 2 inch (51 mm), nominal width.
 7. Top Rail Height: 4 inch (102 mm), nominal.
 8. Intermediate Rail (Muntin Bar) Height: 2 inch (51 mm), nominal.
 9. Bottom Rail Height: 10 inch (254 mm), nominal.
 10. Glazing Stop Width: Manufacturers standard.
 11. Glazing Thickness: 1/4 inch (6 mm).
- C. Full Width Breakout Type Sliding Entrances: Normal operation consisting of side-sliding panel passing sidelight(s); panels along with sidelights have breakout function; sliding panels passing on non-swinging side of sidelight.
 1. Panels: Three; two sliding, one sidelight.
 2. Swing Direction: Panels to swing out into corridor.
 3. Swing Control: Spring-loaded stainless steel ball detent latch.
 4. Floor Track: Trackless.

2.3 COMPONENTS

- A. Aluminum Extrusions for Doors, Sidelights, Headers, and Trim: Alloy as recommended by manufacturer for construction and specified finish; nominal 1/8 inch (3.2 mm) wall thickness.
- B. Sliding Door Header: Track and suspension system concealed with removable cover.
 1. Track: Extruded aluminum, with anti-rising, anti-derailing design.
 2. Door Suspension System: Two wheeled carriers per panel, with steel ball bearings; wheel diameter minimum 1-1/4 inch (32 mm).
 3. Door Hanger Brackets: Nylon wheels with hardened steel bearings.

- C. Breakout Mechanism: 90 degree swing from any position in sliding cycle, released under not more than 50 pounds-force (222 N) pressure at strike stile of panel, with sufficient strength to support weight of panels without drooping or racking.
 - 1. Provide entrance units having UL (DIR) or ITS (DIR) listed exitway.
- D. Glazing Stops: Manufacturer's standard snap-on extruded aluminum square stops with preformed resilient glazing gaskets.
- E. Door Hardware: Provide door handles, recessed door pulls, and other hardware as required for normal and swing-open operation; factory install hardware to greatest extent possible.
- F. Glazing: Refer to Section 088000, Type ____.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that openings are plumb, square, and ready for installation of entrances.
- B. Verify that overhead support is properly located and securely anchored.
- C. Do not begin installation until substrates have been properly prepared.
- D. If substrate preparation is 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. Where aluminum components will contact different metals, prior to installation paint contact surfaces with primer or apply sealant or tape recommended by manufacturer for protection against galvanic action.
- D. Where aluminum components will contact concrete or masonry, prior to installation paint contact surfaces with bituminous paint.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions, except where more stringent requirements are specified.
- B. Install entrances securely anchored in place, plumb, level, and true to location, in alignment with established lines and grades, without warp, bow, or racking of members.
- C. Where frames are assembled in field, fit frame joints hairline tight without burrs or distortion; rigidly secure nonmoving joints and seal watertight.
- D. Install field-installed hardware using concealed fasteners to greatest extent possible.
- E. Install glazing in accordance with requirements of Section 088000.
- F. Adjust for proper operation, without binding or scraping and without excessive noise; lubricate operating hardware and other moving parts.
- G. After operation of the completed installation for minimum of 300 cycles, readjust and re-lubricate.

3.4 CLEANING

- A. Clean installed work to like-new condition.

3.5 PROTECTION

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

END OF SECTION

UNIVERSITY OF VERMONT MEDICAL CENTER
Outpatient Surgery Center
South Burlington, VT 05403

E4H Environments for Health Architecture
Project No. 2021073
January 27, 2023

SECTION 084413
GLAZED ALUMINUM CURTAIN WALLS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Design, engineering, furnishing and installation of aluminum framed glazed curtain wall system. Work includes, but is not limited to:
 - 1. Prefinished aluminum curtainwall framing system, including all angles, clips, and other items required to anchor the systems to the building structure.
 - 2. All glass and glazing materials.
 - 3. Prefinished aluminum formed brake-metal closures, flashings, etc., in conjunction with curtain wall framing.
 - 4. Metal to metal sealing of aluminum assemblies and sealing of assemblies to exterior wall panels.
 - 5. Integral fire stops and air and vapor barrier at floor slabs.
 - 6. Sealant and compressible back-up beads for exterior and interior perimeter joints between framing members furnished hereunder and surrounding dissimilar materials.
- B. Curtain Wall System:
 - 1. Kawneer, 1620 SSG Curtain Wall System, Vertical SSG Mullion.

1.2 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract and Division 01 Specification Sections apply to this Section.
- B. Section 016000 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- C. Section 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements for construction and demolition recycling.
- D. Section 061000 - ROUGH CARPENTRY: Wood blocking, nailers.
- E. Section 072726 - FLUID-APPLIED MEMBRANE AIR BARRIERS.
- F. Section 079200 - JOINT SEALANTS: Requirements for sealant and back-up materials.
- G. Section 088000 - GLAZING: Requirements for Glass and specification of glass types.

1.3 DEFINITIONS

- A. For fenestration industry standard terminology and definitions, refer to American Architectural Manufacturers Association Glossary (AAMA AG-13).

1.4 REFERENCE STANDARDS

- A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 014200 - REFERENCES.
 - 1. AAMA - Metal Curtain Wall, Window, Storefront and Entrance Guide Specification Manual.
 - 2. AAMA - Aluminum Curtain Wall Design Guide Manual, (1989 edition).
 - 3. AAMA - Curtain Wall Manual #10.
 - 4. AAMA - Series Number 12 Structural Sealant Glazing Systems.
 - 5. AAMA 2605 - Specification for High Performance Organic Coatings on Architectural Extrusions and Panels.
 - 6. ASCA 96 - Voluntary Specification for Performance of Organic Coatings on Architectural Aluminum Curtainwall, Extrusions and Miscellaneous Aluminum Components.
 - 7. ASTM E 283 - Rate of Air Leakage through Exterior Entrance and storefront, Curtains Walls and Doors.
 - 8. ASTM E 330 Structural Performance of Exterior Entrance and storefront, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.

9. ASTM E 331 - Test method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
10. AAMA 501.2 - Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls, and Sloped Glazing Systems; 2015.
11. AAMA 503 - Voluntary Specification for Field Testing of Newly Installed Storefronts, Curtain Walls and Sloped Glazing Systems; 2014.
12. ASTM E783 - Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors; 2002 (Reapproved 2010).
13. ASTM E1105 - Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform or Cyclic Static Air Pressure Difference; 2015.

- B. The following reference materials are hereby made a part of this Section by reference thereto:
1. Applicable recommendations and standards of AA, SIGMA and FGMA.

1.5 SUBMITTALS

- A. Submit the following under provisions of Section 013000 - ADMINISTRATIVE REQUIREMENTS:

1. Literature: Manufacturer's product data sheets, specifications, fabrication methods, finishes, performance data, and installation instructions for each item furnished hereunder.
 - a. Provide additional information for glazing and sealant products; including chemical, functional, and environmental characteristics, size limitations, special application requirements. Identify available colors.
 - b. Recycled Content: Provide documentation that aluminum has a minimum of 50% mixed pre- and post-consumer recycled content with a sample document illustrating project specific information that will be provided after product shipment.
2. Certifications:
 - a. Provide manufacturer's testing and submit test data. Demonstrate compliance with specified performance/design criteria.
 - b. Sealed glass unit manufacturer's certificate indicating conformance with standards specified herein and in Section 088000 - GLAZING.
3. Delegated-Design Submittal: For glazed aluminum curtain walls, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
4. Shop drawings:
 - a. 1/4 inch scale elevations and plans.
 - 1) Indicate all types and thickness of glass.
 - b. Large scale design details of curtain wall systems; indicating sizes, types, and gauges of all metal components; expansion provisions, and glazing details.
 - 1) Provide details of perimeter conditions and typical joinery. Indicate which framing members run through and how joints are sealed.
 - 2) Provide details of transition areas and modifications to standard system components.
 - 3) Provide details of bracing and stabilizing members; attachment clips and brackets; and complete installation details.
 - 4) Indicate building column line reference dimensions.
 - 5) Show project specific connection to and continuity with adjacent thermal, weather, air, and vapor barriers.
 - c. Provide reaction loads imposed on the structure, including all deadload, seismic, and windload reactions at each anchor location.
 - d. Provide all shop drawings bearing dimensions of actual measurements taken at the project.
 - e. Design engineering shall be the responsibility of the framing systems manufacturer, and may vary from those indicated on the Contract Drawings, but basic sight lines shall be retained.

5. Verification Samples: For each type of exposed finish required, in manufacturer's standard sizes.
- B. Manufacturer's Certificate: Certify that the products supplied meet or exceed the specified requirements.
- C. Field Quality Control Submittals: Report of field testing for water penetration and air leakage.
- D. Designer's Qualification Statement.
- E. Installer's Qualification Statement.
- F. Maintenance Data: For structural-sealant-glazed curtain walls to include in maintenance manuals. Include ASTM C1401 recommendations for post-installation-phase quality-control program.

1.6 WARRANTY

- A. Submit the following warranties under provisions of Section 017800 - CLOSEOUT SUBMITTALS:
- B. Special Assembly Warranty (Total Curtain Wall Installation): Manufacturer and Installer agrees to repair or replace components of glazed aluminum curtain wall that do not comply with requirements or that fail in materials or workmanship within specified warranty period.
 1. Failures include, but are not limited to, the following:
 - a. Structural failures including, but not limited to, excessive deflection.
 - b. Noise or vibration created by wind and thermal and structural movements.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - d. Water penetration through fixed glazing and framing areas.
- C. Manufacturer's Standard Warranty: Provide written guarantee against defects in material and workmanship for ten (10) years from date of final shipment.
- D. Glass: Provide written warranty for insulated glass units, that they will be free from obstruction of vision as a result of dust or film formation on the internal glass surfaces caused by failure of the hermetic seal due to defects in material and workmanship.
 1. Warranty Period shall be for ten (10) years.
- E. Special Finish Warranty, Anodized Finishes: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of anodized finishes within specified warranty period.
 1. Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Delta E units when tested in accordance with ASTM D2244.
 - b. Chalking in excess of a No. 8 rating when tested in accordance with ASTM D4214.
 - c. Cracking, peeling, or chipping.
 2. Warranty Period: ten (10) years from date of Substantial Completion.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer and that employs a qualified glazing contractor for this Project who is certified under the North American Contractor Certification Program (NACC) for Architectural Glass & Metal (AGM) contractors[and that employs glazing technicians certified under the Architectural Glass and Metal Technician (AGMT) certification program]
- B. Designer Qualifications: Design curtain wall and its structural support framing components under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed at the State in which the Project is located.
- C. Verify that each component is appropriate for use in structural sealant glazing (SSG) application in regards to at least the following properties; size, shape, dimensions, material, self-life, storage conditions, and color.

- D. Pre-installation Conference: Conduct conference at Project site to comply with requirements of Section 013100 - PROJECT MANAGEMENT AND COORDINATION.
1. Required attendees: Owner's Project Manager, Architect, Construction Manager, Curtainwall Installer's Project Superintendent, Curtainwall manufacturer's technical representative and representatives of other related trades as directed by the Architect or Contractor, and representatives for installers of related work specified under the following Sections:
 - a. Section 072700 - AIR/VAPOR BARRIERS.
 - b. Section 079200 - JOINT SEALANTS.
 - c. Section 088000 - GLAZING.
 2. Agenda:
 - a. Scheduling of curtainwall and glazing operations.
 - b. Review of staging and material storage locations.
 - c. Coordination of work by other trades.
 - d. Installation procedures for ancillary equipment.
 - e. Protection of completed Work.
 - f. Establish weather and working temperature conditions to which the Owner's Project Manager, Architect and Contractor must agree.
 - g. Emergency rain protection procedure.
 - h. Discuss process for manufacturer's inspection and acceptance of completed Work of this Section.
- 1.8 DELIVERY, STORAGE, AND HANDLING
- A. Protect pre-finished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings which bond when exposed to sunlight or weather.
 - B. Store framing and glazing materials in manner to keep them dry, protected from weather, direct sunlight, surface contamination, corrosion and damage from construction traffic and other causes.
- 1.9 ENVIRONMENTAL REQUIREMENTS
- A. Do not install sealant when ambient temperature is less than 40 degrees Fahrenheit.
 - B. Maintain this minimum temperature during and 48 hours after installation of sealant.
- 1.10 FIELD MEASUREMENTS
- A. Field Measurements:
 1. Take field measurements before preparation of shop drawings and fabrication, where possible, to ensure proper fitting of Work.
 2. Allow for adjustments within specified tolerances wherever taking of field measurements before fabrication might delay Work.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Product: Kawneer Company Inc. No Substitutions will be acceptable.

2.2 FRAMING SYSTEM

- A. Basis-of Design Product: Kawneer Company Inc., 1620 SSG Curtain Wall System
 1. Sightline: 2" (50.8 mm)
 2. System depth: 6" (152.4 mm)
 3. Outside-glazed pressure plate format and structural silicone glazed (SSG) format at vertical mullions where indicated in Drawings.

2.3 PERFORMANCE/DESIGN CRITERIA

- A. General: Design, fabricate, assemble and erect curtainwall system, and interfacing conditions with contiguous work, to ensure continuity of building enclosure vapor and air barriers and that

all segments of the assemblies will be free from leakage under every condition of weather and exposure. In addition to the specified performance requirements, curtain wall assembly shall conform to, or exceed the requirements of the applicable building code and referenced industry standards for air infiltration, water infiltration, operating forces, deflection and deformation under load.

- B. Engineering criteria: The manufacturer for curtain wall system shall employ the services of a qualified structural engineer, registered to practice in the State of Vermont, to prepare all calculations and other performance criteria for the respective systems, and bear all costs therefor. All shop drawings for the metal components of the respective systems shall bear the registration stamp of the engineer.
1. Wind loading: Conform to 2015 International Building Code:
 - a. Basic Wind Speed: 120 miles per hour, (three-second-gust).
 2. Structural-Test Performance: Test according to ASTM E 330 and TAS 202 as follows:
 - a. When tested at positive and negative wind load design pressures, assemblies do not evidence deflection exceeding L/175 of clear span.
 - b. A static air design load of 42 psf (2010 Pa) shall be applied in the positive and negative direction.
 - 1) When tested at 150% of positive and negative wind-load design pressures, assemblies, including anchorage, do not evidence material failures, structural distress, and permanent deformation of main framing members exceeding 0.2% percent of clear span.
 - 2) Minimum test duration according to ASTM E 330 is 10 seconds.
- C. Testing Requirements: Provide manufacturer's testing and submit test data. Demonstrate compliance with following specified requirements:
1. Test Sequence: Air infiltration testing shall precede water resistance testing.
 2. Air infiltration: through assembly, tested in accordance with ASTM E283 with a static pressure difference of 6.24 psf (300 Pa), shall not exceed 0.06 cfm per square foot of unit surface area.
 3. Water resistance:
 - a. Water Penetration under Static Pressure: No evidence of water penetration through fixed glazing and framing areas when tested according to ASTM E 331 and TAS 202 at 15psf (720 Pa).
 - b. Water Penetration under Dynamic Pressure: No evidence of water penetration through fixed glazing and framing areas when tested according to AAMA 501.1 at dynamic pressure equal to 15psf (720 Pa).
 - 1) Maximum Water Leakage: No uncontrolled water penetrating assemblies or water appearing on assemblies' normally exposed interior surfaces from sources other than condensation.
 4. Deflection: test in accordance with ASTM E330 at a static air pressure difference of 40 psf (positive and negative).
 - a. Deflection of framing members perpendicular to the plane of the wall shall not exceed L/175 of its clear span.
 5. Condensation resistance tests (CRF): conform to AAMA 1503.1 for a minimum CRF of 75 for frame, and CRF of 71 for glass.
 6. Energy Performance: Glazed aluminum curtain walls shall be tested in accordance with NFRC and AAMA Standards.
 - a. Thermal Transmittance (U-factor): Glass and framing areas shall have U-factor of no greater than 0.33 with specified glass as determined according to AAMA 1503.
 7. Sound Transmission: Provide glazed aluminum curtain walls with fixed glazing and framing areas having the following sound-transmission characteristics: STC-31 when tested for laboratory sound transmission loss according to ASTM E 90 and ASTM E 1425, and based on 1 inch insulating glass.
- D. Seismic Story Drift: Accommodate design displacement of adjacent stories indicated.

1. Design Displacement: Shall not exceed 1% of story height.
 2. Test Performance: Meeting criteria for passing based on building occupancy type when tested according to AAMA 501.4 at design displacement and 1.5 times the design displacement.
- E. Thermal Movements: Allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures:
1. Temperature Change (Range): 120 deg F (49 deg C), ambient; 180 deg F (82 deg C), material surfaces.
 2. Test Interior Ambient-Air Temperature: [75 deg F (24 deg C)] .
 3. 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.

2.4 MATERIALS

- A. Extruded Aluminum: Alloy and temper recommended by glazed aluminum curtain wall manufacturer for strength, corrosion resistance, and application of required finish. Complying with ASTM B221: 6063-T6 alloy and temper.
1. Not less than 0.070" (1.8 mm) wall thickness at any location for the main frame.
 2. Recycled content: Shall have a minimum of 50% mixed pre- and post-consumer recycled content.
- B. Sheet Aluminum: ASTM B209; alloy as required for forming and finishing.
- C. Fasteners: Aluminum, nonmagnetic stainless steel or other materials must be non-corrosive and compatible with aluminum 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: Aluminum 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" (6.3 mm) separation.

2.5 FRAMING MATERIALS

- A. The framing system shall provide for a flush glazing appearance with no projecting stops. Vertical and horizontal framing members shall have a nominal dimension of 2 inches face width by depth(s) indicated on Drawings.
- B. Provide and install all miscellaneous formed aluminum work in conjunction with the aluminum frame work as detailed and as required to complete the work including but not limited to sills, mullion covers, closures, flashings.
- C. Aluminum sections shall be of sizes and profiles indicated on the approved shop drawing details; shall present straight, sharply defined lines and arises; and shall be free from defects impairing strength, durability, or appearance.
1. Minimum wall thickness for framing members: not less than 0.070 inch wall thickness at any location for the main framing members.
 2. Thermal Barrier: Thermal barrier consists of 1" (25 mm) separation between the interior and exterior metal members in a typical condition, while maintaining a continuous

watertight seal. Thermal barrier assembly shall be tested to the thermal cycling requirements of ASTM E2692 and show no sign of degradation following the test.

- D. Formed flashings and closures shall be of aluminum Alloy/temper 5005-H34, minimum of 0.04 inch thick, complying with ASTM B 209.
 - 1. Provide and install all miscellaneous formed aluminum work in conjunction with the aluminum frame work as detailed and as required to complete the work including but not limited to sills, mullion covers, closures, flashings.
- E. System shall provide flush glazing on all sides or on 2 sides with SSG glazing on the other two, as indicated in the Drawings, for the indicated thickness of glass, with no projected glazing stops.
- F. All anchors and fasteners, including screws, nuts, bolts, rivets, and other fastening devices shall be of tempered aluminum or non-magnetic type 302/304 stainless steel, compatible with the aluminum frame members. All such devices shall be of suitable type and adequate capacity for each intended purpose. The aluminum work shall generally be constructed and erected without use of exposed fasteners. However, where exposed, the fasteners shall be finished to match the finish of surrounding aluminum.

2.6 ENTRANCE DOOR SYSTEMS

- A. General: Provide as indicated on Drawings and as specified under Section 084113 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS.

2.7 GLASS AND GLAZING MATERIALS

- A. General: Provide glass types scheduled and as indicated on Drawings, as specified under Section 088000 - GLAZING.
- B. Glazing materials, including all sealants, tapes and gaskets: As recommended by the aluminum curtainwall system manufacturer, and shall be in strict accordance with the manufacturer's printed instructions. It shall be the responsibility of the aluminum system manufacturer to provide glazing materials which are appropriate for the various uses and conditions, compatible with each other and also compatible with the materials with which in contact.
 - 1. Glazing Gaskets: Gaskets to meet requirements of ASTM C864. Color: Black.
 - 2. Spaces and Setting Blocks: Manufacturer's standard elastomeric type.
 - 3. Glazing Sealants: As recommended by manufacturer for joint type.
 - 4. Structural Glazing Sealants: ASTM C 1184, chemically curing silicone formulation that is compatible with system components with which it comes into contact, specifically formulated and tested for use as structural sealant and approved by structural sealant manufacturer for use in curtain wall assembly indicated. Color: Black.
 - 5. Weatherseal Sealants: ASTM C920 for Type S; Grade NS; Class 25; Uses NT, G, A, and O; chemically curing silicone formulation that is compatible with structural sealant and other system components with which it comes into contact; recommended by structural-sealant, weatherseal-sealant, and structural-sealant-glazed curtain-wall manufacturers for this use. Color: Black.

2.8 ACCESSORIES

- A. Steel Primer: FS TT-P-31; red; brown; for shop application and field touch-up.
- B. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos and formulated for 30-mil (0.762 mm) thickness per coat.
- C. Fasteners: All anchors and fasteners, including screws, nuts, bolts, rivets, and other fastening devices shall be of tempered aluminum or non-magnetic type 302/304 stainless steel, warranted by the manufacturer to be non-corrosive and compatible with aluminum frame members and other components of the curtain wall assemblies. All such devices shall be of suitable type and adequate capacity for each intended purpose.
 - 1. Perimeter Anchors: Aluminum or steel that is properly insulated from aluminum.

- D. Sealant and backing materials.
1. For all non-structural system sealant joints, including exterior metal-to-metal weather seals: Sealant type "SE" as specified under Section 079200 - JOINT SEALANTS, or as otherwise recommended by manufacturer.
 2. For perimeter joints between system framing and abutting materials, including exterior metal-to-metal weather seals: Sealant type "SE" as specified under Section 079200 - JOINT SEALANTS.
 3. Low pressure, low expansion polyurethane foamed-in-place insulation / air barrier sealant: applied to seal gaps, cracks, cavities and joints in the building envelope, at door frames, perimeter of window frames, and other similar penetrations in exterior walls.
 - a. Acceptable manufacturers for low pressure polyurethane foamed-in-place insulation / air barrier sealant:
 - 1) Fomo Products, Inc., Norton, OH.
 - 2) Dow Chemical Company, Midland, MI.
 - 3) Premier industrial Supply, Phoenix, AZ.
 - 4) Convenience Products, Division of Clayton Corp., Fenton, MO.
 - 5) Henry Company, El Segundo, CA.
 - b. Foamed-in-place insulation for air barrier sealant: Low Pressure Polyurethane foam sealant. Acceptable products include the following or approved equal:
 - 1) Fomo Products, Inc., product: "Handi Foam" or "Handi-Seal".
 - 2) Dow Chemical Company, product: "Great Stuff Pro".
 - 3) Premier industrial Supply, product: "XtraFoam".
 - 4) Convenience Products, Division of Clayton Corp., product: "Touch 'n Foam No Warp".
 - 5) Henry Company, product: "NailTite NT-100".

2.9 FABRICATION

- A. Fabricate components that, when assembled, are sharp, straight, and free of defects or deformations, accurately fit joints, physically and thermally isolate glazing from framing members, accommodates thermal and mechanical movements of glazing and framing that maintain required glazing edge clearances. Provide for field replacement of glazing from exterior, fasteners, anchors, and connection devices that are concealed from view to the greatest extent possible and 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.
- B. Check dimensions of openings for curtain wall systems in the actual construction by accurate field measurement before fabrication. When necessary to proceed with the fabrication without field measurements, coordinate and control installation tolerances to ensure proper fit of the aluminum curtain wall systems.
- C. Before shipment, complete fabrication, assembly, finishing, and other work to the greatest extent possible. Disassemble only for shipment and installation.
- D. Perform fabrication, including cutting, fitting, forming, drilling and grinding to prevent damage to exposed finish surfaces.
- E. Welding: Comply with AWS recommendations; grind exposed welds smooth and restore mechanical finish.
- F. Dissimilar Metals: Separate dissimilar metals with zinc chromate primer, bituminous paint, or other separator.
- G. Continuity: Maintain accurate relation of planes and angles, with hairline fit of contacting members.

2.10 ALUMINUM BRAKE-METAL WORK

- A. Fabricate and install all extruded aluminum and formed sheet aluminum brake-metal work in conjunction with the aluminum curtain wall work as detailed and as reasonably required to complete the work including sill extensions, snap trim pieces, closures, coverings, flashings and other miscellaneous extruded and formed brake-metal work in conjunction with Work of this Section.
 - 1. Provide extruded shapes wherever possible, reserving formed work for conditions where extrusions are not applicable.
 - 2. Provide sheet metal panning not less than 0.060 inch thick.
 - 3. Fasten trim clips, at not more than 16 inches on center.
- B. Protect surfaces from marring when forming work. Provide sufficient material thickness with all necessary concealed reinforcement and anchorage to prevent "oil canning" or deformation of the finished work. Material deemed defective by the architect will be replaced at no cost to the Owner.

2.11 FACTORY FINISHING

- A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
- B. Factory Finishing:
 - 1. Kawneer Permanodic™ AA-M10C21A44, AAMA 611, Architectural Class I (0.7 mils minimum) Anodic Coating. (Color #40 Dark Bronze).
- C. Concealed Steel Items: Galvanized in accordance with ASTM A386 to 2.0 ounces per square foot.
- D. Apply one coat of bituminous paint to concealed aluminum surfaces in contact with cementitious or dissimilar materials.

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 installation and proper water management.
 - 1. Masonry Surfaces: Visibly dry and free of excess mortar, sand, and other construction debris.
 - 2. Wood Blocking: 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 (76.2 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.
- B. Proceed with installation only after correcting unsatisfactory conditions.
- C. Beginning of installation means acceptance of existing project conditions.

3.2 ERECTION

- A. Coordinate the installation of the curtain wall systems, and related items to be furnished hereunder with the work of the other trades responsible for providing receiving and interfacing materials, and ensure that all receiving and supporting surfaces have been completed and ready to receive the work of this Section.
- B. Perform the installation work in strict accordance with the approved shop drawings, and the manufacturers' installation instructions, the applicable provisions of AAMA Aluminum Curtain

Wall Design Guide Manual, and referenced standards. Erect the various systems and items plumb and true, in proper alignment and relation to established lines and grades.

- C. All shims shall be aluminum. Wood shims will not be acceptable.
- D. Provide sheet aluminum closures as indicated or required to complete the Work.
- E. Provide thermal isolation where components penetrate or disrupt building insulation.
- F. Install flashings and set thresholds in bed of mastic and secure.
- G. Perform all glazing work in accordance with FGMA Glazing Manual SIGMA and LSGA standards, and with the curtain wall system manufacturers' recommended glazing procedures.
- H. All glass at frames shall be set by use of resilient glazing gaskets between both interior and exterior stops and glass, weathertight, in strict accordance with the printed glazing instructions of the manufacturers of aluminum work and glazing materials.
- I. Ensure that all metal-to-metal and metal-to-glass joints are completely weathertight, and that adequate provisions have been made to permit expansion and contraction in the metal.
- J. No permanent exposed to view labels of any kind will be permitted to remain on the frames or glass.

3.3 GLAZING

- A. Field glaze in accordance with FGMA Glazing Manual SIGMA and LSGA standards for glazing and installation methods and with the entrance/storefront framing system manufacturers' recommended glazing procedures. Do not glaze when ambient temperature is below 40 degrees Fahrenheit. Additionally:
 - 1. Prior to installing glass, clean glazing channels and framing members.
 - 2. Remove coatings not completely bonded to substrates.
 - 3. Remove lacquer from metal surfaces where in contact with glazing sealant.
 - 4. Protect glass from edge damage at all times. Utilize roller blocks and suction cups.
 - 5. Replace glass from edge damage or other imperfections which would weaken glass.
 - 6. Install setting and side blocks in locations recommended by referenced standards.
 - 7. Center glass in openings. Provide minimum bite and clearances as recommended by referenced standards. Install in manner to permit easy replacement of glass without dismantling frames.
 - 8. Prevent metal to glass contact at all locations. Protect edges of insulated units from moisture and solvents.
 - 9. Clean, prime and install stops.
- B. Glaze curtainwall system by use of resilient glazing gaskets between both interior and exterior stops and glass, weathertight, in strict accordance with the printed glazing instructions of the manufacturers of aluminum work and glazing materials.
- C. Structural Sealant Glazing (SSG) Adhesive: Install structural sealant glazing adhesive and weatherseal sealant in accordance with manufacturer's instructions.
- D. Ensure that all metal-to-metal and metal-to-glass joints are completely weathertight, and that adequate provisions have been made to permit expansion and contraction in the metal.
- E. Upon completion of the installation, thoroughly clean and polish all surfaces. Touch-up all scratches, abrasions, and other defects in the prefinished metal surfaces.

3.4 INSTALLATION - FOAMED-IN-PLACE INSULATION

- A. Apply insulation in method to a uniform monolithic density without voids, in accordance with manufacturer's instructions.
 - 1. Apply application of foam for air barrier seal includes, but is not limited to:
 - a. Door frames, window frames, and similar penetrations in exterior walls.
 - b. Gaps, cracks, cavities and joints in the building envelope, not sealed with other forms of air boots, including electrical boxes and conduit, ducts, fans, and piping.

- c. Where additionally indicated on Drawings.

3.5 TOLERANCES

- A. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities. Erect the aluminum systems plumb and level, free of warp or twist.
1. Install 1/16 inch per 10 feet, non cumulative, maximum variation from plumb.
 2. Install 1/32 inch maximum misalignment of two adjoining members abutting in plane

3.6 FIELD QUALITY CONTROL

- A. Field Tests: The Owner's Project Manager and the 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 (383 Pa).
 - B. Provide services of curtain wall manufacturer's field representative to observe for proper installation of system and submit report.
 - C. See Section 014000 - Quality Requirements, for independent field testing and inspection requirements, and requirements for monitoring quality of specified product installations.
 - D. Water-Spray Test: Provide water spray quality test of installed curtain wall components in accordance with AAMA 501.2 during construction process and before installation of interior finishes.
 1. Perform a minimum of two tests in each designated area as indicated on drawings.
 2. Conduct tests in each area prior to 10 percent and 50 percent completion of this work.
 - E. Provide field testing of installed curtain wall system by independent laboratory in accordance with AAMA 503 during construction process and before installation of interior finishes.
 1. Perform a minimum of two tests in each designated area as indicated on drawings.
 2. Conduct tests in each area prior to 10 percent and 50 percent completion of this work.
 3. Field test for water penetration in accordance with ASTM E1105 with uniform static air pressure difference (Procedure A) not less than 4.18 psf (200 Pa).
 - a. Maximum allowable rate of water penetration in 15-minute test is 0.5 ounce (14 gram) that is not contained in an area with provisions to drain to exterior, or collected on surface of interior horizontal framing member.
 4. Field test for air leakage in accordance with ASTM E783 with uniform static air pressure difference of 1.57 psf (75 Pa).
 - a. Maximum allowable rate of air leakage is 0.09 cfm/sq ft (0.5 L/s sq m).
 - F. Repair or replace curtain wall components that have failed designated field testing, and retest to verify performance conforms to specified requirements.

3.7 CLEANING OF CURTAIN WALL SYSTEM

- A. Clean all curtain wall system promptly after installation, exercising care to avoid damage. Thoroughly clean all metal and glass surfaces free from dirt, handling marks, packing tapes, and foreign matter; remove excess sealant. Remove labels from glass surfaces, and clean and polish same.
- B. Touch-up all scratches, abrasions, and other defects in the prefinished metal surfaces with shop-coat finish material, supplied with the various items to be furnished hereunder.

- C. The manufacturer shall advise the Contractor of protective treatment and other precautions required by him through the remainder of construction to ensure that the work of this Section will be without damage or deterioration at the time of Substantial Completion of the Contract.

3.8 CLEANING OF GLASS

- A. Clean glass surfaces promptly after installation, exercising care to avoid damage to the same. Remove excess sealing compounds, mortar, paint, dirt, and other contaminants.
- B. All exposed edges of sealant and gaskets shall be left smooth, uniform in line, and with edges neatly struck.

3.9 GLASS BREAKAGE

- A. Replace in kind and thickness all glass breakage caused by the work performed under this Section, and bear all costs therefore.
- B. Replace in kind and thickness all glass breakage, caused by other trades, because of negligence or any other reasons, with the costs being borne by the trade at fault, or the Contractor, as applicable.

3.10 PROTECTION

- A. Protect finished metal surfaces from damage during fabrication, shipping, storage, and erection; advise the Contractor of protective treatment and other precautions required through the remainder of construction. Protect installed products from damage until Date of Substantial Completion.

END OF SECTION

SECTION 087100
DOOR HARDWARE

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes commercial door hardware for the following:
1. Swinging doors.
 2. Sliding doors.
 3. Other doors to the extent indicated.
- B. Door hardware includes, but is not necessarily limited to, the following:
1. Mechanical door hardware.
 2. Electromechanical door hardware.
 3. Automatic operators.
 4. Cylinders specified for doors in other sections.
- C. Related Sections:
1. Division 06 Section "Rough Carpentry".
 2. Division 08 Section "Door Schedule".
 3. Division 08 Section "Door Hardware Schedule".
 4. Division 08 Section "Hollow Metal Doors and Frames".
 5. Division 08 Section "Flush Wood Doors".
 6. Division 08 Section "Aluminum-Framed Entrances and Storefronts".
 7. Division 08 Section "Automatic Door Operators".
 8. Division 28 Section "Access Control Hardware Devices".
- D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.
1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
 2. ICC/IBC - International Building Code.
 3. NFPA 70 - National Electrical Code.
 4. NFPA 80 - Fire Doors and Windows.
 5. NFPA 101 - Life Safety Code.
 6. NFPA 105 - Installation of Smoke Door Assemblies.
 7. UL/ULC and CSA C22.2 - Standards for Automatic Door Operators Used on Fire and Smoke Barrier Doors and Systems of Doors.
 8. State Building Codes, Local Amendments.
- E. Standards: All hardware specified herein shall comply with the following industry standards as applicable. Any undated reference to a standard shall be interpreted as referring to the latest edition of that standard:
1. ANSI/BHMA Certified Product Standards - A156 Series.
 2. UL10C - Positive Pressure Fire Tests of Door Assemblies.
 3. ANSI/UL 294 - Access Control System Units.

1.3 SUBMITTALS

- A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.
- B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate

the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
 2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.
 3. Content: Include the following information:
 - a. Type, style, function, size, label, hand, and finish of each door hardware item.
 - b. Manufacturer of each item.
 - c. Fastenings and other pertinent information.
 - d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
 - e. Explanation of abbreviations, symbols, and codes contained in schedule.
 - f. Mounting locations for door hardware.
 - g. Door and frame sizes and materials.
 - h. Warranty information for each product.
 4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project constSAction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.
- C. Shop Drawings: Details of electrified access control hardware indicating the following:
1. Wiring Diagrams: Upon receipt of approved schedules, submit detailed system wiring diagrams for power, signaling, monitoring, communication, and control of the access control system electrified hardware. Differentiate between manufacturer-installed and field-installed wiring. Include the following:
 - a. Elevation diagram of each unique access controlled opening showing location and interconnection of major system components with respect to their placement in the respective door openings.
 - b. Complete (risers, point-to-point) access control system block wiring diagrams.
 - c. Wiring instSActions for each electronic component scheduled herein.
 2. Electrical Coordination: Coordinate with related sections the voltages and wiring details required at electrically controlled and operated hardware openings.
- D. Keying Schedule: After a keying meeting with the owner has taken place prepare a separate keying schedule detailing final instSActions. Submit the keying schedule in electronic format. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instSActions. Owner must approve submitted keying schedule prior to the ordering of permanent cylinders/cores.
- E. Informational Submittals:
1. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.
- F. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Procedures.
- 1.4 QUALITY ASSURANCE
- A. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.

- B. Certified Products: Where specified, products must maintain a current listing in the Builders Hardware Manufacturers Association (BHMA) Certified Products Directory (CPD).
- C. Installer Qualifications: A minimum 3 years documented experience installing both standard and electrified door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in constSAction with a record of successful in-service performance.
- D. Door Hardware Supplier Qualifications: Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor by the manufacturers of the primary materials with a warehousing facility in Project's vicinity. Supplier to have on staff a certified Architectural Hardware Consultant (AHC) available during the course of the Work to consult with Contractor, Architect, and Owner concerning both standard and electromechanical door hardware and keying.
- E. Automatic Operator Supplier Qualifications: Power operator products and accessories are required to be supplied and installed through the Norton Preferred Installer (NPI) program. Suppliers are to be factory trained, certified, and a direct purchaser of the specified power operators and be responsible for the installation and maintenance of the units and accessories indicated for the Project.
- F. Source Limitations: Obtain each type and variety of door hardware specified in this section from a single source unless otherwise indicated.
 - 1. Provide electromechanical door hardware from the same manufacturer as mechanical door hardware, unless otherwise indicated.
- G. Each unit to bear third party permanent label demonstrating compliance with the referenced standards.
- H. Keying Conference: Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Keying conference to incorporate the following criteria into the final keying schedule document:
 - 1. Function of building, purpose of each area and degree of security required.
 - 2. Plans for existing and future key system expansion.
 - 3. Requirements for key control storage and software.
 - 4. Installation of permanent keys, cylinder cores and software.
 - 5. Address and requirements for delivery of keys.
- I. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.
 - 1. Prior to installation of door hardware, conduct a project specific training meeting to instSAct the installing contractors' personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware (including electromechanical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.
 - 2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.
 - 3. Review sequence of operation narratives for each unique access controlled opening.
 - 4. Review and finalize constSAction schedule and verify availability of materials.
 - 5. Review the required inspecting, testing, commissioning, and demonstration procedures
- J. At completion of installation, provide written documentation that components were applied to manufacturer's instSActions and recommendations and according to approved schedule.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.
- B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation with each item or package.
- C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. InstSActions for delivery to the Owner shall be established at the "Keying Conference".

1.6 COORDINATION

- A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.
- B. Door Hardware and Electrical Connections: Coordinate the layout and installation of scheduled electrified door hardware and related access control equipment with required connections to source power junction boxes, low voltage power supplies, detection and monitoring hardware, and fire and detection alarm systems.
- C. Door and Frame Preparation: Doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

1.7 WARRANTY

- A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:
 - 1. StSActural failures including excessive deflection, cracking, or breakage.
 - 2. Faulty operation of the hardware.
 - 3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - 4. Electrical component defects and failures within the systems operation.
- C. Standard Warranty Period: One year from date of Substantial Completion, unless otherwise indicated.
- D. Special Warranty Periods:
 - 1. Ten years for mortise locks and latches.
 - 2. Five years for exit hardware.
 - 3. Twenty five years for manual overhead door closer bodies.
 - 4. Five years for motorized electric latch retraction exit devices.
 - 5. Two years for electromechanical door hardware, unless noted otherwise.

1.8 MAINTENANCE SERVICE

- A. Furnish a complete set of specialized tools and maintenance as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

- A. General: Provide door hardware for each door to comply with requirements in Door Hardware Sets and each referenced section that products are to be supplied under.
- B. Designations: Requirements for quantity, item, size, finish or color, grade, function, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Sets at the end of Part 3. Products are identified by using door hardware designations, as follows:
 - 1. Named Manufacturer's Products: Product designation and manufacturer are listed for each door hardware type required for the purpose of establishing requirements. Manufacturers' names are abbreviated in the Door Hardware Schedule.
- C. Substitutions: Requests for substitution and product approval for inclusive mechanical and electromechanical door hardware in compliance with the specifications must be submitted in writing and in accordance with the procedures and time frames outlined in Division 01, Substitution Procedures. Approval of requests is at the discretion of the architect, owner, and their designated consultants.

2.2 HANGING DEVICES

- A. Hinges: ANSI/BHMA A156.1 certified butt hinges with number of hinge knuckles and other options as specified in the Door Hardware Sets.
 - 1. Quantity: Provide the following hinge quantity:
 - a. Two Hinges: For doors with heights up to 60 inches.
 - b. Three Hinges: For doors with heights 61 to 90 inches.
 - c. Four Hinges: For doors with heights 91 to 120 inches.
 - d. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.
 - 2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:
 - a. Widths up to 3'0": 4-1/2" standard or heavy weight as specified.
 - b. Sizes from 3'1" to 4'0": 5" standard or heavy weight as specified.
 - 3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:
 - a. Exterior Doors: Heavy weight, non-ferrous, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate standard weight.
 - b. Interior Doors: Standard weight, steel, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate heavy weight.
 - 4. Hinge Options: Comply with the following:
 - a. Non-removable Pins: With the exception of electric through wire hinges, provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for the all out-swinging lockable doors.
 - 5. Manufacturers:
 - a. Bommer Industries (BO).
 - b. McKinney (MK).
- B. Continuous Geared Hinges: ANSI/BHMA A156.26 Grade 1-600 certified continuous geared hinge. with minimum 0.120-inch thick extSAde 6063-T6 aluminum alloy hinge leaves and a minimum overall width of 4 inches. Hinges are non-handed, reversible and fabricated to template screw locations. Factory trim hinges to suit door height and prepare for electrical cut-outs.
 - 1. Manufacturers:
 - a. Bommer Industries (BO).
 - b. Pemko (PE).
- C. Pin and Barrel Continuous Hinges: ANSI/BHMA A156.26 Grade 1-600 certified pin and barrel continuous hinges with minimum 14 gauge Type 304 stainless steel hinge leaves, concealed

stainless pin, and twin self-lubricated nylon bearings at each knuckle separation. Factory trim hinges to suit door height and prepare for electrical cut-outs.

1. Manufacturers:
 - a. Markar Products; ASSA ABLOY Architectural Door Accessories (MR).
 - b. Pemko (PE).

- D. Pivots: ANSI/BHMA A156.4, Grade 1, certified. Space intermediate pivots equally not less than 25 inches on center apart or not more than 35 inches on center for doors over 121 inches high. Pivot hinges to have oil impregnated bronze bearing in the top pivot and a radial roller and thSAst bearing in the bottom pivot with the bottom pivot designed to carry the full weight of the door. Pivots to be UL listed for windstorm where applicable.

1. Manufacturers:
 - a. Norton Rixson (RF).

- E. Sliding and Folding Door Hardware: Hardware is to be of type and design as specified and should comply with ANSI/BHMA A156.14.

1. Sliding Bi-Passing Pocket Door Hardware: Provide complete sets consisting of track, hangers, stops, bumpers, floor channel, guides, and accessories indicated.
2. Pocket Sliding Door Hardware: Rated for doors weighing up to 200 lb.
3. Manufacturers:
 - a. Hafele Manufacturing (HF).
 - b. Pemko (PE).

2.3 POWER TRANSFER DEVICES

- A. Concealed Quick Connect Electric Power Transfers: Provide concealed wiring pathway housing mortised into the door and frame for low voltage electrified door hardware. Furnish with Molex™ standardized plug connectors and sufficient number of concealed wires (up to 12) to accommodate the electrified functions specified in the Door Hardware Sets. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Wire nut connections are not acceptable.

1. Manufacturers:
 - a. Pemko (PE) - EL-CEPT Series.
 - b. Securitron (SU) - EL-CEPT Series.

- B. Electric Door Wire Harnesses: Provide electric/data transfer wiring harnesses with standardized plug connectors to accommodate up to twelve (12) wires. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Provide sufficient number and type of concealed wires to accommodate electric function of specified hardware. Provide a connector for through-door electronic locking devices and from hinge to junction box above the opening. Wire nut connections are not acceptable. Determine the length required for each electrified hardware component for the door type, size and constSAction, minimum of two per electrified opening.

1. Provide one each of the following tools as part of the base bid contract:
 - a. McKinney (MK) - Electrical Connecting Kit: QC-R001.
 - b. McKinney (MK) - Connector Hand Tool: QC-R003.
2. Manufacturers:
 - a. McKinney (MK) - QC-C Series.

2.4 DOOR OPERATING TRIM

- A. Flush Bolts and Surface Bolts: ANSI/BHMA A156.3 and A156.16, Grade 1, certified.
1. Flush bolts to be furnished with top rod of sufficient length to allow bolt retraction device location approximately six feet from the floor.
 2. Furnish dust proof strikes for bottom bolts.
 3. Surface bolts to be minimum 8" in length and U.L. listed for labeled fire doors and U.L. listed for windstorm components where applicable.

4. Provide related accessories (mounting brackets, strikes, coordinators, etc.) as required for appropriate installation and operation.
5. Manufacturers:
 - a. Burns Manufacturing (BU).
 - b. Door Controls International (DC).
 - c. Rockwood (RO).
- B. Door Push Plates and Pulls: ANSI/BHMA A156.6 certified door pushes and pulls of type and design specified in the Hardware Sets. Coordinate and provide proper width and height as required where conflicting hardware dictates.
 1. Push/Pull Plates: Minimum .050 inch thick, size as indicated in hardware sets, with beveled edges, secured with exposed screws unless otherwise indicated.
 2. Door Pull and Push Bar Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door unless otherwise indicated.
 3. Offset Pull Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door and offset of 90 degrees unless otherwise indicated.
 4. Fasteners: Provide manufacturer's designated fastener type as indicated in Hardware Sets.
 5. Manufacturers:
 - a. Burns Manufacturing (BU).
 - b. Hiawatha, Inc. (HI).
 - c. Rockwood (RO).

2.5 CYLINDERS AND KEYING

- A. General: Cylinder manufacturer to have minimum (10) years experience designing secured master key systems and have on record a published security keying system policy.
- B. Cylinder Types: Original manufacturer cylinders able to supply the following cylinder formats and types:
 1. Threaded mortise cylinders with rings and cams to suit hardware application.
 2. Rim cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
 3. Bored or cylindrical lock cylinders with tailpieces as required to suit locks.
 4. Tubular deadlocks and other auxiliary locks.
 5. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.
 6. Keyway: Match Facility Restricted Keyway.
- C. Interchangeable Cores: Provide small format interchangeable cores as specified, core insert, removable by use of a special key; usable with other manufacturers' cylinders.
- D. Keying System: Each type of lock and cylinders to be factory keyed.
 1. Supplier shall conduct a "Keying Conference" to define and document keying system instructions and requirements.
 2. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner.
 3. Existing System: Field verify and key cylinders to match Owner's existing system.
- E. Key Quantity: Provide the following minimum number of keys:
 1. Change Keys per Cylinder: Two (2)
 2. Master Keys (per Master Key Level/Group): Five (5).
 3. ConstAction Keys (where required): Ten (10).
- F. ConstAction Keying: Provide temporary keyed ConstAction cores.
- G. Key Registration List (Bitting List):
 1. Provide keying transcript list to Owner's representative in the proper format for importing into key control software.

2. Provide transcript list in writing or electronic file as directed by the Owner.

2.6 KEY CONTROL

- A. Key Control Cabinet: Provide a key control system including envelopes, labels, and tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet. Key control cabinet shall have expansion capacity of 150% of the number of locks required for the project.
 1. Manufacturers:
 - a. Lund Equipment (LU).
 - b. MMF Industries (MM).
 - c. Telkee (TK).

2.7 MECHANICAL LOCKS AND LATCHING DEVICES

- A. Mortise Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.13, Series 1000, Operational Grade 1 Certified Products Directory (CPD) listed. Locksets are to be manufactured with a corrosion resistant steel case and be field-reversible for handing without disassembly of the lock body.
 1. Where specified, provide status indicators with highly reflective color and wording for "locked/unlocked" or "vacant/occupied" with custom wording options if required. Indicator to be located above the cylinder with the inside thumb-turn not blocking the visibility of the indicator status. Indicator window size to be a minimum of 2.1" x 0.6" with a curved design allowing a 180 degree viewing angle with protective covering to prevent tampering.
 2. Manufacturers:
 - a. Sargent Manufacturing (SA) - 8200 Series.

2.8 ELECTROMECHANICAL LOCKING DEVICES

- A. Electromechanical Mortise Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.13, Series 1000, Operational Grade 1 Certified Products Directory (CPD) listed, subject to same compliance standards and requirements as mechanical mortise locksets, electrified locksets to be of type and design as specified below and in the hardware sets.
 1. Electrified Lock Options: Where indicated in the Hardware Sets, provide electrified options including: outside door lock/unlock trim control, latchbolt and lock/unlock status monitoring, deadbolt monitoring, and request-to-exit signaling. Support end-of-line resistors contained within the lock case. Unless otherwise indicated, provide electrified locksets standard as fail secure.
 2. Manufacturers:
 - a. Sargent Manufacturing (SA) - 8200 Series.

2.9 LOCK AND LATCH STRIKES

- A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:
 1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
 2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
 3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.
 4. Double-lipped strikes: For locks at double acting doors. Furnish with retractable stop for rescue hardware applications.
- B. Standards: Comply with the following:
 1. Strikes for Mortise Locks and Latches: BHMA A156.13.
 2. Strikes for Bored Locks and Latches: BHMA A156.2.
 3. Strikes for Auxiliary Deadlocks: BHMA A156.36.
 4. Dustproof Strikes: BHMA A156.16.

2.10 CONVENTIONAL EXIT DEVICES

- A. General Requirements: All exit devices specified herein shall meet or exceed the following criteria:
1. At doors not requiring a fire rating, provide devices complying with NFPA 101 and listed and labeled for "Panic Hardware" according to UL305. Provide proper fasteners as required by manufacturer including sex nuts and bolts at openings specified in the Hardware Sets.
 2. Where exit devices are required on fire rated doors, provide devices complying with NFPA 80 and with UL labeling indicating "Fire Exit Hardware". Provide devices with the proper fasteners for installation as tested and listed by UL. Consult manufacturer's catalog and template book for specific requirements.
 3. Except on fire rated doors, provide exit devices with hex key dogging device to hold the pushbar and latch in a retracted position. Provide optional keyed cylinder dogging on devices where specified in Hardware Sets.
 4. Devices must fit flat against the door face with no gap that permits unauthorized dogging of the push bar. The addition of filler strips is required in any case where the door light extends behind the device as in a full glass configuration.
 5. Flush End Caps: Provide flush end caps made of architectural metal in the same finish as the devices as in the Hardware Sets. Plastic end caps will not be acceptable.
 6. Lever Operating Trim: Where exit devices require lever trim, furnish manufacturer's heavy duty escutcheon trim with threaded studs for thSA-bolts.
 - a. Lock Trim Design: As indicated in Hardware Sets, provide finishes and designs to match that of the specified locksets.
 - b. Where function of exit device requires a cylinder, provide a cylinder (Rim or Mortise) as specified in Hardware Sets.
 7. Vertical Rod Exit Devices: Where surface or concealed vertical rod exit devices are used at interior openings, provide as less bottom rod (LBR) unless otherwise indicated. Provide dust proof strikes where thermal pins are required to project into the floor.
 8. Narrow Stile Applications: At doors constSActed with narrow stiles, or as specified in Hardware Sets, provide devices designed for maximum 2" wide stiles.
 9. Dummy Push Bar: Nonfunctioning push bar matching functional push bar.
 10. Extended cycle test: Devices to have been cycle tested 50 million cycles.
 11. Rail Sizing: Provide exit device rails factory sized for proper door width application.
 12. Through Bolt Installation: For exit devices and trim as indicated in Door Hardware Sets.
- B. Conventional Push Rail Exit Devices (Heavy Duty): ANSI/BHMA A156.3, Grade 1 Certified Products Directory (CPD) listed panic and fire exit hardware devices furnished in the functions specified in the Hardware Sets. Exit device latch to be stainless steel, pullman type, with deadlock feature.
1. Manufacturers:
 - a. Sargent Manufacturing (SA) - 80 Series.

2.11 ELECTROMECHANICAL EXIT DEVICES

- A. Electromechanical Push Rail Exit Devices (Heavy Duty): ANSI/BHMA A156.3, Grade 1 Certified Products Directory (CPD) listed panic and fire exit hardware devices subject to same compliance standards and requirements as mechanical exit devices. Electrified exit devices to be of type and design as specified below and in the hardware sets.
1. Where conventional power supplies are not sufficient, include any specific controllers required to provide the proper inSAsh current.
 2. Motorized Electric Latch Retraction: Devices with an electric latch retraction feature must use motors which have a maximum current draw of 600mA. Solenoid driven latch retraction is not acceptable.
 3. Manufacturers:
 - a. Sargent Manufacturing (SA) - 80 Series.

2.12 DOOR CLOSERS

- A. All door closers specified herein shall meet or exceed the following criteria:
1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers.
 2. Standards: Closers to comply with UL-10C for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.
 3. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the Americans with Disabilities Act, provide units complying with ANSI ICC/A117.1.
 4. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.
 5. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics.
 6. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates as required for proper installation. Provide through-bolt and security type fasteners as specified in the hardware sets.
- B. Door Closers, Surface Mounted (Large Body Cast Iron): ANSI/BHMA A156.4, Grade 1 Certified Products Directory (CPD) listed surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thSA 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron body constSAction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control.
1. Manufacturers: (Exterior)
 - a. Norton Rixson (NO) - 9500 Series.
 - b. Sargent Manufacturing (SA) - 281 Series.
- C. Door Closers, Surface Mounted (Heavy Duty): ANSI/BHMA A156.4, Grade 1 Certified Products Directory (CPD) listed surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thSA 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body constSAction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control. Provide non-handed units standard.
1. Manufacturers: (Interior)
 - a. Norton Rixson (NO) - 7500 Series.
 - b. Sargent Manufacturing (SA) - 351 Series.

2.13 SURFACE MOUNTED CLOSER HOLDERS

- A. Electromagnetic Door Holders: Certified ANSI A156.15 electromagnetic door holder/releases with a minimum 20 to 40 pounds holding power and single coil constSAction able to accommodate .12VDC, 24VAC, 24VDC and 120VAC. Coils to be independently wound, employing an integral fuse and armatures to include a positive release button.
1. Manufacturers:
 - a. Norton Rixson (RF) - 980/990 Series.
 - b. ABH (AH)

2.14 ARCHITECTURAL TRIM

- A. Door Protective Trim
1. General: Door protective trim units to be of type and design as specified below or in the Hardware Sets.
 2. Size: Fabricate protection plates (kick, armor, or mop) not more than 2" less than door width (LDW) on stop side of single doors and 1" LDW on stop side of pairs of doors, and not more than 1" less than door width on pull side. Coordinate and provide proper width

and height as required where conflicting hardware dictates. Height to be as specified in the Hardware Sets.

3. Where plates are applied to fire rated doors with the top of the plate more than 16" above the bottom of the door, provide plates complying with NFPA 80. Consult manufacturer's catalog and template book for specific requirements for size and applications.
4. Protection Plates: ANSI/BHMA A156.6 certified protection plates (kick, armor, or mop), fabricated from the following:
 - a. Stainless Steel: 300 grade, 050-inch thick.
5. Options and fasteners: Provide manufacturer's designated fastener type as specified in the Hardware Sets. Provide countersunk screw holes.
6. Manufacturers:
 - a. Burns Manufacturing (BU).
 - b. Hiawatha, Inc. (HI).
 - c. Rockwood (RO).

2.15 DOOR STOPS AND HOLDERS

- A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.
- B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 certified door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.
 1. Manufacturers:
 - a. Burns Manufacturing (BU).
 - b. Hiawatha, Inc. (HI).
 - c. Rockwood (RO).
- C. Overhead Door Stops and Holders: ANSI/BHMA A156.8, Grade 1 Certified Products Directory (CPD) listed overhead stops and holders to be surface or concealed types as indicated in Hardware Sets. Track, slide, arm and jamb bracket to be constructed of extruded bronze and shock absorber spring of heavy tempered steel. Provide non-handed design with mounting brackets as required for proper operation and function.
 1. Manufacturers:
 - a. Norton Rixson (RF).
 - b. Rockwood (RO).

2.16 ARCHITECTURAL SEALS

- A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.
- B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.
 1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.
- C. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.
 1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and NFPA 252, Standard Methods of Fire Tests of Door Assemblies.
- D. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated.

- E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.
- F. Manufacturers:
 - 1. National Guard Products (NG).
 - 2. Pemko (PE).
 - 3. Reese Enterprises, Inc. (RE).

2.17 ELECTRONIC ACCESSORIES

- A. Networked Proximity Card Readers: Card readers to support HID 125 kHz proximity technology and interface with the access control reader modules and door control hardware devices as specified. Card readers to meet the following, minimum, design and performance specifications.
 - 1. Reader to operate on 12VDC or 5VDC power from the reader I/O modules at a maximum current rating of 150 mA per reader.
 - 2. Reader to be weatherproof type when installed in exterior or other wet environments.
 - 3. Reader to communicate with the reader I/O modules using industry standard Wiegand protocol interface.
 - 4. Reader to have multi-color LED display and audible status indications.
 - 5. Reader type and model to meet the design and mounting applications needs of each entry point as indicated on the drawings.
 - 6. Manufacturers (125 kHz Proximity):
 - a. Corbin SAsswin Hardware (SA) - 752F909/751F929 Series.
 - b. HID Global (HG) - MiniProx 5365/ProxPro II 5455 Series.
 - c. Sargent Manufacturing (SA) - 4302/4304 Series.
- B. Touchless Switches: FCC certified microwave sensing switch used for REX or activation of various access control devices in place of a traditional wired switch. Unit to have an adjustable sensing zone from 4" to 24". At exterior locations furnish foam gaskets and weather covers. Provide single gang or double gang unit as specified in the hardware sets.
 - 1. Manufacturers:
 - a. Alarm Controls (AK) - NTS Series.
 - b. Norton Rixson (NO) - 700 Series.
 - c. Securitron (SU) - WSS Series.
- C. Door Position Switches: Door position magnetic reed contact switches specifically designed for use in commercial door applications. On recessed models the contact and magnetic housing snap-lock into a 1" diameter hole. Surface mounted models include wide gap distance design complete with armored flex cabling. Provide SPDT, N/O switches with optional Rare Earth Magnet installation on steel doors with flush top channels.
 - 1. Manufacturers:
 - a. Sargent Manufacturing (SA) - 3280 Series.
 - b. Securitron (SU) - DPS Series.
- D. Intelligent Switching Power Supplies: Provide power supplies with single, dual or multi-voltage configurations at 12 and/or 24VDC. Power Supply shall have battery backup function with an integrated battery charging circuit. The power supply shall have a standard, integrated Fire Alarm Interface (FAI). The power supply shall provide capability for secondary voltage, power distribution, direct lock control and network monitoring through add on modules. The power supply shall be expandable up to 16 individually protected outputs. Output modules shall provide individually protected, continuous outputs and/or individually protected, relay controlled outputs. Network modules shall provide remote monitoring functions such as status reporting, fault reporting and information logging.
 - 1. Provide the least number of units, at the appropriate amperage level, sufficient to exceed the required total draw for the specified electrified hardware and access control equipment.

2. Manufacturers:
 - a. Securitron (SU) - AQL Series.

2.18 FABRICATION

- A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

2.19 FINISHES

- A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.
- B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware
- C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly constSAction, wall and floor constSAction, and other conditions affecting performance.
- B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.2 PREPARATION

- A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.
- B. Wood Doors: Comply with ANSI/DHI A115-W series.

3.3 INSTALLATION

- A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instSActions and according to specifications.
 1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.
- B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:
 1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
 2. DHI TDH-007-20: Installation Guide for Doors and Hardware.
 3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."
 4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.
- C. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instSActions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.

- D. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."
- E. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

3.4 FIELD QUALITY CONTROL

- A. Field Inspection (Punch Report): Reference Division 01 Sections "Closeout Procedures". Produce project punch report for each installed door opening indicating compliance with approved submittals and verification hardware is properly installed, operating and adjusted. Include list of items to be completed and corrected, indicating the reasons or deficiencies causing the Work to be incomplete or rejected.
 - 1. Organization of List: Include separate Door Opening and Deficiencies and Corrective Action Lists organized by Mark, Opening Remarks and Comments, and related Opening Images and Video Recordings.

3.5 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

3.6 CLEANING AND PROTECTION

- A. Protect all hardware stored on constSAction site in a covered and dry place. Protect exposed hardware installed on doors during the constSAction phase. Install any and all hardware at the latest possible time frame.
- B. Clean adjacent surfaces soiled by door hardware installation.
- C. Clean operating items as necessary to restore proper finish. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

3.7 DEMONSTRATION

- A. InstSAct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

3.8 DOOR HARDWARE SETS

- A. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.
 - 1. Quantities listed are for each pair of doors, or for each single door.
 - 2. The supplier is responsible for handing and sizing all products.
 - 3. Where multiple options for a piece of hardware are given in a single line item, the supplier shall provide the appropriate application for the opening.
- B. Manufacturer's Abbreviations:
 - 1. MK - McKinney
 - 2. MR - Markar
 - 3. PE - Pemko
 - 4. SU - Securitron
 - 5. RF - Rixson
 - 6. RO - Rockwood
 - 7. SA - Corbin SAsswin

8. HS - HES
9. NO - Norton
10. OT - Other

END OF SECTION

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100-01.00 – Framed Openings

Number	Keyset	Location	Fram	Door	Size	Label	Hand	Qty	Type
1273		CORRIDOR 1C26 To NOURISH 1273	HM		3'-0" x 7'-0" x 1-3/4"	---		1	SNGL
1202		CORRIDOR 1C18 To NOURISHMENT 1202	HM		4'-0" x 7'-0" x 1-3/4"	---		1	SNGL
G041		STERILE STORAGE G039 To STERILE PREP G041	HM		5'-0" x 7'-0" x 1-3/4"	---		1	PAIR

Qty Qty Description
 Inact

Finish Mfgr

Note:

Framed Opening No Hardware

101-01.00 – Office Doors

Number	Keyset	Location	Fram	Door	Size	Label	Hand	Qty	Type
1103		CHECK-IN 1102 To SECURITY 1103	HM	WD	3'-0" x 7'-0" x 1-3/4"	---	L	1	SNGL
1114		CORRIDOR 1C3 To DIRECTOR OFFICE 1114	HM	WD	3'-0" x 7'-0" x 1-3/4"	---	R	1	SNGL
1115		CORRIDOR 1C3 To OR MANAGER OFFICE 1115	HM	WD	3'-0" x 7'-0" x 1-3/4"	---	L	1	SNGL
1116		CORRIDOR 1C3 To HM OFFICE 1116	WD		3'-0" x 7'-0" x 1-3/4"	---	R	1	SNGL
1117		CORRIDOR 1C3 To OFFICE 1117	HM	WD	3'-0" x 7'-0" x 1-3/4"	---	L	1	SNGL
1119		CORRIDOR 1C3 To OFFICE 1119	HM	WD	3'-0" x 7'-0" x 1-3/4"	---	L	1	SNGL
1120		CORRIDOR 1C3 To COLLABORATE 1120	HM	WD	3'-0" x 7'-0" x 1-3/4"	---	L	1	SNGL
1121		CORRIDOR 1C3 To IT WORKSTATIONS 1121	HM	WD	3'-0" x 7'-0" x 1-3/4"	---	R	1	SNGL
1169		EQ 1365 To NURSE LEADS WORKSTATION 1169	HM	WD	3'-0" x 7'-0" x 1-3/4"	---	L	1	SNGL
1301		CORRIDOR UNNAMED To ANATOMIC PATH OFFICE 1301	HM	WD	3'-0" x 7'-0" x 1-3/4"	---	L	1	SNGL
1302		CORRIDOR UNNAMED To ANESTH CHARTING 1302	HM	WD	3'-0" x 7'-0" x 1-3/4"	---	L	1	SNGL
1306		CORRIDOR UNNAMED To RAD TECHS 1306	HM	WD	3'-0" x 7'-0" x 1-3/4"	---	R	1	SNGL

Qty Qty Description
 Inact

Finish Mfgr

3	0	4-1/2 Std Wt(.134) Hinge	TA2714	4-1/2" x 4-1/2"		26D	McKinney	101A
1	0	Mortise Lockset	70-8204	x LNL		US26D	Sargent	323A
1	0	Core	7190224				Stanley Security	307A
1	0	Wall Stop	409			US26D	Rockwood	700A
3	0	Silencer	608-RKW			GRAY	Rockwood	900A

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Note

101-02.00 - Basic Room

Number	Keypad	Location	Fram	Door	Size	Label	Hand	Qty	Type
1123		CORRIDOR 1C3 From STORAGE 1123	HM	HM	3'-0" x 7'-0" x 1-3/4"	---	RRA	1	SNGL
G042		STERILE PREP G041 From AUTOCLAVES G042	HM	HM	3'-0" x 7'-0" x 1-3/4"	---	LR	1	SNGL
1106		WAITING 1104 To CONSULT 1106	HM	WD	3'-0" x 7'-0" x 1-3/4"	---	L	1	SNGL
1107		WAITING 1104 To CONSULT 1107	HM	WD	3'-0" x 7'-0" x 1-3/4"	---	R	1	SNGL
1108		WAITING 1104 To CONSULT 1108	HM	WD	3'-0" x 7'-0" x 1-3/4"	---	L	1	SNGL
1C2.2		CORRIDOR 1C2 From CORRIDOR 1C1	HM	WD	3'-0" x 7'-0" x 1-3/4"	---	LR	1	SNGL
1C3		CORRIDOR 1C3 From CORRIDOR 1C2	HM	WD	3'-0" x 7'-0" x 1-3/4"	---	RR	1	SNGL
1C1.2		CORRIDOR 1C2 From CORRIDOR 1C1	HM	WD	3'-0" x 7'-0" x 1-3/4"	C45	LR	1	SNGL
1172			HM	HM	3'-0" x 7'-0" x 1-3/4"	---		1	SNGL

Qty	Qty	Description		Finish	Mfgr
		Inact			
3	0	4-1/2 Std Wt(.134) Hinge	TA2714 4-1/2" x 4-1/2"	26D	McKinney 101A
1	0	Mortise Passage	8215 x LNL	US26D	Sargent 330A
1	0	Wall Stop	409	US26D	Rockwood 700A
3	0	Silencer	608-RKW	GRAY	Rockwood 900A

Note

101-03.00 - Mechanical Spaces or Office w/ Closer

Number	Keypad	Location	Fram	Door	Size	Label	Hand	Qty	Type
G005		CORRIDOR GC4 To WATER SERV G005	HM	HM	3'-0" x 7'-0" x 1-3/4"		R	1	SNGL
G023		CORRIDOR GC4 To MED GAS EQUIPMENT	HM	HM	3'-0" x 7'-0" x 1-3/4"	---	L	1	SNGL
G04A		CORRIDOR CG6 To STOR GC4A	HM	HM	3'-0" x 7'-0" x 1-3/4"	---	L	1	SNGL
G04B		CORRIDOR CG6 To STOR GC4B	HM	HM	3'-0" x 7'-0" x 1-3/4"	---	R	1	SNGL
G012		CORRIDOR GC4 To EQUIP G012	HM	HM	3'-0" x 7'-0" x 1-3/4"	C45	R	1	SNGL
1128		CORRIDOR 1C1 From ELECTRIC ROOM 1128	HM	WD	3'-0" x 7'-0" x 1-3/4"	---	LR	1	SNGL
G003		CORRIDOR GC4 To OFFICE G003	HM	WD	3'-0" x 7'-0" x 1-3/4"	---	R	1	SNGL
G016		CORRIDOR GC6 To EVS OFFICE G016	HM	WD	3'-0" x 7'-0" x 1-3/4"	---	R	1	SNGL
SS2		CORRIDOR 1C9 To SHELL SPACE SS2	HM	WD	3'-0" x 7'-0" x 1-3/4"	---	R	1	SNGL
SS3		CORRIDOR To SHELL SPACE SS2	HM	WD	3'-0" x 7'-0" x 1-3/4"	---	R	1	SNGL
SS3.1		CORRIDOR 1C16 To SHELL SPACE SS3	HM	WD	3'-0" x 7'-0" x 1-3/4"	---	R	1	SNGL

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SS3.2	CORRIDOR 1C16 To SHELL SPACE SS3	HM	WD	3'-0" x 7'-0" x 1-3/4"	---	L	1	SNGL
1310	CORRIDOR UNNAMED From ELECTRIC ROOM 1310	HM	WD	4'-0" x 7'-0" x 1-3/4"	---	RR	1	SNGL
RS-1.2	EXTERIOR ROOF From STAIRWELL	HM	HM	4'-0" x 7'-0" x 1-3/4"	C45	LR	1	SNGL

Qty	Qty Inact	Description		Finish	Mfgr
3	0	5 Hvy Wt(.190) Hinge	T4A3786 5" x 4-1/2"	26D	McKinney 104A
1	0	Mortise Lockset	70-8204 x LNL	US26D	Sargent 323A
1	0	Core	7190224		Stanley Security 307A
1	0	Closer - Parallel Arm with 5th screw	351-CPS x MC	EN	Sargent 509A
1	0	Wall Stop	409	US26D	Rockwood 700A
3	0	Silencer	608-RKW	GRAY	Rockwood 900A

Note

101-04.00 – Toilets

Number	Keypad	Location	Fram	Door	Size	Label	Hand	Qty	Type
G028		CORRIDOR GC4 To TLT G028	HM	HM	3'-0" x 7'-0" x 1-3/4"	---	R	1	SNGL
G030		CORRIDOR GC4 To TLT G030	HM	HM	3'-0" x 7'-0" x 1-3/4"	---	L	1	SNGL
G033		CORRIDOR GC2 To LACT G033	HM	HM	3'-0" x 7'-0" x 1-3/4"	---	L	1	SNGL
G036.3		WOMENS LOCKERS G036 To SHOWER G036	HM	WD	2'-6" x 7'-0" x 1-3/4"	---		1	SNGL
G036.4		WOMENS LOCKERS G036 To SHOWER	HM	WD	3'-0" x 7'-0" x 1-3/4"	---		1	SNGL
1110		WAITING 1104 To PUBLIC TOILET 1110	HM	WD	3'-0" x 7'-0" x 1-3/4"	---	R	1	SNGL
1111		WAITING 1104 To PUBLIC TOILET 1111	HM	WD	3'-0" x 7'-0" x 1-3/4"	---	R	1	SNGL
1112		CORRIDOR 1C1 To LACTATION 1112	HM	WD	3'-0" x 7'-0" x 1-3/4"	---	L	1	SNGL
1113		WAITING 1104 To PUBLIC TOILET 1113	HM	WD	3'-0" x 7'-0" x 1-3/4"	---	R	1	SNGL
1122		CORRIDOR 1C3 To STAFF TOILET 1122	HM	WD	3'-0" x 7'-0" x 1-3/4"	---	L	1	SNGL
1161		CORRIDOR 1C7 To STAFF TOILET 1161	HM	WD	3'-0" x 7'-0" x 1-3/4"	---	L	1	SNGL
1205		CORRIDOR 1C18 To STAFF TOILET 1205	HM	WD	3'-0" x 7'-0" x 1-3/4"	---	R	1	SNGL
1270		CORRIDOR 1C26 To STAFF TOILET 1270	HM	WD	3'-0" x 7'-0" x 1-3/4"	---	R	1	SNGL
G037.2		ALL GENDERS G037 To ADA SHOWER G037.2	HM	WD	3'-0" x 7'-0" x 1-3/4"	---		1	SNGL
G038.3		VESTIBULE GT036.1 To MENS LOCKERS G038	HM	WD	2'-6" x 7'-0" x 1-3/4"	---		1	SNGL
G038.4		MENS LOCKERS G038 To SHOWER	HM	WD	3'-0" x 7'-0" x 1-3/4"	---		1	SNGL

Qty	Qty Description	Finish	Mfgr
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Inact

3	0	4-1/2 Std Wt(.134) Hinge	TA2714 4-1/2" x 4-1/2"	26D	McKinney	101A
1	0	Mortise Privacy	49-8265 x LNL	US26D	Sargent	304A
1	0	Wall Stop	409	US26D	Rockwood	700A
3	0	Silencer	608-RKW	GRAY	Rockwood	900A

Note

101-04.01 – Patient Toilets

Number	Keypad	Location	Fram	Door	Size	Label	Hand	Qty	Type
1157		CORRIDOR 1C7 To PATIENT TOILET 1157	HM	WD	3'-0" x 7'-0" x 1-3/4"	---	L	1	SNGL
1158		CORRIDOR 1C7 To PATIENT TOILET 1158	HM	WD	3'-0" x 7'-0" x 1-3/4"	---	R	1	SNGL
1159		CORRIDOR 1C7 To HM PATIENT TOILET 1159		WD	3'-0" x 7'-0" x 1-3/4"	---	L	1	SNGL
1201		CORRIDOR 1C18 To PATIENT TOILET 1201	HM	WD	3'-0" x 7'-0" x 1-3/4"	---	L	1	SNGL
1204		CORRIDOR 1C18 To PATIENT TOILET 1204	HM	WD	3'-0" x 7'-0" x 1-3/4"	---	L	1	SNGL
1245		CORRIDOR 1C25 From PATIENT TOILET 1245	HM	WD	3'-0" x 7'-0" x 1-3/4"	---	LR	1	SNGL
1246		CORRIDOR 1C25 From PATIENT TOILET 1246	HM	WD	3'-0" x 7'-0" x 1-3/4"	---	LR	1	SNGL
1257		NURSES 1274 From PATIENT TOILET 1257	HM	WD	3'-0" x 7'-0" x 1-3/4"	---	RR	1	SNGL
1258		CORRIDOR 1C23 From PATIENT TOILET 1258	HM	WD	3'-0" x 7'-0" x 1-3/4"	---	RR	1	SNGL

Qty	Qty	Description		Finish	Mfgr
	Inact				
1	0	Continuous Hinge	DSH1000-84C	26D	PE
1	0	Privacy Lock	ML2030 NSA V21	US26D	RU
1	0	Wall Stop	409	US26D	RO
2	0	Kick Plate	K1050 10" High	US26D	RO
3	0	Silencer	608-RKW	GRAY	RO
1	0	Emergency Stop	ERS84C-NOTCHxHT-XX		PE

Note

Double swing patient safe door.

101-05.00 – Work Rooms – Locked High Use

Number	Keypad	Location	Fram	Door	Size	Label	Hand	Qty	Type
1135		CORRIDOR 1C8 To EQUIPMENT STORAGE 1135	HM	WD	3'-0" x 7'-0" x 1-3/4"	---	L	1	SNGL
1166		CORRIDOR 1C3 From STORAGE 1166	HM	WD	3'-0" x 7'-0" x 1-3/4"	---	LR	1	SNGL
1200		CORRIDOR 1C18 To EQUIPMENT STORAGE 1200	HM	WD	3'-0" x 7'-0" x 1-3/4"	---	R	1	SNGL
1305		CORRIDOR UNNAMED To CLEAN 1305	HM	WD	3'-0" x 7'-0" x 1-3/4"	---	L	1	SNGL
1307		CORRIDOR UNNAMED	HM	WD	3'-0" x 7'-0" x 1-3/4"	---	L	1	SNGL

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	To VIDEO INT EQUIP 1307								
1348	CLEAN CORE 1349 To FROZEN TISSUE 1348	HM	WD	3'-0" x 7'-0" x 1-3/4"	---	L	1	SNGL	
1271	CORRIDOR 1C26 To EQUIPMENT STORAGE 1271	HM	WD	3'-6" x 7'-0" x 1-3/4"	---	R	1	SNGL	
1C6A	ELEVATOR CORRIDOR 1C6 From STORAGE 1C6A	HM	WD	3'-0" x 7'-0" x 1-3/4"	---	LR	1	SNGL	

Qty	Qty Inact	Description		Finish	Mfgr
1	0	Continuous Hinge	A510 x 7-0 x AS{1"LHOD}	US32D	Architectural Builders Hardware Mfg., Inc. 109A
1	0	Mortise Lockset	70-8237 x LNL	US26D	Sargent 339A
1	0	Core	7190224		Stanley Security 307A
1	0	Closer	351-UO x DA x MC	EN	Sargent 510A
1	0	Armor Plate	K1050 x 4BE x CSK x 34" x 40"{2"LWOD}	US32D	Rockwood 600A
1	0	Door Edge Guard	A538B x 84"OA	US32D	Architectural Builders Hardware Mfg., Inc. 601A
1	0	Wall Stop	409	US26D	Rockwood 700A
3	0	Silencer	608-RKW	GRAY	Rockwood 900A

Note

Requires SS Channel - Lock Edge

101-06.00 – Work Room, Passage

Number	Keyset	Location	Fram	Door	Size	Label	Hand	Qty	Type
G024		VEST GC5 To BIKE STORAGE G024	HM	HM	3'-0" x 7'-0" x 1-3/4"	---	L	1	SNGL
G035		LAUNDRY G034 To STORAGE G035	HM	HM	3'-0" x 7'-0" x 1-3/4"	---	L	1	SNGL
G039A.1		DECONTAM G010 To EQUIP G039A	HM	HM	3'-0" x 7'-0" x 1-3/4"	---	R	1	SNGL
G039A.2		STERILE STORAGE G039 To EQUIP G039A	HM	HM	3'-0" x 7'-0" x 1-3/4"	---	R	1	SNGL
G009		CORRIDOR GC6 To AIRLOCK G009	HM	HM	3'-0" x 7'-0" x 1-3/4"	C45	R	1	SNGL
1170		SCRUB 1364 From DICTATION 1170	HM	WD	3'-0" x 7'-0" x 1-3/4"	---	LR	1	SNGL
1171		EQ 1365 To LEAD APRONS 1171	HM	WD	3'-0" x 7'-0" x 1-3/4"	---	R	1	SNGL
G027.1		COORIDOR GC4 From VESTIBULE G027	HM	HM	3'-0" x 7'-0" x 1-3/4"	---	LR	1	SNGL

Qty	Qty Inact	Description		Finish	Mfgr
1	0	Continuous Hinge	A510 x 7-0 x PT x AS{1"LHOD}	US32D	Architectural Builders Hardware 108A

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1	0	Mortise Passage	8215 x LNL	US26D	Mfg., Inc.	330A
1	0	Closer	351-UO x DA x MC	EN	Sargent	510A
1	0	Armor Plate	K1050 x 4BE x CSK x 34" x 40" {2" LWOD}	US32D	Rockwood	600A
1	0	Door Edge Guard	A538B x 84" OA	US32D	Architectural Builders Hardware Mfg., Inc.	601A
1	0	Wall Stop	409	US26D	Rockwood	700A
3	0	Silencer	608-RKW	GRAY	Rockwood	900A

Note

101-07.00 – Work Room High Use MHO

Number	Keyset	Location	Fram	Door	Size	Label	Hand	Qty	Type
G011		DECONTAM G010 To HSKP G011	HM	HM	3'-0" x 7'-0" x 1-3/4"	---	R	1	SNGL
G014		VEST G013 To HAZARD STORAGE WET G014	HM	HM	3'-0" x 7'-0" x 1-3/4"	C45	R	1	SNGL
G015		VEST G013 To HAZ MAT DRUGS	HM	HM	3'-0" x 7'-0" x 1-3/4"	C45	R	1	SNGL
G040		STERILE STORAGE G039 To HSKP G040	HM	HM	3'-0" x 7'-0" x 1-3/4"	C45	L	1	SNGL
1162		CORRIDOR 1C7 To CLEAN LINEN TROLLEY 1162	HM	WD	3'-0" x 7'-0" x 1-3/4"	---	L	1	SNGL
1203		CORRIDOR 1C18 To CLEAN LINEN 1203	HM	WD	3'-0" x 7'-0" x 1-3/4"	---	L	1	SNGL
1206		CORRIDOR 1C19 To HSKP 1206	HM	WD	3'-0" x 7'-0" x 1-3/4"	---	L	1	SNGL
1269		NURSES 1274 From CLEAN GONDOLA 1269	HM	WD	3'-0" x 7'-0" x 1-3/4"	---	LR	1	SNGL
1313		CORRIDOR UNNAMED From HSKP 1313	HM	WD	3'-0" x 7'-0" x 1-3/4"	---	LR	1	SNGL
G002.1		DIRTY OUTGOING G002 From CLEAN RECEIVING G001	HM	WD	3'-0" x 7'-0" x 1-3/4"	---	RR	1	SNGL
1314		CORRIDOR UNNAMED To MAT CLEAN 1314	HM	WD	3'-6" x 7'-0" x 1-3/4"	---	RR	1	SNGL

Qty	Qty Inact	Description		Finish	Mfgr	
1	0	Continuous Hinge	A510 x 7-0 x AS{1" LHOD}	US32D	Architectural Builders Hardware Mfg., Inc.	109A
1	0	Mortise Lockset	70-8204 x LNL	US26D	Sargent	323A
1	0	Core	7190224		Stanley Security	307A
1	0	Closer	351-UO x DA x MC	EN	Sargent	510A
1	0	Armor Plate	K1050 x 4BE x CSK x 34" x 40" {2" LWOD}	US32D	Rockwood	600A
1	0	Door Edge Guard	A538B x 84" OA	US32D	Architectural Builders Hardware Mfg., Inc.	601A
1	0	Wall Stop	409	US26D	Rockwood	700A

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1	0	ElectroMagnetic Holder	2300		S1	Architectural Builders Hardware Mfg., Inc.	702A
1	0	Sweep	18061-10BE-NB x Gray		A	Pemko	808A
1	0	Gasketing	S773BL25{OpngSize}		BL	Pemko	807A

Note

Requires SS Channel - Lock Edge

101-08.00 – Doors w/ Keypads

Number	Keypad	Location	Fram	Door	Size	Label	Hand	Qty	Type
G022		CORRIDOR GC4 To EQUIPMENT STORAGE G022	HM	HM	3'-0" x 7'-0" x 1-3/4"	---	LR	1	SNGL
G032		CORRIDOR GC2 To EVS GENERAL STORE G032	HM	HM	3'-0" x 7'-0" x 1-3/4"	---	RR	1	SNGL
G034		CORRIDOR GC1 To LAUNDRY G034	HM	HM	3'-6" x 7'-0" x 1-3/4"	---	RR	1	SNGL
G004		CORRIDOR GC4 To CLEAN LINEN G004	HM	HM	3'-8" x 7'-0" x 1-3/4"	---	RR	1	SNGL
G029		CORRIDOR GC4 To EVS STORAGE G029	HM	HM	4'-0" x 7'-0" x 1-3/4"	---	RR	1	SNGL
G031		CORRIDOR GC2 To FACILITIES & TSP G031	HM	HM	4'-0" x 7'-0" x 1-3/4"	---	RR	1	SNGL
G020		CORRIDOR GC4 To MED GAS BOTTLES	HM	HM	3'-0" x 7'-0" x 1-3/4"	C45	LR	1	SNGL
1312		CORRIDOR UNNAMED From EVS STORAGE	HM	WD	3'-6" x 7'-0" x 1-3/4"	---	LR	1	SNGL

Qty	Qty Inact	Description		Finish	Mfgr	
1	0	Continuous Hinge	A510 x 7-0 x AS{1"LHOD}	US32D	Architectural Builders Hardware Mfg., Inc.	109A
1	0	Mortise Lock - Electric	DL3500CRL/26D	US26D	Alarm Lock	333A
1	0	Core	7190224		Stanley Security	307A
1	0	Closer	351-UO x MC	EN	Sargent	500A
1	0	Door Edge Guard	A538B x 84"OA	US32D	Architectural Builders Hardware Mfg., Inc.	601A
1	0	Wall Stop	409	US26D	Rockwood	700A
1	0	ElectroMagnetic Holder	2300	S1	Architectural Builders Hardware Mfg., Inc.	702A
1	0	Sweep	18061-10BE-NB x Gray x 48" w	10BE	Pemko	814A
1	0	Gasketing	S773BL25{OpngSize}	BL	Pemko	807A

Note

Requires SS Channel - Lock Edge

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101-09.00 – Electrical Rooms

Number	Keyset	Location	Fram	Door	Size	Label	Hand	Qty	Type
G007.2		CORRIDOR GC6 From EMERGENCY ELEC G007	HM	HM	3'-0" x 7'-0" x 1-3/4"	C45	RR	1	SNGL
G008		CORRIDOR GC4 From NORMAL ELECTRIC G008	HM	HM	3'-6" x 7'-0" x 1-3/4"	C45	RR	1	SNGL

Qty	Qty	Description			Finish	Mfgr	
Inact							
3	0	4-1/2 Std Wt(.134) Hinge	TA2714	4-1/2" x 4-1/2"	26D	McKinney	101A
1	0	Push Pad, Rim	8810F	36"w x ETL x 649	US32D	Sargent	320A
1	0	Exit Device Trim Only	ETDL27S1G26DM99	x ET-BIC	US26D	Alarm Lock	318A
1	0	Core	7190224			Stanley Security	307A
1	0	Closer	351-UO	x MC	EN	Sargent	500A
1	0	Door Edge Guard	A538B	x 84"OA	US32D	Architectural Builders Hardware Mfg., Inc.	601A
1	0	Wall Stop	409		US26D	Rockwood	700A
1	0	Sweep	18061-10BE-NB	x Gray x 48"w	10BE	Pemko	814A
1	0	Gasketing	S773BL25{OpngSize}		BL	Pemko	807A

Note

Requires SS Channel - Lock Edge

101-10.00 – Exit Stairs

Number	Keyset	Location	Fram	Door	Size	Label	Hand	Qty	Type
GS-1.1		CORRIDOR GC-1 TO STAIR GS-1	HM	HM	3'-0" x 7'-0" x 1-3/4"	C45		1	SNGL
GS-2.1		STAIR GS-2 From CORRIDOR GC3	HM	HM	3'-0" x 7'-0" x 1-3/4"	C45	LR	1	SNGL
1S-1.1		STAIR 1S-1 From ELEVATOR CORRIDOR 1C6	HM	WD	3'-6" x 7'-0" x 1-3/4"	C45	LR	1	SNGL

Qty	Qty	Description			Finish	Mfgr	
Inact							
3	0	4-1/2 Std Wt(.134) Hinge	TA2714	4-1/2" x 4-1/2"	26D	McKinney	101A
1	0	Push Pad, Rim	8810F	36"w x ETL x 649	US32D	Sargent	320A
1	0	Closer - Parallel Arm with 5th screw	351-CPS	x MC	EN	Sargent	509A
1	0	Wall Stop	409		US26D	Rockwood	700A
3	0	Silencer	608-RKW		GRAY	Rockwood	900A

Note

101-11.00 – Isolation Room

Number	Keyset	Location	Fram	Door	Size	Label	Hand	Qty	Type
1211		CORRIDOR 1C19 To RECOVERY ISOLATION 1211	HM	WD	3'-6" x 7'-0" x 1-3/4"	---	L	1	SNGL

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Qty	Qty Inact	Description		Finish	Mfgr	
1	0	Continuous Hinge	A510 x 7-0 x AS{1"LHOD}	US32D	Architectural Builders Hardware Mfg., Inc.	109A
1	0	Mortise Passage	7815 x PT	US32D	Sargent	334A
1	0	Closer	351-UO x MC	EN	Sargent	500A
1	0	Armor Plate	K1050 x 4BE x CSK x 34" x 40"{2"LWOD}	US32D	Rockwood	600A
1	0	Door Edge Guard	A538B x 84"OA	US32D	Architectural Builders Hardware Mfg., Inc.	601A
1	0	Wall Stop	409	US26D	Rockwood	700A
1	0	Sweep	18061-10BE-NB x Gray x 48"w	10BE	Pemko	814A
1	0	Gasketing	S773BL25{OpngSize}	BL	Pemko	807A
3	0	Silencer	608-RKW	GRAY	Rockwood	900A

Note

101-12.00 – Locker 2nd Entry

Number	Keyset	Location	Fram	Door	Size	Label	Hand	Qty	Type
G036.2		VEST G036 To WOMENS LOCKERS G036	HM	HM	3'-0" x 7'-0" x 1-3/4"	---	L	1	SNGL
G038.2		VEST G038 To MENS LOCKERS G038	HM	HM	3'-0" x 7'-0" x 1-3/4"	---	R	1	SNGL

Qty	Qty Inact	Description		Finish	Mfgr	
3	0	4-1/2 Std Wt(.134) Hinge	TA2714 4-1/2" x 4-1/2"	26D	McKinney	101A
1	0	Push Plate	70C-RKW	US32D	Rockwood	402A
1	0	Door Pull	110-RKW x Type 1	US32D	Rockwood	403A
1	0	Closer	351-UO x MC	EN	Sargent	500A
1	0	Armor Plate	K1050 x 4BE x CSK x 34" x 40"{2"LWOD}	US32D	Rockwood	600A
1	0	Door Edge Guard	A538B x 84"OA	US32D	Architectural Builders Hardware Mfg., Inc.	601A
1	0	Wall Stop	409	US26D	Rockwood	700A
3	0	Silencer	608-RKW	GRAY	Rockwood	900A

Note

101-13.00 – Staff Break

Number	Keyset	Location	Fram	Door	Size	Label	Hand	Qty	Type
1166.1		STAFF BREAK 1166 From ELEVATOR CORRIDOR 1C6	HM	WD	3'-0" x 8'-0" x 1-3/4"	---	LR	1	SNGL
1166.2		STAFF BREAK 1166 From ELEVATOR CORRIDOR 1C6	HM	WD	3'-0" x 8'-0" x 1-3/4"	---	RR	1	SNGL

Qty	Qty Inact	Description	Finish	Mfgr
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3	0	4-1/2 Std Wt(.134) Hinge	TA2714 4-1/2" x 4-1/2"	26D	McKinney	101A
1	0	Push Plate	70C-RKW	US32D	Rockwood	402A
1	0	Door Pull	110-RKW x Type 1	US32D	Rockwood	403A
1	0	Closer - Parallel Arm with 5th screw	351-CPS x MC	EN	Sargent	509A
1	0	Armor Plate	K1050 x 4BE x CSK x 34" x 40" {2" LWOD}	US32D	Rockwood	600A
1	0	Door Edge Guard	A538B x 84" OA	US32D	Architectural Builders Hardware Mfg., Inc.	601A
1	0	Sweep	18061-10BE-NB x Gray	A	Pemko	808A
1	0	Gasketing	S773BL25{OpngSize}	BL	Pemko	807A
3	0	Silencer	608-RKW	GRAY	Rockwood	900A

Note

101-14.00 – Conference Room

Number	Keyset	Location	Fram	Door	Size	Label	Hand	Qty	Type
G025.1		VEST GC5 To NO NAME ROOM	HM	HM	3'-0" x 7'-0" x 1-3/4"	---	L	1	SNGL
G025.2		VEST GC5 To CONF ROOM/EDUCATION G025	HM	HM	3'-0" x 7'-0" x 1-3/4"	---	L	1	SNGL

Qty	Qty Inact	Description				Finish	Mfg		
3	0	4-1/2 Std Wt(.134) Hinge	TA2714 4-1/2" x 4-1/2"			26D	McKinney	101A	
1	0	Mortise Lockset	70-8205 x LNL			US26D	Sargent	338A	
1	0	Core	7190224				Stanley Security	307A	
1	0	Closer	351-UO x MC			EN	Sargent	500A	
1	0	Wall Stop	409			US26D	Rockwood	700A	
3	0	Silencer	608-RKW			GRAY	Rockwood	900A	

Note

102-01.00 – Operating Room Unequal Pairs w/ Operators

Number	Keyset	Location	Fram	Door	Size	Label	Hand	Qty	Type
1343.1		CORRIDOR UNNAMED To OP ROOM 1343	HM	HM	6'-0" x 7'-0" x 1-3/4" (4'-0" / 2'-0")	---	BRA	1	UNPR
1350.1		CORRIDOR UNNAMED To OP ROOM 1350	HM	HM	6'-0" x 7'-0" x 1-3/4" (4'-0" / 2'-0")	---	RRA	1	UNPR
1340.1		CORRIDOR UNNAMED To OP ROOM 1340	HM	HM	6'-0" x 7'-0" x 1-3/4" (4'-0" / 2'-0")	---	BRA	1	UNPR
1344.1		CORRIDOR UNNAMED To OP ROOM 1344	HM	HM	6'-0" x 7'-0" x 1-3/4" (4'-0" / 2'-0")	---	RRA	1	UNPR
1347.1		CORRIDOR UNNAMED To OP ROOM 1347	HM	HM	6'-0" x 7'-0" x 1-3/4" (4'-0" / 2'-0")	---	LRA	1	UNPR
1353.1		CORRIDOR UNNAMED To OP ROOM 1353	HM	HM	6'-0" x 7'-0" x 1-3/4" (4'-0" / 2'-0")	---	LRA	1	UNPR
1354.1		CORRIDOR UNNAMED	HM	HM	6'-0" x 7'-0" x 1-3/4"	---	RRA	1	UNPR
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To OP ROOM 1354 (4'-0" / 2'-0")

1357.1 CORRIDOR UNNAMED HM HM 6'-0" x 7'-0" x 1-3/4" --- LRA 1 UNPR
 To OP ROOM 1357 (4'-0" / 2'-0")

Qty	Qty Inact	Description		Finish	Mfgr
1	1	Continuous Hinge	A510 x 7-0 x PT x AS{1"LHOD}	US32D	Architectural Builders Hardware Mfg., Inc. 108A
1	1	Push Pad, SVR	55-56-NB8773J x 42"w x 84"h x ETL x 24V x 646	US32D	Sargent 313A
1	1	Closer - Automatic Operator	103-03	---	Stanley 505A
1	1	Armor Plate	K1050 x 4BE x CSK x 34" x 40"{2"LWOD}	US32D	Rockwood 600A
1	1	Door Edge Guard	A538B x 84"OA	US32D	Architectural Builders Hardware Mfg., Inc. 601A
1	0	Gasketing	S773BL25{OpngSize}	BL	Pemko 807A
1	1	Wiring Harness	QC-C1500		McKinney 804A
1	1	Wiring Harness	QC-C300		McKinney 805A
1	1	Actuator	BEA 10MS41-DA Wave Actuator	---	Miscellaneous 961A
1	1	Electric Power Transfer	EL-EPTL		Securitron 905A
1	0	Power Supply	AQD2		Securitron 902A
1	1	Motion Sensor	BEA - SUPERSCAN II	---	Bea 908A
1	1	Silencer	Raceway	---	Miscellaneous 904A

Note

102-02.00 – OR Back Doors

Number	Keyset	Location	Fram	Door	Size	Label	Hand	Qty	Type
1340.3		CLEAN CORE 1358 To OP ROOM 1340	HM	WD	3'-0" x 7'-0" x 1-3/4"	---	L	1	SNGL
1343.3		CLEAN CORE To OP ROOM 1343	HM	WD	3'-0" x 7'-0" x 1-3/4"	---	L	1	SNGL
1344.3		CLEAN CORE 1349 To OP ROOM 1344	HM	WD	3'-0" x 7'-0" x 1-3/4"	---	L	1	SNGL
1347.3		CLEAN CORE 1349 To OP ROOM 1347	HM	WD	3'-0" x 7'-0" x 1-3/4"	---	R	1	SNGL
1349		CORRIDOR UNNAMED From CLEAN CORE 1349	HM	WD	3'-0" x 7'-0" x 1-3/4"	---	LR	1	SNGL
1350.3		CLEAN CORE 1349 To OP ROOM 1350	HM	WD	3'-0" x 7'-0" x 1-3/4"	---	RR	1	SNGL
1353.3		CLEAN CORE 1349 To OP ROOM 1353	HM	WD	3'-0" x 7'-0" x 1-3/4"	---	R	1	SNGL
1354.3		CLEAN CORE 1354 To OP ROOM 1354	HM	WD	3'-0" x 7'-0" x 1-3/4"	---	R	1	SNGL
1357.3		CLEAN CORE 1358 To OP ROOM 1357	HM	WD	3'-0" x 7'-0" x 1-3/4"	---	R	1	SNGL
1358.2		CORRIDOR 1C16 To CLEAN CORE 1358	HM	WD	3'-0" x 7'-0" x 1-3/4"	---	R	1	SNGL

Qty	Qty Inact	Description		Finish	Mfgr
3	0	5 Hvy Wt(.190) Hinge	T4A3786 5" x 4-1/2"	26D	McKinney 104A
1	0	Mortise Passage	7815 x PT	US32D	Sargent 334A

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1	0	Closer	351-UO x MC	EN	Sargent	500A
1	0	Armor Plate	K1050 x 4BE x CSK x 34" x 40" {2" LWOD}	US32D	Rockwood	600A
1	0	Door Edge Guard	A538B x 84" OA	US32D	Architectural Builders Hardware Mfg., Inc.	601A
1	0	Wall Stop	409	US26D	Rockwood	700A
1	0	ElectroMagnetic Holder	2300	S1	Architectural Builders Hardware Mfg., Inc.	702A
1	0	Sweep	18061-10BE-NB x Gray x 48" w	10BE	Pemko	814A
1	0	Gasketing	S773BL25{OpngSize}	BL	Pemko	807A
3	0	Silencer	608-RKW	GRAY	Rockwood	900A

Note

102-03.00 – Set Up w/ Door Operators

Number	Keyset	Location	Fram	Door	Size	Label	Hand	Qty	Type
1341		CLEAN CORE 1358 To SET UP 1341	HM	WD	4'-0" x 7'-0" x 1-3/4"	---	L	1	SNGL
1342		CLEAN CORE 1358 To SET UP 1342	HM	WD	4'-0" x 7'-0" x 1-3/4"	---	R	1	SNGL
1345		CLEAN CORE 1349 To SET UP 1345	HM	WD	4'-0" x 7'-0" x 1-3/4"	---	L	1	SNGL
1346		CLEAN CORE 1349 To SET UP 1346	HM	WD	4'-0" x 7'-0" x 1-3/4"	---	R	1	SNGL
1351		CLEAN CORE 1349 To SET UP 1351	HM	WD	4'-0" x 7'-0" x 1-3/4"	---	RR	1	SNGL
1352		CLEAN CORE 1349 To SET UP 1352	HM	WD	4'-0" x 7'-0" x 1-3/4"	---	R	1	SNGL
1355		CLEAN CORE 1358 To SET UP 1355	HM	WD	4'-0" x 7'-0" x 1-3/4"	---	L	1	SNGL
1356		CLEAN CORE 1358 To SET UP 1356	HM	WD	4'-0" x 7'-0" x 1-3/4"	---	R	1	SNGL

Qty	Qty Inact	Description		Finish	Mfg	
1	0	Continuous Hinge	A510 x 7-0 x AS{1" LHOD}	US32D	Architectural Builders Hardware Mfg., Inc.	109A
1	0	Mortise Passage	8215 x LNL	US26D	Sargent	330A
1	0	Electric Strike	1600-12/24D-630 x 1DB-630	630	Hes	335A
1	0	Closer - Automatic Operator	103-03	---	Stanley Access Tech	505A
1	0	Armor Plate	K1050 x 4BE x CSK x 34" x 40" {2" LWOD}	US32D	Rockwood	600A
1	0	Door Edge Guard	A538B x 84" OA	US32D	Architectural Builders Hardware Mfg., Inc.	601A
1	0	Wall Stop	409	US26D	Rockwood	700A
1	0	Sweep	18061-10BE-NB x Gray x 48" w	10BE	Pemko	814A
1	0	Actuator	BEA 10MS41-DA Wave Actuator	---	Bea	813A
1	0	Gasketing	S773BL25{OpngSize}	BL	Pemko	807A
1	0	Actuator	BEA 10MS41-DA Wave Actuator	---	Miscellaneous	961A
1	0	Misc	Wiring Needs ?	---	Miscellaneous	970A
1	0	Motion Sensor	BEA - SUPERSCAN II	---	Bea	908A

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Note

Operator to signal electric strike to release, allowing door to swing open. Stainless Steel Channel on edges.

102-04.00 – Door Pairs Standard

Number	Keyset	Location	Fram	Door	Size	Label	Hand	Qty	Type
G002.2		CORRIDOR GC6 To DIRTY OUTGOING G002	HM	HM	6'-0" x 7'-0" x 1-3/4"	---	BRA	1	PAIR
G006.1		CORRIDOR GC4 To BREAK OUT G006	HM	HM	6'-0" x 7'-0" x 1-3/4"	---	LRA	1	PAIR
G006.2		CORRIDOR GC4 To BREAK OUT G006	HM	HM	6'-0" x 7'-0" x 1-3/4"	---	LRA	1	PAIR
1308		CORRIDOR UNNAMED To RADIOLOGY STORAGE 1308	HM	WD	6'-0" x 7'-0" x 1-3/4"	---	BRA	1	PAIR
1309.1		CORRIDOR UNNAMED To EQUIPMENT STORAGE 1309	HM	WD	6'-0" x 7'-0" x 1-3/4"	---	BRA	1	PAIR
1309.2		CORRIDOR UNNAMED To EQUIPMENT STORAGE 1309	HM	WD	6'-0" x 7'-0" x 1-3/4"	---	BRA	1	PAIR
1309.3		CORRIDOR UNNAMED To EQUIPMENT STORAGE 1309	HM	WD	6'-0" x 7'-0" x 1-3/4"	---	BRA	1	PAIR
1309.4		CORRIDOR UNNAMED To EQUIPMENT STORAGE 1309	HM	WD	6'-0" x 7'-0" x 1-3/4"	---	BRA	1	PAIR

Qty	Qty Inact	Description		Finish	Mfgr	
1	1	Continuous Hinge	A510 x 7-0 x AS{1"LHOD}	US32D	Architectural Builders Hardware Mfg., Inc.	109A
0	1	Flush Bolt, Extension, Auto	2842	US26D	Rockwood	202A
0	1	Dust Proof Strike	570	US26D	Rockwood	201A
1	0	Mortise Passage	8215 x LNL	US26D	Sargent	330A
1	0	Gravity Coordinator	576	US26D	Rockwood	404A
1	1	Closer	351-UO x MC	EN	Sargent	500A
1	1	Door Edge Guard	A538B x 84"OA	US32D	Architectural Builders Hardware Mfg., Inc.	601A
1	1	Wall Stop	409	US26D	Rockwood	700A
1	1	Sweep	18061-10BE-NB x Gray x 48"w	10BE	Pemko	814A
1	0	Gasketing	S773BL25{OpngSize}	BL	Pemko	807A

Note

Requires SS Channel - Lock Edge

102-05.00 – Door Pairs Sealed

Number	Keyset	Location	Fram	Door	Size	Label	Hand	Qty	Type
G001		CORRIDOR GC4 From CLEAN RECEIVING G001	HM	HM	6'-0" x 7'-0" x 1-3/4"	---	BRA	1	PAIR
G05.2		VEST GC5 From CORRIDOR UNNAMED	HM	HM	6'-0" x 7'-0" x 1-3/4"	---	BRA	1	PAIR
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G06.4 CORRIDOR GC6 From HM HM 6'-0" x 7'-0" x 1-3/4" --- BRA 1 PAIR
 CORRIDOR GC6

Qty	Qty Inact	Description		Finish	Mfgr	
1	1	Continuous Hinge	A510 x 7-0 x AS{1"LHOD}	US32D	Architectural Builders Hardware Mfg., Inc.	109A
1	1	Push Pad, SVR	NB8715J 42"w x 84"h x ETL x 646	US32D	Sargent	325A
1	1	Closer	351-UO x MC	EN	Sargent	500A
1	1	Door Edge Guard	A538B x 84"OA	US32D	Architectural Builders Hardware Mfg., Inc.	601A
1	1	Wall Stop	409	US26D	Rockwood	700A
1	1	Sweep	18061-10BE-NB x Gray x 48"w	10BE	Pemko	814A
1	0	Gasketing	S773BL25{OpngSize}	BL	Pemko	807A

Note

Requires SS Channel - Lock Edge

102-06.00 – Door Pair Mechanical

Number	Keypad	Location	Fram	Door	Size	Label	Hand	Qty	Type
G043.2		EXTERIOR From MECHANICAL G043	HM	HM	7'-0" x 7'-0" x 1-3/4"	---	RA	1	PAIR
G043.1		CORRIDOR GC3 To MECHANICAL G043	HM	HM	8'-0" x 7'-0" x 1-3/4"	C45	RA	1	PAIR

Qty	Qty Inact	Description		Finish	Mfgr	
1	1	Continuous Hinge	A510 x 7-0 x AS{1"LHOD}	US32D	Architectural Builders Hardware Mfg., Inc.	109A
0	1	Flush Bolt, Extension, Auto	2842	US26D	Rockwood	202A
0	1	Dust Proof Strike	570	US26D	Rockwood	201A
1	0	Mortise Lockset	70-8204 x LNL	US26D	Sargent	323A
1	0	Core	7190224		Stanley Security	307A
0	1	Gravity Coordinator	576	US26D	Rockwood	404A
1	0	Closer	351-UO x MC	EN	Sargent	500A
1	1	Armor Plate	K1050 x 4BE x CSK x 34" x 40" {2"LWOD}	US32D	Rockwood	600A
1	1	Door Edge Guard	A538B x 84"OA	US32D	Architectural Builders Hardware Mfg., Inc.	601A
1	1	Wall Stop	409	US26D	Rockwood	700A
1	1	Sweep	18061-10BE-NB x Gray x 48"w	10BE	Pemko	814A
1	0	Gasketing	S773BL25{OpngSize}	BL	Pemko	807A

Note

Requires SS Channel - Lock Edge

102-07.00 – Door Pair Main Electrical

Number	Keypad	Location	Fram	Door	Size	Label	Hand	Qty	Type
G007.1		CORRIDOR GC4 From EMERGENCY ELEC	HM	HM	6'-0" x 7'-0" x 1-3/4"	C45	RRA	1	PAIR

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G007

Qty	Qty Inact	Description		Finish	Mfgr	
3	3	4-1/2 Std Wt(.134) Hinge	TA2714 4-1/2" x 4-1/2"	26D	McKinney	101A
1	1	Push Pad, SVR	12-NB8710F 36"w x 84"h x No Trim x 646 x 68-3943	US32D	Sargent	340A
1	0	Exit Device Trim Only	ETDL27S1G26DM99 x ET-BIC	US26D	Alarm Lock	318A
1	0	Core	7190224		Stanley Security	307A
1	1	Closer - Parallel Arm with 5th screw	351-CPS x MC	EN	Sargent	509A
1	1	Kickplate	K1050 x 4BE x 10" x 34" {2" LWOD}	US32D	Rockwood	603A

Note

103-01.00 – CR Work Rooms High Use

Number	Keyset	Location	Fram	Door	Size	Label	Hand	Qty	Type
G039.1		CORRIDOR GC4 From VEST G039	HM	HM	4'-0" x 7'-0" x 1-3/4"	---	LR	1	SNGL
G041.1		CORRIDOR GC3 To STERILE PREP G041	HM	HM	4'-0" x 7'-0" x 1-3/4"	---	R	1	SNGL
1272.1		CORRIDOR 1C26 To MED ROOM/CLEAN	HM	WD	3'-0" x 7'-0" x 1-3/4"	---	LR	1	SNGL
1272.2		CORRIDOR 1C25 To MED ROOM/CLEAN	HM	WD	3'-0" x 7'-0" x 1-3/4"	---	L	1	SNGL
1300		CORRIDOR UNNAMED To ANATOMIC PATH	HM	WD	3'-0" x 7'-0" x 1-3/4"	---	R	1	SNGL
G027.2		FROM VEST G027 TO STERILE STOR G039	HM	HM	4'-0" x 7'-0" x 1-3/4"	---		1	SNGL
G010		DECONTAM G010 From AIRLOCK G009	HM	HM	3'-0" x 7'-0" x 1-3/4"	---	RR	1	SNGL
G036.1		CORRIDOR GC2 To VEST G036	HM	HM	3'-0" x 7'-0" x 1-3/4"	---	R	1	SNGL
G037.1		CORRIDOR GC2 To ALL GENDERS G037	HM	HM	3'-0" x 7'-0" x 1-3/4"	---	R	1	SNGL
G038.1		CORRIDOR GC2 To VEST G038	HM	HM	3'-0" x 7'-0" x 1-3/4"	---	L	1	SNGL
1164.1		NURSES 1160 To MEDS/CLEAN SUPPLY 1164	HM	WD	3'-0" x 7'-0" x 1-3/4"	---	L	1	SNGL
1164.2		CORRIDOR 1C9 To MEDS/CLEAN SUPPLY 1164	HM	WD	3'-0" x 7'-0" x 1-3/4"	---	R	1	SNGL
1223.1		NURSES 1222 To MEDS/CLEAN SUPPLY 1223	HM	WD	3'-6" x 7'-0" x 1-3/4"	---	R	1	SNGL
1223.2		NURSES 1224 To MEDS/CLEAN SUPPLY 1224	HM	WD	3'-6" x 7'-0" x 1-3/4"	---	L	1	SNGL

Qty	Qty Inact	Description		Finish	Mfgr	
1	0	Continuous Hinge	A510 x 7-0 x PT x AS{1"LHOD}	US32D	Architectural Builders Hardware Mfg., Inc.	108A

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1	0	Mortise Lockset	RX-70-8273 x 24V x LNL	US26D	Sargent	332A
1	0	Core	7190224		Stanley Security	307A
1	0	Closer	351-UO x MC	EN	Sargent	500A
1	0	Armor Plate	K1050 x 4BE x CSK x 34" x 40" {2" LWOD}	US32D	Rockwood	600A
1	0	Door Edge Guard	A538B x 84" OA	US32D	Architectural Builders Hardware Mfg., Inc.	601A
1	0	Wall Stop	409	US26D	Rockwood	700A
1	0	Door Position Switch	DPS-M-BK	BK	Securitron	803A
1	0	Wiring Harness	QC-C1500		McKinney	804A
1	0	Wiring Harness	QC-C300		McKinney	805A
1	0	Electric Power Transfer	EL-EPTL		Securitron	905A
1	0	Power Supply	AQD2		Securitron	902A
3	0	Silencer	608-RKW	GRAY	Rockwood	900A
1	0	Silencer	Raceway	---	Miscellaneous	904A

Note

103-02.00 – CR Work Rooms Soiled (sealed)

Number	Keyset	Location	Fram	Door	Size	Label	Hand	Qty	Type
1268		CORRIDOR 1C23 To SOILED 1268	HM	WD	4'-0" x 7'-0" x 1-3/4"	C45	R	1	SNGL
G013		CORRIDOR GC6 To VESTIBULE G013	HM	HM	3'-0" x 7'-0" x 1-3/4"	---	R	1	SNGL
1225		CORRIDOR 1C18 To SOILED 1225	HM	WD	3'-0" x 7'-0" x 1-3/4"	---	L	1	SNGL
1311		CORRIDOR UNNAMED To SOILED HOLD 1311	HM	WD	3'-6" x 7'-0" x 1-3/4"	---	R	1	SNGL
1154		CORRIDOR 1C7 To HM SOILED WORK 1154	HM	WD	3'-6" x 7'-0" x 1-3/4"	C45	R	1	SNGL

Qty	Qty Inact	Description		Finish	Mfg
1	0	Continuous Hinge	A510 x 7-0 x PT x AS{1" LHOD}	US32D	Architectural Builders Hardware Mfg., Inc.
1	0	Mortise Lockset	RX-70-8273 x 24V x LNL	US26D	Sargent
1	0	Core	7190224		Stanley Security
1	0	Closer	351-UO x DA x MC	EN	Sargent
1	0	Armor Plate	K1050 x 4BE x CSK x 34" x 40" {2" LWOD}	US32D	Rockwood
1	0	Door Edge Guard	A538B x 84" OA	US32D	Architectural Builders Hardware Mfg., Inc.
1	0	Wall Stop	409	US26D	Rockwood
1	0	Sweep	18061-10BE-NB x Gray x 48" w	10BE	Pemko
1	0	Gasketing	S773BL25{OpngSize}	BL	Pemko
1	0	Wiring Harness	QC-C1500		McKinney
1	0	Wiring Harness	QC-C300		McKinney
1	0	Electric Power Transfer	EL-EPTL		Securitron
1	0	Power Supply	AQD2		Securitron
1	0	Silencer	Raceway	---	Miscellaneous

Note

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Requires SS Channel - Lock Edge

103-03.00 – CR General Doors (low abuse)

Number	Keyset	Location	Fram	Door	Size	Label	Hand	Qty	Type
1C2.1		CORRIDOR 1C2 From CORRIDOR 366 SF	HM	WD	3'-0" x 7'-0" x 1-3/4"	---	RR	1	SNGL
1104.2		WAITING 1104 From CORRIDOR 1C1	HM	WD	3'-0" x 7'-0" x 1-3/4"	---	RR	1	SNGL

Qty	Qty	Description		Finish	Mfgr
Inact					
3	0	4-1/2 Std Wt(.134) Hinge	TA2714 4-1/2" x 4-1/2"	26D	McKinney 101A
1	0	Mortise Lockset	RX-70-8273 x 24V x LNL	US26D	Sargent 332A
1	0	Electric Strike	1600-12/24D-630 x 1DB-630	630	Hes 335A
1	0	Core	7190224		Stanley 307A
					Security
1	0	Closer	351-UO x MC	EN	Sargent 500A
1	0	Wall Stop	409	US26D	Rockwood 700A
1	0	Wiring Harness	QC-C1500		McKinney 804A
1	0	Wiring Harness	QC-C300		McKinney 805A
1	0	Electric Power Transfer	EL-EPTL		Securitron 905A
1	0	Power Supply	AQD2		Securitron 902A
3	0	Silencer	608-RKW	GRAY	Rockwood 900A
1	0	Silencer	Raceway	---	Miscellaneous 904A

Note

103-04.00 – CR General Door w/ Operator

Number	Keyset	Location	Fram	Door	Size	Label	Hand	Qty	Type
1104.1		CHECK-IN 1102 From CORRIDOR 1C1	HM	HM	3'-0" x 7'-0" x 1-3/4"	---	RR	1	SNGL

Qty	Qty	Description		Finish	Mfgr
Inact					
3	0	4-1/2 Std Wt(.134) Hinge	TA2714 4-1/2" x 4-1/2"	26D	McKinney 101A
1	0	Mortise Lockset	RX-70-8204 x LNL	US26D	Sargent 302A
1	0	Electric Strike	1600-12/24D-630 x 1DB-630	630	Hes 335A
1	0	Core	7190224		Stanley 307A
					Security
1	0	Closer - Automatic Operator	103-02	---	Stanley 501A
					Access Tech
1	0	Wall Stop	409	US26D	Rockwood 700A
1	0	Actuator	BEA 10MS41-DA Wave Actuator	---	Miscellaneous 961A
1	0	Door Position Switch	DPS-M-BK	BK	Securitron 803A
1	0	Wiring Harness	QC-C1500		McKinney 804A
1	0	Wiring Harness	QC-C300		McKinney 805A
1	0	Electric Power Transfer	EL-EPTL		Securitron 905A
1	0	Power Supply	AQD2		Securitron 902A
3	0	Silencer	608-RKW	GRAY	Rockwood 900A
1	0	Silencer	Raceway	---	Miscellaneous 904A

Note

Magic Force operator to be actuated by Card Reader on Secure side, or by Wave on Passage Side.
 Operator will signal electric strike to release.

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103-05.00 – CR Secure (low use)

Number	Keyset	Location	Fram	Door	Size	Label	Hand	Qty	Type
G021		CORRIDOR GC4 To MDF G021	HM	HM	3'-0" x 7'-0" x 1-3/4"	---	RR	1	SNGL
1129		CORRIDOR 1C1 To IDF 1129	HM	WD	3'-0" x 7'-0" x 1-3/4"	---	LR	1	SNGL
1167		CORRIDOR 1C5 To IDF 1167	HM	WD	3'-0" x 7'-0" x 1-3/4"	---	RR	1	SNGL

Qty	Qty Inact	Description		Finish	Mfgr	
3	0	4-1/2 Std Wt(.134) Hinge	TA2714 4-1/2" x 4-1/2"	26D	McKinney	101A
1	0	Mortise Lockset	RX-70-8273 x 24V x LNL	US26D	Sargent	332A
1	0	Core	7190224		Stanley Security	307A
1	0	Closer	351-UO x MC	EN	Sargent	500A
1	0	Wall Stop	409	US26D	Rockwood	700A
1	0	Door Position Switch	DPS-M-BK	BK	Securitron	803A
1	0	Wiring Harness	QC-C1500		McKinney	804A
1	0	Wiring Harness	QC-C300		McKinney	805A
1	0	Electric Power Transfer	EL-EPTL		Securitron	905A
1	0	Power Supply	AQD2		Securitron	902A
3	0	Silencer	608-RKW	GRAY	Rockwood	900A
1	0	Silencer	Raceway	---	Miscellaneous	904A

Note

103-06.00 – CR Secure (high use)

Number	Keyset	Location	Fram	Door	Size	Label	Hand	Qty	Type
1127		CORRIDOR 1C1 To RETAIL PHARMACY 1127	HM	WD	3'-0" x 7'-0" x 1-3/4"	---	R	1	SNGL
1130		CORRIDOR 1C1 To ANESTH WORK 1130	HM	WD	3'-0" x 7'-0" x 1-3/4"	---	LR	1	SNGL
1304		CORRIDOR UNNAMED To PHARM 1304	HM	WD	3'-0" x 7'-0" x 1-3/4"	---	L	1	SNGL

Qty	Qty Inact	Description		Finish	Mfgr	
1	0	Continuous Hinge	A510 x 7-0 x PT x AS{1"LHOD}	US32D	Architectural Builders Hardware Mfg., Inc.	108A
1	0	Mortise Lockset	RX-70-8273 x 24V x LNL	US26D	Sargent	332A
1	0	Core	7190224		Stanley Security	307A
1	0	Closer	351-UO x MC	EN	Sargent	500A
1	0	Armor Plate	K1050 x 4BE x CSK x 34" x 40"{2"LWOD}	US32D	Rockwood	600A
1	0	Door Edge Guard	A538B x 84"OA	US32D	Architectural Builders Hardware Mfg., Inc.	601A
1	0	Wall Stop	409	US26D	Rockwood	700A
1	0	Door Position Switch	DPS-M-BK	BK	Securitron	803A
1	0	Wiring Harness	QC-C1500		McKinney	804A
1	0	Wiring Harness	QC-C300		McKinney	805A
1	0	Electric Power Transfer	EL-EPTL		Securitron	905A

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1	0	Power Supply	AQD2				Securitron	902A
3	0	Silencer	608-RKW			GRAY	Rockwood	900A
1	0	Silencer	Raceway			---	Miscellaneous	904A

Note

Requires SS Channel - Lock Edge

103-07.00 – CR Med Storage

Number	Keyset	Location	Fram	Door	Size	Label	Hand	Qty	Type
1303		CORRIDOR UNNAMED To ANESTH STORAGE 1303	HM	WD	3'-0" x 7'-0" x 1-3/4"	---	L	1	SNGL

Qty	Qty	Description				Finish	Mfgr	
	Inact							
1	0	Continuous Hinge	A510 x 7-0 x PT x AS{1"LHOD}			US32D	Architectural Builders Hardware Mfg., Inc.	108A
1	0	Mortise Lockset	RX-70-8273 x 24V x LNL			US26D	Sargent	332A
1	0	Core	7190224				Stanley Security	307A
1	0	Closer	351-UO x MC			EN	Sargent	500A
1	0	Armor Plate	K1050 x 4BE x CSK x 34" x 40" {2"LWOD}			US32D	Rockwood	600A
1	0	Door Edge Guard	A538B x 84"OA			US32D	Architectural Builders Hardware Mfg., Inc.	601A
1	0	Wall Stop	409			US26D	Rockwood	700A
1	0	ElectroMagnetic Holder	2300			S1	Architectural Builders Hardware Mfg., Inc.	702A
1	0	Door Position Switch	DPS-M-BK			BK	Securitron	803A
1	0	Gasketing	S773BL25{OpngSize}			BL	Pemko	807A
1	0	Wiring Harness	QC-C1500				McKinney	804A
1	0	Wiring Harness	QC-C300				McKinney	805A
1	0	Electric Power Transfer	EL-EPTL				Securitron	905A
1	0	Power Supply	AQD2				Securitron	902A
1	0	Silencer	Raceway			---	Miscellaneous	904A

Note

Requires SS Channel - Lock Edge

103-08.00 – CR Exit Doors

Number	Keyset	Location	Fram	Door	Size	Label	Hand	Qty	Type
1S-2.1		STAIR 1S-2 From CORRIDOR 1C16	HM	WD	3'-6" x 7'-0" x 1-3/4"	---	LR	1	SNGL

Qty	Qty	Description				Finish	Mfgr	
	Inact							
3	0	4-1/2 Std Wt(.134) Hinge	TA2714 4-1/2" x 4-1/2"			26D	McKinney	101A
1	0	Mortise Cylinder	1E-7-4-C4-RP x L/C			626	Stanley Security	309A

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1	0	Push Pad, Rim	55-56-70-8804F 36" w x ETL x 649	US32D	Sargent	308A
1	0	Core	7190224		Stanley	307A
					Security	
1	0	Closer	351-UO x MC	EN	Sargent	500A
1	0	Wall Stop	409	US26D	Rockwood	700A
1	0	Door Position Switch	DPS-M-BK	BK	Securitron	803A
1	0	Wiring Harness	QC-C1500		McKinney	804A
1	0	Wiring Harness	QC-C300		McKinney	805A
1	0	Electric Power Transfer	EL-EPTL		Securitron	905A
3	0	Silencer	608-RKW	GRAY	Rockwood	900A
1	0	Silencer	Raceway	---	Miscellaneous	904A

Note

103-09.00 – CR Pairs

Number	Keyset	Location	Fram	Door	Size	Label	Hand	Qty	Type
G017		CORRIDOR GC6 To COMPACTORS G017	HM	HM	6'-0" x 7'-0" x 1-3/4"	---	BRA	1	PAIR

Qty	Qty Inact	Description		Finish	Mfgr	
1	1	Continuous Hinge	A510 x 7-0 x PT x AS{1" LHOD}	US32D	Architectural Builders Hardware Mfg., Inc.	108A
1	1	Electromagnetic Lock - Surface	M62		Securitron	329A
1	1	Closer - Automatic Operator	103-02	---	Stanley Access Tech	501A
1	1	Armor Plate	K1050 x 4BE x CSK x 34" x 40" {2" LWOD}	US32D	Rockwood	600A
1	1	Door Edge Guard	A538B x 84" OA	US32D	Architectural Builders Hardware Mfg., Inc.	601A
1	1	Door Position Switch	DPS-M-BK	BK	Securitron	803A
1	1	Wiring Harness	QC-C1500		McKinney	804A
1	1	Wiring Harness	QC-C300		McKinney	805A
1	1	Misc	BEA 10LPR36HW 36" Vertical Actuation Bar	---	Miscellaneous	961A
1	1	Electric Power Transfer	EL-EPTL	Securitron	905A	
1	0	Power Supply	AQD2		Securitron	902A
1	0	Key Switch	MK		Securitron	906A
1	1	Motion Sensor	BEA - SUPERSCAN II	---	Bea	908A
1	1	Silencer	608-RKW	GRAY	Rockwood	900A
1	1	Silencer	Raceway	---	Miscellaneous	904A

Note

Magic Force operator to open both leaves simultaneously when wave actuated.
 Operator will signal mag lock to release.

103-10.00 – Dual Egress Pairs w/ CR and Operators

Number	Keyset	Location	Fram	Door	Size	Label	Hand	Qty	Type
1C11		CORRIDOR 1C5 From EQ 1363	HM	WD	7'-0" x 7'-10" x 1-3/4"	B90	DEL	1	PAIR
1C18		CORRIDOR 1C18 From EQ 1367	HM	WD	7'-0" x 7'-10" x 1-3/4"	B90	DEL	1	PAIR

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Qty	Qty Inact	Description		Finish	Mfgr	
1	1	Continuous Hinge	A510 x 7-0 x AS{1"LHOD}	US32D	Architectural Builders Hardware Mfg., Inc.	109A
1	1	Push Pad, SVR	55-56-12-NB8710J 42"w x 84"h x No Trim x 646	US32D	Sargent	319A
1	0	Electromagnetic Lock - Surface	M62		Securitron	329A
1	1	Closer	351-UO x MC	EN	Sargent	500A
1	1	Closer - Automatic Operator	Misc ADD 103-01	---	Stanley Access Tech	503A
1	1	Armor Plate	K1050 x 4BE x CSK x 34" x 40"{2"LWOD}	US32D	Rockwood	600A
1	1	Door Edge Guard	A538B x 84"OA	US32D	Architectural Builders Hardware Mfg., Inc.	601A
1	1	Wall Stop	409	US26D	Rockwood	700A
1	1	ElectroMagnetic Holder	2300	S1	Architectural Builders Hardware Mfg., Inc.	702A
1	1	Actuator	BEA 10MS41-DA Wave Actuator	---	Bea	813A
1	1	Wiring Harness	QC-C1500		McKinney	804A
1	1	Wiring Harness	QC-C300		McKinney	805A
1	0	Misc	Z-MM15BK	BK	Securitron	959A
1	0	Misc	Magic Force-Operator Controlled By Fire Alarm ?	---	Miscellaneous	967A
1	1	Electric Power Transfer	EL-EPTL		Securitron	905A
1	0	Power Supply	AQD2		Securitron	902A
1	1	Motion Sensor	BEA - SUPERSCAN II	---	Bea	908A
1	1	Silencer	608-RKW	GRAY	Rockwood	900A

Note

Double egress pair with Magic Force Operators. Secure side to be actuated by card reader, both leaves to open. Passage side to be actuated by wave reader. In both cases the maglock will be released and the latches will be retracted, then doors will swing open freely. Both leaves to open by panic hardware in the event of fire alarm actuation. Requires SS Channel – lockedge. Door 1C11 has two card readers locations on card reader side, one in pre-op area one in corridor.

103-11.00 – Cross Corridor Pairs w/ CR and Operators

Number	Keyset	Location	Fram	Door	Size	Label	Hand	Qty	Type
1C1.1		CORRIDOR 1C1 From CORRIDOR 1C5	HM	WD	7'-0" x 7'-10" x 1-3/4"	---	BRA	1	PAIR

Qty	Qty Inact	Description		Finish	Mfgr	
1	1	Continuous Hinge	A510 x 7-0 x PT x AS{1"LHOD}	US32D	Architectural Builders Hardware Mfg., Inc.	108A
1	1	Push Pad, SVR	55-56-12-NB8710J 42"w x 84"h x No Trim x 646	US32D	Sargent	319A
1	1	Closer - Automatic Operator	Misc ADD 103-02	---	Stanley Access Tech	501A
1	1	Armor Plate	K1050 x 4BE x CSK x 34" x 40"{2"LWOD}	US32D	Rockwood	600A
1	1	Door Edge Guard	A538B x 84"OA	US32D	Architectural Builders Hardware Mfg., Inc.	601A

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1	1	Actuator	BEA 10MS41-DA Wave Actuator	---	Bea	813A
1	1	Wiring Harness	QC-C1500		McKinney	804A
1	1	Wiring Harness	QC-C300		McKinney	805A
1	0	Misc	Magic Force	---	Miscellaneous	969A
1	1	Electric Power Transfer	EL-EPTL		Securitron	905A
1	0	Power Supply	AQD2		Securitron	902A
1	1	Motion Sensor	BEA - SUPERSCAN II	---	Bea	908A
3	0	Silencer	608-RKW	GRAY	Rockwood	900A
1	1	Silencer	Raceway	---	Miscellaneous	904A

Note

Magic Force Operator actuated by Card Reader and Wave on Secure side, Wave only on passage side.
 Operator to signal latch retraction to allow door to swing freely.

103-12.00- Cross Corridor Pairs w/ CR and Operators

Number	Keyset	Location	Fram	Door	Size	Label	Hand	Qty	Type
1C6.1		CORRIDOR 1C18 From CORRIDOR UNNAMED	HM	WD	6'-4" x 7'-10" x 1-3/4"	---	BRA	1	PAIR
1C6.2		CORRIDOR 1C5 From CORRIDOR UNNAMED	HM	WD	6'-4" x 7'-10" x 1-3/4"	---	BRA	1	PAIR

Qty	Qty	Description		Finish	Mfgr
	Inact				
4	4	4-1/2 Std Wt(.134) Hinge	TA2714 4-1/2" x 4-1/2"	26D	McKinney 101A
1	1	Push Pad, SVR	55-56-NB8773J x 42"w x 84"h x ETL x 24V x 646	US32D	Sargent 313A
1	1	Core	7190224		Stanley 307A
1	1	Closer	351-UO x MC	EN	Sargent 500A
1	1	Armor Plate	K1050 x 4BE x CSK x 34" x 40" {2" LWOD}	US32D	Rockwood 600A
1	1	Door Edge Guard	A538B x 84"OA	US32D	Architectural Builders Hardware Mfg., Inc. 601A
1	1	Wall Stop	409	US26D	Rockwood 700A
1	1	Wiring Harness	QC-C1500		McKinney 804A
1	1	Wiring Harness	QC-C300		McKinney 805A
1	0	Misc	Magic Force	---	Miscellaneous 969A
1	1	Electric Power Transfer	EL-EPTL		Securitron 905A
1	0	Power Supply	AQD2		Securitron 902A
1	1	Silencer	608-RKW	GRAY	Rockwood 900A

Note

103-13.00 – Door Pairs - Exterior

Number	Keyset	Location	Fram	Door	Size	Label	Hand	Qty	Type
G05.1		EXTERIOR From VEST GC5	HM	HM	6'-0" x 7'-0" x 1-3/4"	---	BRA	1	PAIR
G06.3		EXTERIOR From CORRIDOR GC6	HM	HM	6'-0" x 7'-0" x 1-3/4"	---	BRA	1	PAIR

Qty	Qty	Description		Finish	Mfgr
	Inact				
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1	1	Continuous Hinge	A510 x 7-0 x AS{1"LHOD}	US32D	Architectural Builders Hardware Mfg., Inc.	109A
1	1	Push Pad, SVR	55-56-12-NB8710J 42"w x 84"h x No Trim x 646	US32D	Sargent	319A
1	1	Core	7190224		Stanley Security	307A
1	1	Closer - Parallel Arm with 5th screw	351-CPS x MC	EN	Sargent	509A
1	1	Door Edge Guard	A538B x 84"OA	US32D	Architectural Builders Hardware Mfg., Inc.	601A
1	1	Wall Stop	409	US26D	Rockwood	700A
1	1	ElectroMagnetic Holder	2300	S1	Architectural Builders Hardware Mfg., Inc.	702A
1	1	Sweep	18061-10BE-NB x Gray x 48"w	10BE	Pemko	814A
1	0	Gasketing	S773BL25{OpngSize}	BL	Pemko	807A
1	1	Wiring Harness	QC-C1500		McKinney	804A
1	1	Wiring Harness	QC-C300		McKinney	805A
1	1	Electric Power Transfer	EL-EPTL		Securitron	905A
1	0	Power Supply	AQD2		Securitron	902A
1	1	Silencer	608-RKW	GRAY	Rockwood	900A
1	1	Silencer	Raceway	---	Miscellaneous	904A

Note

Requires SS Channel - Lock Edge

104-01.00 – Double Egress Doors w/ MHO

Number	Keypad	Location	Fram	Door	Size	Label	Hand	Qty	Type
1C23		CORRIDOR 1C23 From CORRIDOR 1C18	HM	WD	7'-0" x 7'-10" x 1-3/4"	---	BRA	1	PAIR
1358		CLEAN CORE 1349 To CLEAN CORE 1358	HM	WD	7'-0" x 7'-10" x 1-3/4"	C45	DER	1	PAIR
1C5		CORRIDOR 1C5 From CORRIDOR 1C7	HM	WD	7'-0" x 7'-10" x 1-3/4"	---	BRA	1	PAIR
1C7		CORRIDOR 1C7 From CORRIDOR 1C5	HM	WD	7'-0" x 7'-10" x 1-3/4"	---	BRA	1	PAIR

Qty	Qty Inact	Description		Finish	Mfgr	
1	1	Continuous Hinge	A510 x 7-0 x AS{1"LHOD}	US32D	Architectural Builders Hardware Mfg., Inc.	109A
1	1	Push Pad, SVR	NB-12-8706J 42"w x 94"h x ETL x 646 x KD	US32D	Sargent	337A
1	1	Closer	351-UO x MC	EN	Sargent	500A
1	1	Armor Plate	K1050 x 4BE x CSK x 34" x 40"{2"LWOD}	US32D	Rockwood	600A
1	1	Door Edge Guard	A538B x 84"OA	US32D	Architectural Builders Hardware Mfg., Inc.	601A
1	1	Wall Stop	409	US26D	Rockwood	700A
1	1	ElectroMagnetic Holder	2300	S1	Architectural Builders Hardware	702A

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Mfg., Inc.
 Rockwood 900A

1 1 Silencer 608-RKW

GRAY

Note

Requires SS Channel - Lock Edge

104-02.00 – Cross Corridor

Number	Keypad	Location	Fram	Door	Size	Label	Hand	Qty	Type
1C15		EQ 1337 From EQ	HM	WD	7'-0" x 7'-10" x 1-3/4"	C45	BRA	1	PAIR
1C17		EQ 1362 From EQ	HM	WD	7'-0" x 7'-10" x 1-3/4"	C45	BRA	1	PAIR
Qty	Qty	Description				Finish	Mfgr		
	Inact								
1	1	Continuous Hinge	A510 x 7-0 x AS{1"LHOD}			US32D	Architectural Builders Hardware Mfg., Inc.	109A	
1	1	Push Pad, SVR	NB-12-8706J 42"w x 94"h x ETL x 646 x KD			US32D	Sargent	337A	
1	1	Core	7190224				Stanley Security	307A	
1	1	Closer	351-UO x MC			EN	Sargent	500A	
1	1	Armor Plate	K1050 x 4BE x CSK x 34" x 40" {2"LWOD}			US32D	Rockwood	600A	
1	1	Door Edge Guard	A538B x 84"OA			US32D	Architectural Builders Hardware Mfg., Inc.	601A	
1	1	Wall Stop	409			US26D	Rockwood	700A	
1	1	ElectroMagnetic Holder	2300			S1	Architectural Builders Hardware Mfg., Inc.	702A	
1	1	Sweep	18061-10BE-NB x Gray x 48"w			10BE	Pemko	814A	
1	0	Gasketing	S773BL25{OpngSize}			BL	Pemko	807A	

Note

Requires SS Channel - Lock Edge

105-01.00 – Set Up Room ICU Auto Sliders

Number	Keypad	Location	Fram	Door	Size	Label	Hand	Qty	Type
1340.2		SET UP 1341 To OP ROOM 1340	HM	WD	4'-6" x 7'-0" x 1-3/4"	---	SLID	1	SNGL
1343.2		SET UP 1342 To OP ROOM 1343	HM	WD	4'-6" x 7'-0" x 1-3/4"	---	SLID	1	SNGL
1344.2		SET UP 1345 To OP ROOM 1344	HM	WD	4'-6" x 7'-0" x 1-3/4"	---	SLID	1	SNGL
1347.2		SET UP 1346 To OP ROOM 1347	HM	WD	4'-6" x 7'-0" x 1-3/4"	---	SLID	1	SNGL
1353.2		SET UP 1352 To OP ROOM 1353	HM	WD	4'-6" x 7'-0" x 1-3/4"	---	SLID	1	SNGL
1357.2		SET UP 1356 To OP ROOM 1357	HM	WD	4'-6" x 7'-0" x 1-3/4"	---	SLID	1	SNGL
1354.2		SET UP 1355 To OP ROOM 1354	HM	WD	4'-6" x 7'-0" x 1-3/4"	C45	SLID	1	SNGL
1350.2		SET UP 1352 To OP ROOM 1353	HM	WD	4'-6" x 7'-0" x 1-3/4"	---	SLID	1	SNGL
Qty	Qty	Description				Finish	Mfgr		
	Inact								

DOOR HARDWARE

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1	0	Closer - Automatic Operator	Misc ADD Set 104-05	---	Stanley	508A
					Access Tech	
1	0	Actuator	BEA 10MS41-SA Wave Actuator	---	Bea	813A

Note

Stanley Duraglide Sliders to be actuated by Wave?

105-02.00 – 23HR Toilet Sliders

Number	Keypad	Location	Fram	Door	Size	Label	Hand	Qty	Type
1212		RECOVERY ISOLATION 1211 To PATIENT TOILET 1212	HM	WD	3'-4" x 7'-0" x 1-3/4"	---	SLID	1	SNGL
1250.1		RECOVERY 1249 To PATIENT TOILET 1250	HM	WD	3'-4" x 7'-0" x 1-3/4"	---	SLID	1	SNGL
1250.2		RECOVERY 1251 To PATIENT TOILET 1250	HM	WD	3'-4" x 7'-0" x 1-3/4"	---	SLID	1	SNGL
1253.1		RECOVERY 1254 To PATIENT TOILET 1253	HM	WD	3'-4" x 7'-0" x 1-3/4"	---	SLID	1	SNGL
1253.2		RECOVERY 1252 To PATIENT TOILET 1253	HM	WD	3'-4" x 7'-0" x 1-3/4"	---	SLID	1	SNGL
1260.1		RECOVERY 1259 To PATIENT TOILET 1260	HM	WD	3'-4" x 7'-0" x 1-3/4"	---	SLID	1	SNGL
1260.2		RECOVERY 1261 To PATIENT TOILET 1260	HM	WD	3'-4" x 7'-0" x 1-3/4"	---	SLID	1	SNGL
1263.1		RECOVERY 1264 To PATIENT TOILET 1263	HM	WD	3'-4" x 7'-0" x 1-3/4"	---	SLID	1	SNGL
1263.2		RECOVERY 1262 To PATIENT TOILET 1263	HM	WD	3'-4" x 7'-0" x 1-3/4"	---	SLID	1	SNGL

Qty	Qty Inact	Description	Finish	Mfgr
1	0	Misc AD Systems Door Slider Package	---	Miscellaneous 950A

Note

AD Systems sliding doors. To have interlocking mag locks for privacy with other toilet room door. Will need to be released on both sides by fire alarm. Self closing. Soft Open and Soft Close. Will need visible indicators to show locking condition. 32" minimum clear opening.

105-03.00 – 23HR Room ICU Sliders

Number	Keypad	Location	Fram	Door	Size	Label	Hand	Qty	Type
1249			AL	AL	8'-6" x 7'-4" x 1-3/4"	---		1	SNGL
1251			AL	AL	8'-6" x 7'-4" x 1-3/4"	---		1	SNGL
1252			AL	AL	8'-6" x 7'-4" x 1-3/4"	---		1	SNGL
1254			AL	AL	8'-6" x 7'-4" x 1-3/4"	---		1	SNGL
1259			AL	AL	8'-6" x 7'-4" x 1-3/4"	---		1	SNGL
1261			AL	AL	8'-6" x 7'-4" x 1-3/4"	---		1	SNGL
1262			AL	AL	8'-6" x 7'-4" x 1-3/4"	---		1	SNGL
1264			AL	AL	8'-6" x 7'-4" x 1-3/4"	---		1	SNGL

Qty	Qty Inact	Description	Finish	Mfgr
1	0	Misc Set 104-04 8300 ICU MANUAL SLIDER	---	Stanley 913A Access Tech

Note

DOOR HARDWARE

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Stanley 8300 Procure Manual Slider

105-04.00 – CR Auto Slider Entry Doors

Number	Keypad	Location	Fram	Door	Size	Label	Hand	Qty	Type
1234.1		EXTERIOR To VESTIBULE 1234	AL	AL	8'-0" x 7'-0" x 1-3/4"	---	BA	1	PAIR
1100.1		VESTIBULE 1100 To CHECK IN 1102	AL	AL	8'-0" x 9'-0" x 1-3/4"	---	BA	1	PAIR

Qty	Qty Inact	Description	Finish	Mfgr
1	0	Mortise Cylinder	626	Stanley Security 309A
1	0	Core		Stanley Security 307A
1	0	Misc	---	Stanley Access Tech 910A
1	0	Misc	---	Miscellaneous 964A
1	0	Motion Sensor	---	Bea 908A

Note

Stanley Duraglide with transom and autolocking. Two panel bypass with full breakout. DPS in active leaf. Card Reader from exterior. Finish to match Kawneer Finish No. #40.

105-05.00 – Auto Slider Vestibule Doors

Number	Keypad	Location	Fram	Door	Size	Label	Hand	Qty	Type
1234.2		VESTIBULE 1234 To NURSES 1275	AL	AL	8'-0" x 9'-0" x 1-3/4"	---	BA	1	PAIR
1100.2		VESTIBULE 1100 To CHECK IN 1102	AL	AL	8'-0" x 9'-0" x 1-3/4"	---	BA	1	PAIR

Qty	Qty Inact	Description	Finish	Mfgr
1	0	Mortise Cylinder	--	Stanley Security 309A
1	0	Core		Stanley Security 307A
1	0	Misc	---	Stanley Access Tech 910A
1	0	Motion Sensor	---	Bea 908A

Note

Stanley Duraglide with transom and autolocking. Two panel bypass with full breakout. DPS in active leaf. Finish to match Kawneer Finish No. #40.

106-01.00 – Storefront Doors Exterior

Number	Keypad	Location	Fram	Door	Size	Label	Hand	Qty	Type
1105.2		EXTERIOR From VESTIBULE 1105	AL	AL	3'-0" x 7'-0" x 1-3/4"	---	RR	1	SNGL
GS-2.2		EXTERIOR From STAIR GS2.2	AL	AL	3'-0" x 7'-0" x 1-3/4"	---		1	SNGL

Qty	Qty Inact	Description	Finish	Mfgr
1	0	Misc	---	Miscellaneous 965A

DOOR HARDWARE

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Note

Finish to match Kawneer Finish No. #40.

106-02.00 – Storefront Doors Exterior

Number	Keypad	Location	Fram	Door	Size	Label	Hand	Qty	Type
1105.1		VESTIBULE 1105 From WAITING 1104	AL	AL	3'-0" x 7'-0" x 1-3/4"	---	RR	1	SNGL

Qty	Qty	Description	Finish	Mfgr
Inact				
1	0	Misc Aluminum Door Hardware By Others	---	Miscellaneous 965A

Note

Finish to match Kawneer Finish No. #40.

BYO.00 – Garage Doors

Number	Keypad	Location	Fram	Door	Size	Label	Hand	Qty	Type
E-003			AL	AL	6'-0" x 7'-0" x 1-3/4"	---		1	SNGL
E-004			AL	AL	6'-0" x 7'-0" x 1-3/4"	---		1	SNGL
E-001			AL	AL	8'-0" x 10'-0" x 1-3/4"	---		1	SNGL
E-002			AL	AL	8'-0" x 10'-0" x 1-3/4"	---		1	SNGL

Qty	Qty	Description	Finish	Mfgr
Inact				
1	0	Misc All Hardware at STL oversized doors to be supplied by STL door mfg	---	By Others 909A

Note

SECTION 088000
GLAZING

PART 1 - GENERAL

1.1 SUMMARY

- A. General requirements for glass and glazing work performed under Sections, including:
 - 1. Section 084113 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS.
- B. Furnish and install the following:
 - 1. Insulated glass units.
 - 2. Tempered glass in non-rated hollow metal doors and frames.
 - 3. Wire-less fire resistant rated glazing in designated rated doors and frames.
 - 4. All materials required to properly install glass furnished hereunder, including sealant, tapes, setting blocks, and spacers.
- C. Work of this section includes installation of glazing beads furnished under related sections.

1.2 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract and Division 01 Specification Sections apply to this Section.
- B. Section 016000 - Product Requirements: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- C. Section 017419 - Construction Waste Management and Disposal: Procedural and administrative requirements for construction and demolition recycling.
- D. Section 079200 - JOINT SEALANTS: Requirements for sealants and backing materials.
- E. Section 081113 - HOLLOW METAL DOORS AND FRAMES: Steel doors, door and window frames, and related glazing stops, for both fire-resistance rated (labeled) and non-rated (labeled) conditions.
- F. Section 084113 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS.

1.3 REFERENCES

- A. Reference Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - References. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. AAMA 804.1 - Ductile Back-Bedding Compound.
 - 2. ASTM C 1036 - Flat Glass.
 - 3. ASTM C 1048 - Heat-Treated Flat Glass - Kind HS, Kind FT Coated and Uncoated Glass.
 - 4. ASTM E 546 - Test Method For Frost Point of Sealed Insulating Glass Units.
 - 5. ASTM E 576 - Test Method for Dew/Frost Point of Sealed Insulating Glass Units in Vertical Position.
 - 6. ASTM E 773 - Test Method for Seal Durability of Sealed Insulating Glass Units.
 - 7. ASTM E 774 - Sealed Insulating Glass Units.
 - 8. ANSI Z97.1 - Safety Performance Specifications and Methods of Test for Safety Glazing Used in Buildings.
 - 9. Federal Safety Standards for Architectural Glazing Materials 16CFR1201.
 - 10. IGCC: Certified Products Directory, and Certification Guidelines.
 - 11. NFPA Publication 80 - Fire Doors and Windows.
 - 12. SGCC: Certified Products Directory, and Certification Guidelines.
- B. The following reference materials are hereby made a part of this Section by reference thereto:
 - 1. GANA Laminated Glazing Reference Manual (2006 edition).
 - 2. GANA - Glazing Manual (2004 edition).
 - 3. SIGMA - Vertical Glazing Guidelines, Number A3000-87.

4. Consumer Product Safety Commission-Safety Standard for Architectural Glazing Materials.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Sequencing:
 1. Field Measurements:
 - a. Take field measurements before preparation of shop drawings and fabrication, where possible, to ensure proper fitting of Work.
 - b. Allow for adjustments within specified tolerances wherever taking of field measurements before fabrication might delay Work.

1.5 SUBMITTALS

- A. Information and Review Submittals: Submit the following under provisions of Section 013300 - SUBMITTAL PROCEDURES:
 1. Product Data:
 - a. Product data sheets on glazing products: Provide chemical, functional, and environmental characteristics, size limitations, special application requirements. Identify available colors.
 - b. Sample Warranty: Provide copies of manufacturers' actual warranties for all materials to be furnished under this Section, clearly defining all terms, conditions, and time periods for the coverage thereof.
 - c. Shop Drawings: Show sufficient detail to show fabrication, installation, anchorage, and interface of the work of this Section with the work of adjacent trades.
 - 1) Plans and elevations 1/4 inch scale of each type of glazing and mirror assembly; indicate dimensions, and reference details. Verify dimensions with field measurements.
 - d. Verification Samples:
 - 1) 12 x 12 inch pieces of each specified type and thickness of glass, bearing labels indicating locations where each type of glass will be used.
 - 2) Glazing tape: 12 inch length of specified type and size.
 - e. Certificates: Manufacturer's written certification stating that the materials installed, meet or exceed the requirements specified under this Section.
 - B. Closeout Submittals: Submit the following under provisions of Section 017800 - Closeout Submittals.
 1. Bonds and Warranty Documentation:
 - a. Manufacturer's Warranties and Guarantees as specified elsewhere herein this Section.

1.6 QUALITY ASSURANCE

- A. General: Perform glazing work in accordance with GANA - Glazing Manual, FGMA Glazing Manual, SIGMA and LSGA standards for glazing and installations methods.
 1. Notify the Owner's Project Manager and the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.
 2. Qualifications:
 3. Installer/Applicator: Minimum of 3 years documented experience demonstrating previously successful work of the type specified herein.
 4. Welders Certificates: Utilize only qualified welders employed on the Work. Submit verification that Welder's are AWS D1.1 and D1.4 qualified within the previous 12 months.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Delivery and Acceptance Requirements:
 1. Do not deliver items to the site, until all specified submittals have been submitted to, and approved by, the Owner's Project Manager and the Architect.
 2. Deliver materials in labeled, protective packages, when and as required.

B. Storage and Handling Requirements:

1. Store and handle in strict compliance with manufacturer's instructions and recommendations of GANA Glazing Manual. Use clean gloves and tools when handling materials, avoid contamination. Use rolling blocks and suction cups to move glass units not in shipping crates.
 - a. Carefully store materials to avoid overloading any building component or structure.
 - b. Do not unpack material until it is to be set, unless un-packing is required for inspection by the Owner's Project Manager and the Architect.
 - c. Store mirrors and coated glass in a dry place with acid-free paper between glass sheets.
 - d. Protect factory finished materials from damage due to moisture, direct sunlight, excessive temperatures, surface contamination, corrosion and damage from construction operations and other causes.

1.8 SITE CONDITIONS

- A. Do not install glazing when ambient temperature is less than 50 degrees Fahrenheit.
- B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.9 WARRANTY

- A. General: Submit warranties under provisions of Section 017800 - CLOSEOUT SUBMITTALS.
- B. Manufacturer Warranty/Guarantee: All shall include replacement of defective glass and mirrors, and delivery of replacement glass products furnished f.o.b. from point of manufacturer to project site.
 1. Insulating Glass: Manufacturer's 10 year written guarantee covering insulating glass against defects in materials and workmanship, including failure of seals effective on date of original factory shipment to site.
 - a. Provide coverage in Guarantee for manufacturing defects, including failure of hermetic seal of air space (except by glass breakage) as evidenced by intrusion of dirt or moisture, internal condensation or fogging, deterioration of protected internal glass coating or other visual indications of seal failure or performance.
 - b. Mirrors: Manufacturer's 5 year written guarantee covering against defects in materials and workmanship of reflective coatings on mirrors and replacement of the same.
 - 1) Provide coverage in Guarantee for manufacturing defects, including failure of reflective coatings as evidenced by peeling, cracking, discoloration, deterioration in metallic coating, or other visual indications of failure.

PART 2 - PRODUCTS

2.1 GLASS - GENERAL

- A. General requirements for glass: Of domestic and foreign manufacture, conforming to the referenced standards and with the additional requirements specified herein; factory labeled on each pane stating the strength, type, thickness and quality; with all labels remaining on glass until final cleaning.
 1. Glass thickness shown and heat treatment specified are minimum requirements. Provide glass thickness and heat treatment as required to meet specified performance criteria, State and local codes and ordinances.
- B. Float Glass: Comply with ASTM C 1036, Class 1 clear, quality q3 glazing select.
- C. Heat Strengthened Glass: Comply with ASTM C 1048 HS, heat strengthened, Class 1 clear, quality q3 glazing select.
- D. Tempered Glass: Comply with ASTM C 1048 FT, fully tempered, Class 1 clear, quality q3 glazing select, conforming to ANSI Z97.1.

2.2 GLASS - TYPES

- A. Glass Type (GL-A): Insulated “Low-E,” safety glass 1 inch thick units:
 - 1. Components
 - a. Outer layer: 1/4 inch (6 mm) thick fully tempered safety glass, color “Low-Iron Clear” equal to PPG Industries, Inc., product “Starphire Ultra-clear” Glass with Low-E sputter coating on number 2 surface.
 - b. Inner layer: 1/4 inch (6 mm) thick clear fully tempered safety glass, ‘clear’.
 - c. Gas fill: 90% Argon/10% Air.
 - 2. Performance Requirements: Glass units shall be equal to PPG “Solarban 70XL (2),Low E”.
- B. Glass Type (GL-1) - Fully tempered clear safety glass: 1/4 inch thick.
- C. Glass Type (GL-2): 8mm-9 mm thick (5/16 inch-3/8 inch) transparent wire-less fire rated ceramic glazing material with polished finish.
 - 1. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - a. Nippon Electric Glass Co., Ltd., “Firelite Plus”.
 - b. Vetrotech Saint-Gobain, “SSG Keralite FR-L”.
 - c. SAFTI First, “Pyran Platinum L”.
 - d. For fire rated door assemblies, conform with latest edition of ASTM E152, ASTM E163, NFPA-80, NFPA 252, NFPA 257.
 - e. Conforms to ANSI Z97.1 - Safety Performance Specifications and Methods of Test for Safety Glazing Used in Buildings.
 - f. Permanently identify each individual glazing unit with a listing mark visible after installation.
 - g. In accordance with manufacturer's specifications, Firelite Plus must be glazed into frames with a similar rating, using silicone glazing compound which shall be supplied with the Firelite Plus material.

2.3 FABRICATION

- A. General: Do not fabricate materials until all specified submittals have been submitted to, and approved by, the Architect.
- B. Fabricate glass as required to openings with edge clearances and bite on glass as recommended by the manufacturer with clean-cut edges where concealed, and smooth-ground, polished and seamed edges where exposed to view. Do not cut, seam, nip or abrade glass after heat-tempering.
 - 1. For non-tempered to be cut at site, provide glass larger than required so as to obtain clean cut edges without seaming or nipping.
- C. Fabricate glass with the following edge treatments.
 - 1. Exposed edges: Polished-finished radiused (penciled).
 - 2. Concealed edges: Cut edges with minimum edge work.
 - 3. Butt-joint edges: Flat round and finished with edges eased.

2.4 ACCESSORIES

- A. Glazing tape: Preformed butyl-polyisobutylene rubber with 100 percent solids contained in extruded tape roll form and complying with AAMA 804.1; coiled on release paper; of sizes required for proper glazing. equal to one of the following:
 - 1. Protective treatments 3030 or 606.
 - 2. Tremco Preshimmed 440.
 - 3. Woodmont Chem-Tape 40.
- B. Setting blocks: Neoprene, 80-90 shore A durometer hardness, certified to be “silicone compatible”; sized as follows:

1. Length: 0.1 inch per square foot of glass, but not less than 4 inches.
 2. Width: equal to glazing rabbet space minus 1/16 inch.
 3. Height to suit glazing method and pane weight and area.
- C. Spacers: Neoprene, 60-80 shore A durometer hardness; sized as required.
- D. Glazing sealant:
1. General glazing sealant: One-part medium modulus, neutral curing, synthetic rubber sealant, having a useful life expectancy of at least 20 years, conforming to ASTM C 920, Type S, grade NS, Class 25 for uses NT, G and A, FS TT-S-001543A, Type, Class A. Color as selected by the Architect.
 - a. Dow Corning Corporation, Midland MI.; product, "Silicone Glazing Sealant".
 - b. General Electric Company (GE Silicones) Waterford NY.; product, "SilGlaze II SCS2800".
- E. Bond-breakers and backing materials: Type recommended by manufacturer of sealants and gaskets.
- F. Cleaners, Primers, and Sealers: Type recommended by manufacturer of glass and gaskets.
- G. Mirror mastic: Asphalt-based adhesive mirror mastic compatible with mirror backing for adhesive application to wall substrate. Provided mastic wall-board sealer as recommended by adhesive manufacturer.
- H. Basis of Design: Palmer Products Corporation, Louisville, KY., product: "Palmer Mirror Mastic", or approved equal.
 1. Pecora Corporation, Harleysville PA, product "7hr4 Mirror-Tac".
 2. Royal Adhesives and Sealants, South Bend, IL, "Gunther Brand" product "Ultra/Bond Mirror Mastic".
 3. Mirror mounting clips: Chrome plated brass, nickel plated brass, 'Anachrome' brass, or stainless steel J-shape mirror clips designed for 1/4 inch mirrors, minimum 1 inch support width, equal to C.R. Laurence Co., Inc., Los Angeles CA., "Dallas Mirror Clip", model N°. 778B, unless otherwise indicated on the Drawings.
- 2.5 ACCESSORIES FOR WIRE-LESS FIRE-RATED GLAZING
- A. Glazing Tape: Closed cell polyvinyl chloride (PVC) foam, coiled on release paper over adhesive on two sides, maximum water absorption by volume of 2 percent.
- B. Silicone Sealant: One-part neutral curing silicone, medium modulus sealant, Type S; Grade NS; Class 25 with additional movement capability of 50 percent in both extension and compression (total 100 percent); Use (Exposure) NT; Uses (Substrates) G, A, and O as applicable. Available Products:
 1. Dow Corning Corporation, Midland MI.; product, "795".
 2. General Electric Company (GE Silicones) Waterford NY.; product "Silglaze-II 2800"
 3. Tremco, Beachwood OH.; product, "Spectrem 2".
- C. Setting Blocks: Neoprene, EPDM, or silicone; tested for compatibility with glazing compound; of 70 to 90 Shore A hardness.

PART 3 - EXECUTION

3.1 EXAMINATION AND PREPARATION

- A. Inspect receiving surfaces and ensure that they are dry and free from dust, or other foreign materials before glazing. Clean all surfaces with cloth saturated with mineral spirits of high-flash naphtha as recommended by glazing tape manufacturer, before glazing.
- B. Field Measurements: Verify that field measurements are as indicated on approved Shop Drawings.
 1. Check all openings, prior to glazing, to make certain that the opening is square, plumb and secure in order that uniform face and edge clearances are maintained.

2. Determine the actual sizes required by measuring the receiving openings. Size glass to permit required clearance and bite around full perimeter of glass, as set forth in the referenced FGMA standards, or as recommended by the glass manufacturer. Do not nip edges, to remove flares or to reduce oversize dimensions, under any circumstance.

C. Beginning of installation means acceptance of existing conditions.

3.2 INSTALLATION - DRY GLAZING

- A. Utilize dry glazing methods for field installation of glass in interior doors and frames.
 1. Install in vision panels in fire-rated doors and frames to requirements of NFPA 80.
 2. Install so that appropriate UL, Warnock Hersey, or other approval labeled markings remain permanently visible.
- B. Cut glazing tape to length and set against permanent stops, projecting 1/16 inch (2 mm) above sight line.
- C. Place setting blocks at 1/4 points with edge block no more than 6 inches from corners.
- D. Rest glazing on setting blocks and push against tape for full contact at perimeter of pane.
- E. Place glazing tape on free perimeter of glazing in manner as described above.
- F. Install removable stop without displacement of tape. Exert pressure on tape for full continuous contact.
- G. Knife trim protruding tape.

3.3 INSTALLATION - WET GLAZING

- A. Utilize wet glazing methods for field installation of glass in exterior curtainwall, storefront and window systems.
- B. Place setting blocks at quarter points on web of sill receiving member. Set glass unit in place with equal spaces on all sides.
- C. Install spacers at a spacing not exceeding 24 inches apart uniformly around perimeter, between interior face of glass unit and the fixed glazing rabbet.
- D. Apply a continuous heel bead of specified sealant between the outer edges of the glass unit and the web of the receiving member, in sufficient quantity to engage the leg of the applied glazing stop, when installed.
- E. As the glazing stop is being applied, install spacers between the outer face of the glass unit and the stop, locating the spacers directly opposite the previously installed interior spacers. Install the glazing stops, ensuring that all clearances around the perimeter of the glass unit conform to the requirements of the respective standards referenced herein.
- F. Apply a continuous bead of sealant around the exterior and interior perimeters, between the glass unit and the fixed rabbet, and between the glass unit and the applied glazing stop, extending the sealant material slightly above the sight line to permit proper tooling thereof.
- G. Tool all exposed sealant at a 45 degree angle away from the glass surface, leaving the sealant surface uniformly dense and smooth.
- H. Immediately remove all excess sealant from surfaces of metal and glass.

3.4 PROTECTION

- A. Protect glass from breakage immediately upon installation. Use streamers or ribbons suitably attached to framing and held free of the glass. Do not apply warning markings directly to the glass.
- B. Cover glass To protect it from activities that might abrade the glass surface.

3.5 CLEANING

- A. Clean glass surfaces promptly after installation, exercising care to avoid damage to the same. Remove excess glazing tape, labels, dirt, and other contaminants.

END OF SECTION

SECTION 088700
GLAZING SURFACE FILMS

PART 1 - GENERAL

1.1 SUMMARY

- A. The work of this Section consists of field-applied glazing films where shown on the Drawings, as specified herein, and as required for a complete and proper installation. Work includes, but is not limited to the following scope.
- B. Furnish and install the following: Privacy glazing film.

1.2 REFERENCES

- A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 014200 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. ASHRAE - American Society for Heating, Refrigeration, and Air Conditioning Engineers; Handbook of Fundamentals.
 - 2. ASTM E 84 - Standard Method of Test for Surface Burning Characteristics of Building Materials.
 - 3. ASTM E 308 - Standard Recommended Practice for Spectrophotometry and Description of Color in CIE 1931 System.
 - 4. ASTM E 903 - Standard Methods of Test for Solar Absorbance, Reflectance and Transmittance of Materials Using Integrating Spheres.
 - 5. ASTM G 26 - Standard Practice for Performing Accelerated Outdoor Weatherizing for Non-metallic Materials Using Concentrated Natural Sunlight.

1.3 SUBMITTALS

- A. Information and Review Submittals: Submit the following under provisions of Section 013000 - ADMINISTRATIVE REQUIREMENTS:
- B. Product Data:
 - 1. Product data sheets on glazing products: Provide chemical, functional, and environmental characteristics, size limitations, special application requirements. Identify available colors.
 - 2. Sample Warranty: Provide copies of manufacturers' actual warranties for all materials to be furnished under this Section, clearly defining all terms, conditions, and time periods for the coverage thereof.
- C. Shop Drawings: For custom patterns (as appropriate).
- D. Selection Samples: Sets of color chips representing manufacturer's full range of available colors and patterns.
- E. Verification Samples: Minimum 12 x 12 inch Samples representing actual product color and opacity.
- F. Test and Evaluation Reports: Provide a Glass Stress Analysis of the existing glass and proposed glass/film combination as recommended by the film manufacturer.
- G. Manufacturer's Instructions:
 - 1. Preparation instructions and recommendations.
 - 2. Installation methods.
- H. Closeout Submittals: Submit the following under provisions of Section 017800 - CLOSEOUT SUBMITTALS.
 - 1. Bonds and Warranty Documentation:
 - a. Manufacturer's Warranties and Guarantees as specified elsewhere herein this Section.

1.4 QUALITY ASSURANCE

- A. General: Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.
- B. Qualifications:
 - 1. Installer/Applicator: Installer Qualifications: 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.

1.5 FIELD-SAMPLE / MOCK-UP

- A. Provide field sample / mock-up(s) under provisions of Section 014000 - QUALITY REQUIREMENTS.
- B. Provide mock-up using selected film types, minimum 16 square feet, illustrating color, texture and finish, and demonstrating the minimum standard for the Work.
- C. Locate mock-ups where directed.
- D. Maintain mock-up during construction for workmanship comparison; remove and legally dispose of mock-up when no longer required.
- E. Do not proceed with remaining work until mock-up is approved by Architect.
- F. Accepted mock-ups may not remain as part of the work; the number of mock-ups shall not be restricted.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Delivery and Acceptance Requirements:
 - 1. Do not deliver items to the site, until all specified submittals have been submitted to, and approved by, the Architect.
 - 2. Do not deliver glazing film materials to the project is fully enclosed, until all concrete, masonry, plaster and other wet work has been completed and dry.
 - 3. Deliver materials in original unopened packages, containers or bundles bearing brand name, and identification of manufacturer, with labels and package seals intact and legible.
- B. Storage and Handling Requirements:
 - 1. Store and handle materials following manufacturer's recommended procedures, and in accordance with material safety data sheets.
 - 2. Protect materials from damage due to moisture, direct sunlight, excessive temperatures, surface contamination, corrosion and damage from construction operations and other causes. Protect glazing films from temperature cycling and temperatures below 40 degrees Fahrenheit.
- C. Damaged material: Remove any damaged or contaminated materials from job site immediately, including materials in broken packages, packages containing water marks, or show other evidence of damage, unless Architect specifically authorizes correction thereof and usage on project.

1.7 SITE 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 limits.

1.8 WARRANTY

- A. General: Submit warranties under provisions of Section 017800 - CLOSEOUT SUBMITTALS.
- B. Manufacturer Warranty: In addition to the specific guarantee requirements of the GENERAL CONDITIONS and SUPPLEMENTAL GENERAL CONDITIONS, the Contractor shall obtain in the Owner's name the standard written manufacturer's guarantee of all materials furnished under this Section where such guarantees are offered in the manufacturer's published product

data. All these guarantees shall be in addition to, and not in lieu of, other liabilities which the Contractor may have by law or other provisions of the Contract Documents.

PART 2 - PRODUCTS

2.1 GLAZING FILM

- A. Acceptable Manufacturer, (WF-1):
 - 1. Decorative Films, LLC, Frederick, MD.
- B. Acceptable Manufacturer, (WF-2):
 - 1. Level Digital Wallcoverings, <http://www.findyourlevel.com>

2.2 PERFORMANCE/DESIGN CRITERIA

- A. Fire Performance: Surface burning characteristics when tested in accordance ASTM E 84:
 - 1. Flame Spread: 25, maximum.
 - 2. Smoke Developed: 450, maximum.

2.3 ACCESSORIES

- A. Slip solution: Composed of one capful of baby shampoo or dishwashing liquid to 1 gallon of water, or as otherwise recommended by glazing film manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Inspect all surfaces and verify that they are in proper condition to receive the work of this Section.
 - 1. Beginning of installation means acceptance of existing substrate and project conditions.

3.2 PREPARATION

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

3.3 APPLICATION

- A. Install in accordance with manufacturer's instructions.
- B. Cut film edges neatly and square at a uniform distance of 1/8 inch to 1/16 inch of window sealant. Use new blade tips after 3 to 4 cuts.
- C. Spray slip solution on window glass and adhesive to facilitate proper positioning of film.
- D. Apply film to glass and lightly spray film with slip solution.
- E. Squeegee from top to bottom of window. Spray slip solution to film and squeegee a second time.
- F. Bump film edge with lint-free towel wrapped around edge of a 5-way tool.
- G. Upon completion of film application, allow 30 days for moisture from film installation to dry thoroughly, and to allow film to dry flat with no moisture dimples when viewed under normal viewing conditions.

3.4 CLEANING

- A. Touch-up, repair or replace damaged products before Substantial Completion.
- B. After application of film, wash film using common window cleaning solutions, including ammonia solutions, 30 days after application. Do not use abrasive type cleaning agents and bristle brushes to avoid scratching film. Use synthetic sponges or soft cloths.

END OF SECTION

SECTION 090506
COMMON WORK RESULTS FOR FLOORING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes general requirements for flooring preparation, installation and temporary protection.
 - 1. Provide independent testing laboratory services to perform relative humidity, moisture vapor emission, and pH tests on in situ concrete slabs, which shall be in addition to testing as may be performed by Owner.

1.2 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract and Division 01 Specification Sections apply to this Section.
- B. Section 015000 - TEMPORARY FACILITIES AND CONTROLS: Application of protection paper to finished resilient flooring.
- C. Section 016000 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- D. Section 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements for construction and demolition recycling.
- E. Section 024100 - DEMOLITION: Removal of existing floor finishes
- F. Section 030513 - CONCRETE SEALERS: Concrete sealers/coatings on exposed-to-view concrete floors.
- G. Section 096513 - RESILIENT BASE AND ACCESSORIES: Resilient base.
- H. Section 096516 - RESILIENT SHEET FLOORING: Sheet vinyl flooring.
- I. Section 096519 - RESILIENT TILE FLOORING: Resilient plank flooring.
- J. Section 096523 - RUBBER FLOORING: Rubber composition tile flooring.
- K. Section 096543 - LINOLEUM FLOORING: Linoleum sheet & tile flooring.
- L. Section 096723 - RESINOUS FLOORING: Troweled seamless epoxy flooring system.

1.3 REFERENCES

- A. Reference Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 014200 - REFERENCES. The standards referenced herein are included to establish recognized minimum quality only. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern. Equivalent quality and testing standards will be acceptable, subject to their timely submission, review and acceptance by the Architect.
 - 1. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.
 - 2. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
 - 3. ASTM F3010 - Standard Practice for Two-Component Resin Based Membrane-Forming Moisture Mitigation Systems for Use Under Resilient Floor Coverings.
 - 4. All applicable federal, state and municipal codes, laws and regulations regarding flammability and smoke generation of interior finishes.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. General: Coordinate flooring work with the respective trades responsible for installing interfacing and adjoining work for proper sequence of installation, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.

- B. Pre-Installation Meetings: At least 30 calendar days prior to commencing any flooring work, conduct a pre-installation conference at the Project site. Comply with requirements of Section 013000 - ADMINISTRATIVE REQUIREMENTS. Coordinate time of meeting to occur prior to installation of work under the related sections named below.
1. Required Attendees:
 - a. Owner.
 - b. Architect.
 - c. Contractor.
 - d. Project Superintendents representing each floor system installer.
 - e. Manufacturer's technical representative(s) for flooring products as designated by Architect or Contractor.
 - f. Representatives of related trades as directed by the Architect or Contractor, and representatives for installers of related work specified under the following Sections:
 - 1) Section 030136 - RESURFACING AND PATCHING OF CONCRETE SLABS.
 - 2) Section 030513 - CONCRETE SEALERS.
 - 3) Section 096516 - RESILIENT SHEET FLOORING.
 - 4) Section 096519 - RESILIENT TILE FLOORING.
 - 5) Section 096523 - RUBBER FLOORING.
 - 6) Section 096543 - LINOLEUM FLOORING.
 - 7) Section 096723 - RESINOUS FLOORING.
 2. Agenda:
 - a. Scheduling of preparation and flooring operations.
 - b. Procedures for testing of relative humidity and moisture content of in situ substrates.
 - c. Water vapor emission control methods.
 - d. Review of staging and material storage locations.
 - e. Coordination of work by other trades.
 - f. Protection of completed Work.
 - g. Establish humidity and temperature limitations for performing the work, to which Architect and Contractor must agree.
 - h. Discuss process for inspection and acceptance of completed Work of this Section.
- C. Sequencing:
1. Sequence flooring installation when base cabinets or other built-in casework is present on the substrate.
 2. Field Measurements:
 - a. Take field measurements before preparation of shop drawings and fabrication, where possible, to ensure proper fitting of Work.
 - b. Allow for adjustments within specified tolerances wherever taking of field measurements before fabrication might delay Work.
 3. Ensure that installation of flooring and accessories occurs after other finishing operations, including painting.
- 1.5 RELATIVE HUMIDITY, MOISTURE VAPOR EMISSION AND ACIDITY/ALKALINITY (PH)TESTING
- A. Concrete Slabs and Floors:
1. Contractor shall employ and pay for services of an independent testing laboratory to perform relative humidity, moisture vapor emission, and pH tests on concrete slabs as follows. The test shall be witnessed by the Contractor, flooring subcontractors and Owner's Project Representative.
 - a. Relative Humidity, Moisture Vapor Emission and pH Testing on all concrete slabs over-which a finished floor is to be installed. This includes, but is not limited to:
 - 1) Resilient sheet flooring, including (but not limited to) rubber, and vinyl flooring.
 - 2) Resinous and epoxy resin flooring.
 - 3) Painted floors and concrete sealers.

- b. Perform moisture and pH tests on all concrete floors over-which stone flooring is to be applied.
 2. Requirements: As specified under Part 3 of this Section.
 - a. Submit a copy of test data to the installers of all flooring materials or coating materials scheduled to be installed.
 - b. Provide additional testing in the event test results indicate higher moisture content than recommended by the flooring material and coating material manufacturers for the installation of their products. Perform such additional testing, at no additional cost to the Owner, after procedures have been performed to reduce moisture content to ratings acceptable to the various flooring and coating manufacturers.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that spaces to receive flooring finishes are suitable for installation. Do not proceed with work until unsatisfactory conditions are corrected. Comply with manufacturer's recommendations including the following:
 1. Substrates shall be dry and clean.
 2. Substrates shall be free of depressions, raised areas, or other defects which would telegraph through installed flooring.
 3. Verify concrete substrates have a flat tolerance of 3/16" in ten linear feet.
 4. Temperature of resilient flooring and substrate shall be within specified tolerances.
 5. Moisture condition and adhesive bond tests shall be performed as specified herein.
- B. For applications on concrete, verify curing, hardening, or breaking compounds have not been used. If there are any, do not proceed until compounds have been removed as specified.
- C. For applications on concrete slab on grade or below grade, verify vapor barrier below slab was installed. If no vapor barrier was installed, do not proceed with work unless written acceptance of such conditions is received and submitted.
- D. Perform testing of in situ concrete, relative humidity and surface pH testing to all concrete slabs specified to be covered with floor coverings or resinous coatings as specified herein. Do not proceed with work until results of moisture condition tests are acceptable.

3.2 PREPARATION

- A. General: Comply with flooring manufacturer's requirements for preparation of substrate to receive resilient flooring.
- B. Vacuum clean substrate, and ensure that substrate is dry, clean and smooth prior to application of flooring.
- C. Remove, by light sanding and grinding, all protruding edges, high spots.
- D. Ensure substrate is flat to a plus or minus 1/8 inch in 10 feet tolerance. Fill minor or local low spots, cracks, joints, holes, and other defects with subfloor filler to achieve smooth, flat, hard surface. Prohibit traffic until filler is cured.
- E. Ensure that substrate is free from paint, varnish, wax, oil, existing adhesive residue, or other foreign matter.
- F. Apply primers as recommended by adhesive manufacturer's written instructions.
- G. Condition flooring materials, accessories and adhesives to room temperatures for a period of 48 hours minimum.

3.3 TESTING IN SITU CONCRETE SUBSTRATES

- A. Scope:
 1. Provide in situ concrete relative humidity and surface pH testing to all concrete slabs specified to be covered with floor coverings or resinous coatings. Includes concrete

placed as part of this Work which occurs below grade, above grade (suspended slabs), and slabs on grade.

- a. Existing building suspended slabs may be excluded from this requirement.
- B. Scheduling:
1. Testing shall take place after allowing concrete to dry for a minimum of 90 days. Testing to be scheduled no less than one, nor more than three weeks prior to scheduled flooring installation.
 - a. DO NOT conduct testing unless the slab environment is identical to that in which the finished flooring is to be installed.
 2. In the event new flooring is to be installed over existing resilient flooring, remove the portion of the existing flooring and adhesive directly under the area where testing will be conducted. Patch flooring to match existing construction after completion of testing.
- C. Test Result Submittals:
1. Report all test results in chart form listing test dates, time, depth of test well, in situ temperature, relative humidity, moisture vapor and pH levels.
 2. List test locations on chart and show same on marked up Floor Plan Drawings.
 3. Deliver copies of report to Architect, Owner's Project Representative and Contractor.
- D. Testing Equipment: Shall be equal to the following
1. For Relative Humidity Testing:
 - a. Digital Meter and Calibrated Humidity and Temperature probe kit as manufactured by Vaisala Inc. (Boston Office) 10D Gill Street, Woburn, MA, 01801 (telephone 781-933-4500).
 - 1) Minimum 2 point probe calibration.
 2. For Calcium Chloride Testing:
 - a. Anhydrous calcium chloride testing in accordance with Rubber Manufacturer's Association (RMA) Test requirements.
 - b. Test kits: Vaprecision, inc. 2941 West MacArthur Boulevard, Suite 135. Santa Ana, CA 92704 (telephone 800-449-6194).
 3. For pH Testing:
 - a. pH test paper by Micro Essential Laboratory, Inc., P.O. Box 100824, 4224 Avenue "H", Brooklyn, NY 11210, (telephone 718-338-3618).
 - b. Distilled or de ionized water.
- E. Testing Procedures: General.
1. Initial testing: Provide 3 tests for the first 1,000 square feet.
 2. Add one test for each additional 1,000 square feet.
 3. Concrete surface area to be tested shall be completely clean. Remove all adhesives, residue, debris and sealing compounds. Remove all dust by vacuum or other methods. Do not use chemicals of any kind to clean concrete.
 4. Perform moisture tests in strict accordance with the kit manufacturer's Instructions. Moisture tests shall remain undisturbed for 60 to 72 hours.
 5. Immediately after moisture test has been removed from test area, conduct pH test in area previously covered by plastic dome of moisture test kit.
 6. After completion of tests submit 2 copies of test data to the Architect. Submit a copy of the test data to all installers of flooring materials and resinous flooring materials scheduled to be installed.
 7. Provide additional testing in the event test results indicate higher moisture content than recommended by the flooring material and coating material manufacturers for the installation of their products. Perform such additional testing, at no additional cost to the Owner, after procedures have been performed to reduce moisture content to ratings acceptable to the various flooring and coating manufacturers.
- F. Testing Procedures: Quantification of Relative Humidity.

1. The test site should be maintained at the same temperature and humidity conditions as those anticipated during normal occupancy. These temperature and humidity levels should be maintained for 48 hours prior and during test period. If meeting this criteria is not possible, then minimum conditions should be 75 degrees F (plus or minus 10 degrees F), and 50 percent (plus or minus 10 percent) relative humidity. When a building is not under HVAC control, a recording hygrometer or data logger shall be in place recording conditions during the test period. A transcript of this information must be Included with the test report.
 2. The number of In situ relative humidity test sites is determined by the square footage of the facility. The minimum number of tests to be placed is equal to 3 in the first 1,000 square feet and 1 per each additional 1,000 square feet.
 3. Drill test holes utilizing a roto hammer drill. Hole diameter shall not exceed outside diameter of the insertable test sleeve by more than 0.04 inch. Drilling operation must be dry. Determine the thickness of the concrete slab from Construction Documents. Depths of test holes shall be as follows:
 - a. For elevated slabs (not poured in pans), drill test holes to a depth equal to 20 percent of the concrete thickness.
 - b. For slabs on grade and elevated slabs in pans, drill test holes to a depth equal to 40 percent of the concrete thickness.
 4. Vacuum all concrete dust from test hole.
 5. Insert a hole liner, or sleeve, to the full depth of test hole, assuring that the liner is capped or plugged at the end protruding from the concrete surface.
 6. Permit the test site to acclimate, or equilibrate, for 72 hours prior to taking relative humidity readings.
 7. Remove the sleeve plug and place a probe into the sleeve assuring that it reaches the bottom of the test hole.
 8. Allow the probe to sit in the test sleeve for 30 minutes before taking readings.
 9. Read and record temperature and relative humidity at the test site.
- G. Testing Procedures: Quantification of Concrete Moisture Vapor Emission through Calcium Chloride Testing.
1. The test site should be maintained at the same temperature and humidity conditions as those anticipated during normal occupancy. These temperature and humidity levels should be maintained for 48 hours prior and during test period. If meeting this criteria is not possible, then minimum conditions should be 75 degrees F (plus or minus 10 degrees F) and 50 percent relative humidity (plus or minus 10 percent). When a building is not under HVAC control, a recording hygrometer or data logger shall be in place recording conditions during the test period. A transcript of this information must be included with the test report.
 2. The number of vapor emission test sites is determined by the square footage of the facility. The minimum number of tests to be placed is equal to 3 In the first 1.000 square feet and 1 per each additional 1,000 square feet.
 3. Tests sites are to be cleaned of all adhesive residue, curing compounds, paints, sealers, floor coverings, and similar materials. 24 hours prior to the placement of test kits.
 4. Weigh test dish on site prior to start of test. Scale must report weight to 0.1 grams. Record weight and start time.
 5. Expose Calcium Chloride and set dish on concrete surface.
 6. Install test containment dome and allow test to proceed for 60 to 72 hours.
 7. Retrieve test dish by carefully cutting through containment dome. Close and reseal test dish.
 8. Weigh test dish on site recording weight and stop time.
 9. Calculate and report results as pounds of emission per 1,000 square feet per 24 hours."
- H. Testing Procedures: Quantification of Acidity/Alkalinity (pH) Level.

1. At or near the relative humidity test site and each vapor emission (calcium chloride) test site, perform pH test.
 - a. At each testing site, lay down a loose 2 foot by 2 foot sheet of non perforated sheet backed by plywood. Leave in place for 48 hours.
 - b. Remove sheet and place several drops of distilled or de ionized water onto the concrete surface to form a puddle approximately 1 inches in diameter.
 - c. Allow the water to set for approximately 60 seconds.
 - d. Dip the pH paper into the water and remove immediately, compare color to chart provided by paper supplier to determine pH reading
2. Record and report results.

3.4 FLOOR PREPARATION - GENERAL REQUIREMENTS

- A. General: Comply with ASTM F710 and manufacturer's recommendations for surface preparation. Remove substances incompatible with resilient flooring adhesive by method acceptable to manufacturer.
 1. Concrete floors with steel troweled (slick) finish shall be properly roughened up (sanded) to ensure suitable adhesion.
 2. Concrete floors with curing, hardening, and breaking compounds shall be abraded with mechanical methods only to remove compounds. Use blastrac or similar equipment.
- B. Fill voids, cracks, and depressions with trowel-applied leveling compounds acceptable to manufacturer. Remove projections and repair other defects to tolerances acceptable to manufacturer.
- C. Vacuum subfloors immediately prior to installation to remove loose particles.

3.5 ADHESIVE BOND TESTING

- A. Use the specified flooring and recommended adhesive, install approximately 3 by 3 foot sized flooring as specified under individual flooring specification sections. Install test samples approximately 50 feet apart throughout the area. Areas next to walls or other light traffic areas should be selected for the bond test. Tape down the perimeter of the flooring to prevent drying of the adhesive at the edges. After a minimum period of 72 hours the flooring should be pulled from the subfloor. If an unusual amount of force is required, the bond could be considered sufficient. Floors demonstrating unsuitable bond to substrate require modifications to flooring installation and may require application of moisture mitigation products. Review all conditions with Architect/Engineer.

3.6 PROTECTION

- A. Provide protection of completed flooring areas from construction traffic until Substantial Completion of the General Contract. Cover all floor surfaces with heavyweight kraft paper and overlay with red-rosin paper, taping the edges to maintain position of the protection paper. Reapply papers as required to maintain floor protection.

END OF SECTION

SECTION 092216
NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Non-load-bearing steel framing systems for interior partitions.
- B. Suspension systems for interior ceilings and soffits.
- C. Flexible track assemblies for curved walls.

1.2 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract and Division 01 Specification Sections apply to this Section.
- B. Section 016000 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- C. Section 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements for construction and demolition recycling.
- D. Section 054000 - Cold-Formed Metal Framing: Exterior wall stud framing.
- E. Section 092900 - GYPSUM BOARD: Gypsum board, applied over metal framing.

1.3 REFERENCE STANDARDS

- A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 014200 - REFERENCES. The standards referenced herein are included to establish recognized minimum quality only. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern. Equivalent quality and testing standards will be acceptable, subject to their timely submission, review and acceptance by the Architect.
 - 1. ASTM A568/A568M - Standard Specification for Steel, Sheet, Carbon, Structural, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements for; 2017.
 - 2. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2017.
 - 3. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members; 2014, with Editorial Revision (2015).
 - 4. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2017.
 - 5. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board; 2018.
 - 6. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009 (Reapproved 2016).
 - 7. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2018.
 - 8. ASTM E413 - Classification for Rating Sound Insulation; 2016.
 - 9. UL 2079 - Standard for Tests for Fire Resistance of Building Joint Systems.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the work of this Section with the respective trades responsible for installing interfacing work, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.
 - 2. Work of this Section shall be closely coordinated with the work of Section 092900 - GYPSUM BOARD to assure the steady progress of the Contract.

1.5 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.

1. Product Data: Manufacturer's product data sheets, specifications, performance data, physical properties for each item furnished hereunder.

1.6 QUALITY ASSURANCE

- A. General: Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.
- B. Seismic Compliance: Nonstructural components that are permanently attached to structures and their support attachments, shall be designed and constructed to resist the effects of earthquake motions in accordance to local jurisdiction.
- C. Sole Source: Obtain products required for the Work of this Section from a single manufacturer.
- D. Qualifications:
 1. Installer/Applicator: Minimum of 3 years documented experience demonstrating previously successful work of the type specified herein.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Delivery and Acceptance Requirements:
 1. Do not deliver items to the site, until all specified submittals have been submitted to, and approved by, the Architect.
- B. Storage and Handling Requirements:
 1. Store and handle materials following manufacturer's recommended procedures, and in accordance with material safety data sheets.
 2. Protect materials from damage due to moisture, surface contamination, corrosion and damage from construction operations and other causes.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated, according to ASTM E119 by an independent testing agency.
- B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated, according to ASTM E90 and classified according to ASTM E413 by an independent testing agency.

2.2 MANUFACTURERS

- A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 1. Metal components and related items (including non-rated deflection track assemblies):
 - a. CEMCO, City of Industry, CA; www.cemcosteel.com.
 - b. ClarkDietrich Building Systems; www.clarkdietrich.com.
 - c. MarinoWARE, South Plainfield, NJ; www.marinoware.com.
 - d. The Steel Network, Inc; Durham, NC: www.SteelNetwork.com.
 - e. Super Stud Building Products, Inc., Edison, NJ; www.buysuperstud.com.
 - f. Telling Industries, LLC, Cleveland, OH; www.buildstrong.com.
 2. Fire rated deflection track assemblies:
 - a. CEMCO, City of Industry, CA; www.cemcosteel.com.
 - b. Fire Trak Inc., Watkins, MN; www.firetrak.com.
 - c. The Steel Network, Inc., Durham, NC; www.steelnetwork.com.
- B. The design and details as shown on the drawings and the model numbers specified herein are to establish the standards of design and quality and not to limit competition.

2.3 DESCRIPTION

- A. Regulatory Requirements:

1. Obtain certificate of compliance from authority having jurisdiction indicating approval of specified products.
2. Fire resistance ratings: Where gypsum board systems with fire-resistance ratings are indicated, provide materials and assemblies of the rating required, tested per ASTM E119, which are identical to those indicated by reference to Gypsum Association file numbers in "Fire Resistance Design Manual" or to design designation in the Underwriters Laboratories "Fire Resistance Directory" or in listing of other testing agencies acceptable to authorities having jurisdiction and to the Owners' insurance underwriters.
 - a. Fire-Test-Response Characteristics: Provide components that comply with rating requirements specified for fire-rated assemblies under UL 2079 for non-load bearing wall systems.
 - 1) Deflection Clips and Firestop Track: Connections and/or top runner provided in fire-resistance-rated assemblies shall be certified by UL 2079 for cyclic movement requirements.

2.4 FRAMING MATERIALS

- A. Furring Channels: 7/8 x 2-3/4 inch, roll-formed, hat-shaped, furring channel 25 gage hot-dip galvanized steel conforming to ASTM C645.
- B. Studs: 'C-shaped' screw studs, hot-dip galvanized steel, 20 gage-equivalent (nominal 0.02 inches [0.75 mm] of widths indicated on the Drawings).
 1. Basis of Design: ClarkDietrich Building Systems, LLC, product "ProStud" series
 2. Acceptable manufacturers:
 - a. CEMCO.
 - b. ClarkDietrich Building Systems, LLC.
 - c. MarinoWARE.
 - d. Super Stud Building Products Inc.
 - e. Telling Industries, LLC.
- C. Runners for Metal Studs: 'U-shaped' hemmed, hot-dip galvanized steel track conforming to ASTM C645, of gage and width to match respective stud sizes, or heavier gage per design requirements, having 1-1/4 inch leg, provided at tops and bottoms of all studs and at heads of all openings in stud partitions.
- D. Internal reinforcement for various stud conditions, and bracing as required: 10 gage, minimum, galvanized steel.
- E. Furnish cross bracing and knee bracing, as required to assure a completely rigid assembly on metal stud partitions and furred areas.

2.5 FLEXIBLE TRACK ASSEMBLIES

- A. Non-load bearing flexible header and sill track system for curved wall applications; Flex-Ability Concepts, Edmond, OK, or approved equal, products:
 1. Flex Ability Concepts product "FLEX-C TRAC": Manufacturer's proprietary C- shaped flexible steel track with banded flanges and screw attachments at every flange interval.
 2. Flex Ability Concepts product "FLEX-C ANGLE": Manufacturer's proprietary L-shaped flexible steel angle with banded flanges and screw attachments at every flange interval.

2.6 DEFLECTION TRACK ASSEMBLIES

- A. Non Fire-Rated Assemblies:
 1. Deflection Track: Manufacturer's standard top runner with extended flanges designed to prevent cracking of gypsum board applied to interior partitions resulting from deflection of the structure above fabricated from steel sheet complying with ASTM A653 or ASTM A568. Thickness as indicated for studs, and width to accommodate depth of studs, and the following configuration.
 - a. Top runner with extended deep flanges that have one of the following: V-shaped offsets that compress, slots 1 inch on center that allow fasteners for stud attachment;

- 16 gage sliding clip assemblies attached to top track and clipped to stud, or double track systems as required to meet anticipated vertical movement.
2. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - a. CEMCO, product; "Slotted Track CST".
 - b. ClarkDietrich Building Systems, LLC, product; "Deep Leg Deflection Track System", "Fast Top Clip", or "DoubleTrack System".
 - c. Marino\WARE, product: "Slotted Track".
 - d. The Steel Network, Inc., product; "VertiTrack VT", "VertiTrack VTD", or "VertiClip SLD".
 - e. Super Stud Building Products Inc., product: "ITTC 450 Top Track Deflection Clip".
 - f. Telling Industries, product; "ViperTrack Deep Leg Deflection Track".
 - B. Fire-Rated Assemblies: Head of wall dynamic fire rated joint systems for assemblies in compliance with UL 2079 HW-D. Provide clips or deep leg track system including step bushings complying with ASTM C645 fabricated from steel sheet complying with ASTM A653 or ASTM A568. Thickness as indicated for studs, and width to accommodate depth of studs.
 1. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - a. CEMCO, product; "FAS Track UL Assemblies".
 - b. ClarkDietrich Building Systems, LLC, product; "SLP-TRK Slotted Deflection Track".
 - c. Fire Trak Inc., Watkins, MN, product "Fire Trak", or "Posi Clips"
 - d. The Steel Network, Inc., Durham, NC. product; "VertiClip SLD".
 - C. Coordination: Verify with partition schedule on the Drawings to ensure proper depth of flange offsets at various partitions types.
- 2.7 CEILING AND SOFFIT FRAMING MATERIALS
- A. Carrying channels, 2 inches deep, 16 gage cold-rolled channels, galvanized.
 - B. Support channels: 3/4 inches deep, 16 gage cold-rolled channels, galvanized.
 - C. Furring Channels: 7/8 x 2-3/4 inch, roll-formed, hat-shaped, furring channel 25 gage hot-dip galvanized steel conforming to ASTM C645.
 - D. Metal Studs used in soffit and ceiling framing: 'C-shaped' screw studs, hot-dip galvanized steel complying to ASTM C645, 25 gage, of widths indicated on the Drawings, or other gages as required under the specified standards to meet fire resistance ratings.
- 2.8 ACCESSORIES
- A. Metal sheet plate blocking and bracing, where indicated: galvanized sheet 0.0312 inch thickness (20 gage).
 - B. Fasteners:
 1. Expansion-type fasteners for securing vertical concrete and masonry surfaces.
 2. Concrete stub nails for securing runners to concrete.
 3. N^o.7 by 7/16 inch Pan head self-drilling screw to attach metal framing components.
 - C. Reinforcing plates for blocking: 20 gage cold rolled sheet steel, provide minimum 6 inch width, or as otherwise indicated on the drawings.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Installation Standard: ASTM C754.
 1. Gypsum Board Assemblies: Also comply with requirements in ASTM C840 that apply to framing installation.

- B. Install framing and accessories plumb, square, and true to line, with connections securely fastened.
- C. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.
- D. Install bracing at terminations in assemblies.
- E. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.2 INSTALLING FRAMED ASSEMBLIES

- A. Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.
- B. Install studs so flanges within framing system point in same direction.
- C. Install tracks (runners) at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts that penetrate partitions above ceiling.
 - 1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
 - 2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.
 - a. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch (13-mm) clearance from jamb stud to allow for installation of control joint in finished assembly.
 - b. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.
 - 3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
 - 4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.
 - a. Firestop Track: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.
 - 5. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.
 - 6. Curved Partitions:
 - a. Bend track to uniform curve and locate straight lengths so they are tangent to arcs.
 - b. Begin and end each arc with a stud, and space intermediate studs equally along arcs. On straight lengths of no fewer than two studs at ends of arcs, place studs 6 inches (150 mm) o.c.
- D. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch (3 mm) from the plane formed by faces of adjacent framing.

3.3 INSTALLING SUSPENSION SYSTEMS

- A. Install suspension system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.
- B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.
- C. Suspend hangers from building structure as follows:
 - 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.

- a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.
 - a. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.
 3. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
 4. Flat Hangers: Secure to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices and fasteners that are secure and appropriate for structure and hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.
 5. Do not attach hangers to steel roof deck.
 6. Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
 7. Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.
 8. Do not connect or suspend steel framing from ducts, pipes, or conduit.
- D. Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.
- E. Seismic Bracing: Sway-brace suspension systems with hangers used for support.
- F. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet (3 mm in 3.6 m) measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.
- 3.4 INSTALLATION OF FLEXIBLE TRACK ASSEMBLIES
- A. Install in strict compliance to manufacturer's written instructions.
 1. Do not torch cut components.
 - B. Fasten flexible track members by welding or screw fastening, as standard with fabricator. Locate mechanical fasteners and install according to manufacturer's instructions with screw penetrating banding at every flange interval and joined members by not less than 3 exposed screw threads.
 - C. Install flexible track members in one or multi-piece lengths. Splice flexible track segments by overlapping bands from one flexible track member to another and attaching screwed fasteners at overlapping plates or flange intervals. Screw penetrations of not less than 3 exposed screw threads.
 - D. Provide temporary bracing and leave in place until framing is permanently stabilized.
 - E. Fasten reinforcement plate over web penetrations that exceed size of manufacturer's standard punched openings.

END OF SECTION

**SECTION 092900
GYPSUM BOARD**

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Interior gypsum board.
- B. Moisture resistant gypsum board.
- C. Trim accessories.

1.2 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract and Division 01 Specification Sections apply to this Section.
- B. Section 016000 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- C. Section 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements for construction and demolition recycling.
- D. Section 078400 - FIRESTOPPING: Firestopping, firesafing, smoke seals and related accessories.
- E. Section 092216 - NON-STRUCTURAL METAL FRAMING: Non-structural steel framing and suspension systems that support gypsum board panels.
- F. Section 093000 - TILING: Tile finishes over backer board substrate.
- G. Section 099100 - PAINTING: Applied finish coatings.

1.3 REFERENCES

- A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 014200 - REFERENCES. The standards referenced herein are included to establish recognized minimum quality only. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern. Equivalent quality and testing standards will be acceptable, subject to their timely submission, review and acceptance by the Architect.
 - 1. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.
 - 2. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board.
 - 3. ASTM C919 - Standard Practice for Use of Sealants in Acoustical Applications
 - 4. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.
 - 5. ASTM C1047 - Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base.
 - 6. ASTM C1193 - Standard Guide for Use of Joint Sealants.
 - 7. ASTM C1396 - Standard Specification for Gypsum Board.
 - 8. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.
 - 9. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
 - 10. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
 - 11. ASTM E413 - Classification for Rating Sound Insulation.
 - 12. GA-214 - Recommended Levels of Finish for Gypsum Board, Glass Mat & Fiber-Reinforced Gypsum Panels.
 - 13. GA-216 - Application and Finishing of Gypsum Panel Products.

14. GA-220 - Gypsum Board Winter Related Installation Recommendations.
15. GA-600 - Gypsum Fire Resistance Design Manual.
16. UL - Fire Resistance Directory.
17. All applicable federal, state and municipal codes, laws and regulations regarding flammability and smoke generation of interior finishes.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 1. General: Coordinate the work of this Section with the respective trades responsible for installing interfacing and adjoining work for proper sequence of installation, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.
- B. Sequencing: Do not install gypsum board until all pipes, ducts, conduits, and other such items which are to be enclosed thereby, have been permanently installed, inspected and approved.

1.5 SUBMITTALS

- A. Information and Review Submittals: Submit the following under provisions of Section 013000 - ADMINISTRATIVE REQUIREMENTS:
 1. Product Data: Manufacturer's product data, including specifications, performance data, and physical properties for each item furnished hereunder.
 2. Shop Drawings:
 - a. Details of any special conditions associated with fireproofing.
 - b. Mark-up a set of blackline interior elevations indicate corrections to grid layout and provide dimensioning showing locations of all proposed control joints and expansion joints.
 - 1) Provide interior elevation drawings for interior elevations which are not included as part of the Contract Drawing set.

1.6 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 gypsum board application and finishing, with minimum five years of experience.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.8 FIELD CONDITIONS

- A. Environmental Limitations: Comply with ASTM C840 requirements or gypsum board manufacturer's written instructions, whichever are more stringent.
- B. Do not install gypsum panels until installation areas are enclosed and conditioned.
- C. Do not install panels that are wet, moisture damaged, and mold damaged.
 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E119 by an independent testing agency.

- B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E90 and classified according to ASTM E413 by an independent testing agency.
- C. Gypsum Board Assemblies: Provide completed assemblies complying with ASTM C840 and GA-216.
 - 1. Interior Partitions Indicated as Acoustic: Provide completed assemblies with the following characteristics:
 - a. Acoustic Attenuation: STC of 45-49 calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90.
 - 2. Fire Rated Assemblies: Provide completed assemblies complying with applicable code.
 - a. ICC IBC Item Numbers: Comply with applicable requirements of ICC IBC for the particular assembly.
 - b. Gypsum Association File Numbers: Comply with requirements of GA-600 for the particular assembly.
 - c. UL Assembly Numbers: Provide construction equivalent to that listed for the particular assembly in the current UL Fire Resistance Directory.
- D. Performance Requirements: Fabricate and install systems as indicated but not less than that required to comply with ASTM C754 under the following conditions:
 - 1. Gypsum board partitions:
 - a. Standard Systems: Maximum deflection of L/240 of partition height.
 - b. Systems to Receive Tile: Maximum deflection of L/360 of partition height.

2.2 BOARD MATERIALS

- A. Standard Gypsum Board: Conforming to ASTM C1396, 5/8 inch thick, except where other thickness are indicated on Drawings, of lengths to minimize end joints, with tapered edges.
 - 1. Acceptable products include the following, or approved equal:
 - a. USG Sheetrock brand "Gypsum Panels"
 - b. National Gypsum Company, Gold Bond brand product "Gypsum Board".
 - c. G-P Gypsum Corporation product, "ToughRock".
- B. Fire Rated Gypsum Board: UL fire resistance rated, ASTM C1396 'Type X' board, 5/8 inch thick, 48 inch width, of lengths to minimize end joints, with tapered edges.
 - 1. Acceptable products include the following, or approved equal:
 - a. USG Sheetrock brand "Firecode Core"
 - b. National Gypsum Company, Gold Bond brand product "Fireshield Gypsum Board".
 - c. G-P Gypsum Corporation product, "Toughrock Fireguard".
- C. Sag-Resistant Gypsum Board Ceiling Panels: Non-rated 1/2 inch thick, 48 inch width, of lengths to minimize end joints, with tapered edges, conforming to ASTM C1396.
 - 1. Acceptable products include the following or approved equal:
 - a. USG Sheetrock brand product "Interior Ceiling Panel, Sag Resistant".
 - b. National Gypsum Company, Gold Bond brand product "High Strength Ceiling Board".
 - c. G-P Gypsum Corporation product, "ToughRock CD Ceiling Board".
 - 2. At fire-resistant rated ceilings, provide 5/8 inch thick fire-rated gypsum board as specified herein.
- D. Mold and Moisture Resistant (MR) Gypsum Board: fire resistant, water-resistant, mold-resistant interior wall panel; conforming to ASTM C1396, with Type "X" core 5/8 inch thick, 48 inch width, of lengths to minimize end joints, with tapered edges.
 - 1. Treated paper faced acceptable products include the following or approved equal:
 - a. USG Sheetrock brand "Mold Tough Firecode Panels" .
 - b. National Gypsum Company, Gold Bond brand product "XP Fireshield Gypsum Board".

- E. Flexible Gypsum Board for curved-partition construction: Non-rated, conforming to ASTM C1396, 1/4 inch thick, 48 inch width, of lengths to minimize end joints, with tapered edges. Boards shall be capable of bending to a 5'-0 inch radius and greater.
1. Acceptable products include the following, or approved equal:
 - a. National Gypsum Company, Gold Bond brand product "High Flex".
 - b. USG Sheetrock brand "Sheetrock Gypsum Panels, 1/4" Flexible."
 - c. G-P Gypsum Corporation product, "ToughRock Flexroc."
 2. Refer to Section 092216 - NON-STRUCTURAL METAL FRAMING for flexible track assemblies.

2.3 ACCESSORIES

A. Metal Trim Accessories:

1. Corner Beads: 1-1/4 by 1-1/4 inch corner bead for finishing with joint compound fabricated from galvanized steel conforming with ASTM C1047.
 - a. Acceptable products include the following or approved equal:
 - 1) Bailey Metal Products Ltd., model D100.
 - 2) ClarkDeidrich Metal Framing, model CBS.
 - 3) Gold Bond product, 1-1/4 inch Wallboard Corner Bead.
 - 4) USG product "Dur-A-Bead - number 103".
2. Casing Beads: Edge casing bead with 1/2 inch back leg, for finishing with joint compound fabricated from galvanized steel conforming with ASTM C1047.
 - a. Acceptable products include the following or approved equal:
 - 1) Bailey Metal Products Ltd., model D-200
 - 2) ClarkDeidrich Metal Framing, model M20B.
 - 3) Gold Bond product, Wallboard Casing number 100.
 - 4) USG product "Dur-A-Bead - number 200A"

B. Control Joints and Reveal Trim: "V-shaped control joint, with nominal 3/16 inch reveal.

1. Acceptable products include the following or approved equal:
 - a. Basis of Design: Fry Reglet Corporation, model; "DA.7 "V" Reveal"
 - b. Phillips Manufacturing Company, model "EZ Strip Expansion Joint".
 - c. Plastic Components model number: 2027-16.
 - d. Vinyl Corp. model number: CJV16.
 - e. AMICO. model number: AMDCJV16.

C. Tapes and Compound:

1. Joint Tape (at paper-faced gypsum): Nominal 2 inch wide, high strength, cross-fibered paper drywall tape.
2. Joint Tape (at fiberglass faced gypsum): Nominal 2 inch wide, self-adhering (adhesive backed), fiberglass mesh tape.
3. Joint Compound for setting fiberglass joint tape:
 - a. Cetainteed, Valley Forge PA., product "ProRock Moisture and Mold Resistant 90".
 - b. Georgia Pacific Gypsum LCC., Pittsburgh PA, product "Densarmor Cote"
 - c. CTS Cement Manufacturing Corporation, Cypress CA., product "Rapid Set OnePass".
4. Joint Compound for Setting Paper Joint Tape: 'Speed-setting type compound', field mixed.
 - a. Acceptable products, or approved equal:
 - 1) USG product "Durabond 20".
 - 2) Gold bond product "Stay Smooth 30".
 - 3) Georgia Pacific Gypsum LCC, product "ToughRock All-Purpose Dry Mix"
5. Joint Compound for Finishing: Field mixed joint compound or factory pre-mixed compound.
 - a. Field Mixed Compounds: acceptable products, or approved equal:
 - 1) USG product "Durabond 90".

- 2) Gold bond product "Stay Smooth 90".
- 3) Georgia Pacific Gypsum LCC, product "ToughRock Setting Compound 90".
- b. Factory Pre-Mixed Compounds: acceptable products, or approved equal:
 - 1) USG product "Ready-Mixed Joint Compound".
 - 2) Gold bond product "All Purpose Compound".
 - 3) Georgia Pacific Gypsum LCC, product "ToughRock Ready Mix All-Purpose Compound"
- D. Fasteners (interior board systems):
 1. Type S, bugle head screws complying with ASTM C1002, for applying gypsum board to metal framing, ceiling grid system, and furring channels.
 - a. Not less than 1 inch long for single layer gypsum board.
 - b. Not less than 1-5/8 inch [41mm] long for double-layer gypsum board.
 2. Type S-12, fine thread self-drilling screws complying with ASTM C1002, for applying gypsum board to light gage metal framing.
 - a. Not less than 1 inch [25 mm] long for 1/2 inch thick single layer gypsum board.
 - b. Not less than 1-1/4 inch [31mm] long for 5/8 inch thick single layer gypsum board.
 - c. Not less than 1-5/8 inch [41mm] long for double-layer gypsum board,
- E. Ceiling Buttons: Perforated type, 1 inch diameter, for use at multiple layered gypsum board ceiling systems.
- F. Laminating Adhesive: Ready mix joint compounds as specified herein above.
- G. Joint Sealers (interior acoustical sealant type): One component acrylic latex, permanently elastic, non-staining, non-shrinking, non-migrating and paintable. Acceptable products include the following, or approved equal.
 1. Tremco, Beachwood, OH.; product, "Acoustical Sealant".
 2. United States Gypsum Company, Chicago, IL.; product "USG Acoustical Sealant".
 3. Pecora Corporation, Harleysville, PA.; product " AC-20 FTR".

2.4 SOURCE QUALITY CONTROL

- A. Obtain gypsum board products from a single manufacturer, or from manufacturers recommended by the prime manufacturer of gypsum boards.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that all items which are to be enclosed by Work of this Section, have been permanently installed, inspected and approved.
- B. Inspect framing and other substrates; verify that they are in proper condition to receive the work of this Section.
- C. Beginning of installation means acceptance of existing substrate and site conditions.

3.2 PREPARATION

- A. During the operation of gypsum board work, protect all wood, metal, glass, flooring, and other finished materials against undue soilage and damage by the exercise of reasonable care and precautions. Repair or replace any work so damaged and soiled.

3.3 INSTALLATION - GENERAL

- A. General: Perform erection procedures for the various gypsum board system conditions, except as otherwise specified, as set forth in GA-216 and GA-220, the written instructions of gypsum board manufacturer, together with the additional requirements specified herein and as indicated on the Drawings.
- B. Where fire-resistive rated assemblies are indicated, erect gypsum board systems in strict accordance with the manufacturers' UL listed test constructions for the required fire rating on each specific assembly.

- C. Install specified control joints where indicated on Drawings and where run of partitions, or furred surfaces exceeds 30 feet. Show locations of all control joints on shop drawings.
 - 1. Locate control joints at corners of head frames of doors.
 - 2. Run vertical control joints continuously to top of partition or furred area, as applicable.

3.4 BOARD INSTALLATION

- A. Screw-fasten only, gypsum board to framing and furring, with ends and edges occurring over firm bearing. At all door jambs screw fasten gypsum panels 8 inches on center to both box studs
 - 1. Erect single layer fire-resistance rated gypsum board vertically.
 - 2. Erect standard gypsum board in most economical direction.
 - 3. Erect moisture resistant gypsum board in most economical direction.
 - 4. Erect ceiling and soffit gypsum boards to meet UL requirements, where applicable, stagger end joints over supports. Secure gypsum board with fasteners inserted through ceiling buttons; anchor fasteners directly to framing or suspended support system.
- B. Wherever items penetrate the gypsum board surfaces, use extra care in cutting the gypsum board to ensure a uniformly-dimensioned joint between the penetrating item and the gypsum board, and fill joints with specified sealant material. Verify the expected deflection factor of the penetrating members, and cut the gypsum accordingly, to prevent damage thereto from the deflecting members.
 - 1. Treat cut edges and holes in moisture resistant gypsum board with approved liquid sealer.
 - a. If shellac is used, apply in thin layers to dry quickly.
- C. Installing Trim Accessories:
 - 1. General: For trim with back flanges intended for fasteners, attach to framing with same screw fasteners used for gypsum board. Otherwise, attach trim according to manufacturer's written instructions.
 - a. Nailing, stapling, or crimping methods to install trim components is prohibited.
 - 2. Install corner beads at all exterior corners of gypsum boards.
 - 3. Install casings (metal trim) wherever gypsum board meets a dissimilar material, and in other locations indicated on the Drawings, except at floors where bottom of the board will be concealed by base, integral with flooring, resilient base, wood base or carpeted base.

3.5 APPLICATION OF ACOUSTICAL SEALANT

- A. General: Install sealant and backing in accordance with the recommendations of ASTM C919 and sealant manufacturer's recommendations.
 - 1. Perform preparation in accordance with C1193. Thoroughly clean all joints, removing all loose mortar, oil, grease, dust, frost, and other foreign materials that will prevent proper adhesion of primers and sealant materials.
 - 2. If so recommended and furnished by the specific sealant manufacturer, apply primer to all joint surfaces, taking care not to stain adjacent surfaces.
- B. Seal all partition perimeters prior to taping or compounding. Where perimeters are edged with metal trim, apply sealant and backing material between trim and dissimilar material.
- C. Seal all penetrations in partition types designated for "acoustical" insulation. Penetrations to receive sealant include electrical boxes, plumbing, heating and air conditioning ducts, telephone, intercom hookups and similar items.
 - 1. Install joint bead back-up in all joints in excess of 5/8-inch depth, and joints that have no back-up therein, placing the joint bead in the joint in a manner that will assure a constant depth 1/8 inch greater than the sealant and caulking material depth tolerances.
 - a. Set beads into joints continuously, by slightly stretching during placement, to permit compression against sides of joint, without surface wrinkles or buckles.
 - b. Do not stretch back-up material into joints.
 - c. Install bond breaker wherever recommended by the sealant manufacturer to prevent bond of the sealant to surfaces where such bond might impair the Work.

2. Apply sealant in continuous beads without open joints, voids or air pockets
 - a. The depth of sealant and caulking materials shall be in accordance with manufacturer's recommendations for the specific joint function, but in no case exceed 1/2-inch in depth, nor less than 1/4-inch, regardless of the joint width.
3. Remove the temporary masking tape immediately after tooling, and before the sealant or caulking material has taken initial set.

3.6 APPLICATION OF JOINT TREATMENT

- A. Install joint tape at all joints where gypsum boards abut and where boards form internal corners, whether or not such joints will be concealed from view.
- B. Apply compound to all joints, edges, corners, fastener head depressions and abrasions in the surfaces, whether or not such conditions will be concealed from view. Sand completely smooth all compound surfaces, which will be exposed to view, and leave ready to receive applied coatings or finish.
- C. Provide the minimum levels of gypsum board finishes as defined by the Gypsum Association recommended specifications GA-214 and GA-216, per the following:
 1. At areas hidden from view, except as otherwise specified: Level 1.
 2. At areas hidden from view, requiring a fire rating: Level 1.
 3. At areas hidden from view, requiring smoke-resistance: Level 1.
 4. At areas hidden from view, corridor side of all corridor partitions: Level 1.
 5. At concealed plenum spaces above ceilings attic spaces: Level 1.
 6. At non-occupied spaces (i.e. attics): Level 1.
 7. At surfaces scheduled to receive tile: Level 2.
 8. At surfaces scheduled to receive painted finishes: Level 4.
 9. At each of the following conditions, provide Level 5 finish:
 - a. Boards having glass-fiber facing scheduled to receive a painted finish.
 - b. Surfaces subject to long dimensional runs, sun-lit and grazed lighting conditions.
 - c. Wall surfaces with a light cove at the ceiling level.
 - d. Wall surfaces that are lit with raking light or washed with lights.
 - e. Wall surfaces that are perpendicular to an exterior wall that have a window coming right up to the intersection of the interior and exterior walls.
 - f. Locations noted on Drawings.

3.7 TOLERANCES

- A. Maximum variation for gypsum board partitions and ceilings from true flatness: 1/8 inch per 10 feet, noncumulative.

3.8 CLEANING

- A. Daily clean work areas by sweeping and disposing of debris, scraps, and deposits of compound and gypsum fill.
- B. After completion of the work of this Section, remove equipment, and clean all wall, partition, and floor areas free from deposits of gypsum fill, and other materials installed under this Section.

END OF SECTION

SECTION 093000

TILING

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Furnish and install the following:
 - 1. Porcelain wall tile and associated wall base tile.
 - 2. Cementitious tile backer board.
 - 3. Installation systems, adhesives, mortars and grouts.
- B. Install the following furnished under the designated Sections:
 - 1. Install access panels into tiled walls as specified under Section 083100 - ACCESS DOORS AND PANELS.
- C. Perform drilling and cutting in tile surfaces, as required to accommodate penetrating items of other trades, from templates and instructions furnished by the respective trades.

1.2 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract and Division 01 Specification Sections apply to this Section.
- B. Section 016000 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- C. Section 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements for construction and demolition recycling.
- D. Section 061000 - ROUGH CARPENTRY: Wood blocking.
- E. Section 079200 - JOINT SEALANTS: Backer rod and sealant at control joints.
- F. Section 092216 - NON-STRUCTURAL METAL FRAMING: Metal stud framing to receive cementitious backer board installed under this Section.
- G. Division 22 - PLUMBING: Floor drains.
- H. Section 224000 - Plumbing Fixtures: Shower receptor.

1.3 REFERENCE STANDARDS

- A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 014200 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. ANSI A108.5 - American National Standard Specifications for Installation of Ceramic Tile with Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar; 1999 (Reaffirmed 2010).
 - 2. ANSI A108.10 - American National Standard Specifications for Installation of Grout in Tilework; 1999 (Reaffirmed 2010).
 - 3. ANSI A108.11 - Interior Installation of Cementitious Backer Units.
 - 4. ANSI A118.1 - American National Standard Specifications for Dry-Set Cement Mortar; 2012 (Revised).
 - 5. ANSI A118.4 - American National Standard Specifications for Modified Dry-Set Cement Mortar; 2012 (Revised).
 - 6. ANSI A118.6 - American National Standard Specifications for Standard Cement Grouts for Tile Installation; 2010 (Reaffirmed 2016).
 - 7. ANSI A118.7 - American National Standard Specifications for High Performance Cement Grouts for Tile Installation; 2010 (Reaffirmed 2016).
 - 8. ANSI A118.9 - Cementitious Backer Units.
 - 9. ANSI A118.10 - Waterproofing.
 - 10. ANSI A118.1 - American National Standard Specifications for Dry-Set Cement Mortar; 2012 (Revised).

11. ANSI A118.1 - American National Standard Specifications for Dry-Set Cement Mortar; 2012 (Revised).
12. ANSI A137.1 - American National Standard Specifications for Ceramic Tile; 2012.
13. ANSI A10.20 - Safety Requirements for Ceramic Tile, Terrazzo and Marble Work.
14. ASTM C1027 - Determining Visible Abrasion Resistance of Glazed Ceramic Tile
15. ASTM E119 - Fire Test of Building Construction and Materials.

B. Inclusionary References: The following reference materials are hereby made a part of this Section by reference thereto:

1. TCNA (formerly TCA) - Handbook for Ceramic Tile Installation, latest edition.

C. Definitions: For purposes of this specification, the following terms are defined:

1. Wet Areas: Rooms/spaces which has plumbing fixtures, sinks, toilets, or floor drains. Wet areas additionally include rooms/spaces which are exposed to weather.
2. Dry Areas: Rooms/spaces which have no plumbing, sinks, toilets, or floor drains.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate the work of this Section with the respective trades responsible for installing interfacing work, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.

1.5 SUBMITTALS

A. Information and Review Submittals: Submit the following under provisions of Section 013000 - Administrative Requirements:

1. Product Data: Manufacturer's product data sheets, specifications, performance data, physical properties and installation instructions for each item furnished hereunder.
 - a. Include maintenance data and recommended cleaning materials, and cleaning and stain removal methods.
2. Shop Drawings: 1/4 inch scale elevations and plans of tile patterns.
3. Selection Samples:
 - a. Manufacturer's sample boards for each type and color group of tile specified, and grout colors, for selections by the Architect.
4. Verification Samples:
 - a. Mount tile and apply grout on one 24 by 24 inch cement backer board, for each tile type and selected color, to indicate color and texture variations, tile flatness and joint size variations.
 - b. Trim shapes and base, in selected colors in types and shapes indicated for project conditions.
5. Source Quality Control Submittals:
 - a. Grade Certificates: Manufacturer's Master Grade Certificates submitted prior to shipment of tile to project.

B. Maintenance Material Submittals: Submit the following under provisions of Section 017800 - CLOSEOUT SUBMITTALS. Clearly label and package extra materials securely to prevent damage.

1. Extra Stock Materials: Upon completion of the Work of this Section, deliver to the Owner extra materials in, an amount equal to 3 percent of tile and trim of each color, finish and type installed.

1.6 QUALITY ASSURANCE

A. General: Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.

1. Conform to ANSI/TCNA A 137.1 and TCNA Handbook for Ceramic Tile Installation.

B. Qualifications:

1. Installer/Applicator: Minimum of 3 years documented experience demonstrating previously successful work of the type specified herein.

1.7 MOCK-UPS

- A. Provide mock-up under provisions of Section 014000 - QUALITY REQUIREMENTS.
- B. Provide waterproofing mock-up, minimum 12 square feet, illustrating a lap joint, planar transition, and piping penetration, demonstrating the minimum standard for the Work.
 1. Mock-up will demonstrate quality of work, construction methods, color and texture of tile, flatness of installation, joint spacing and color of grout. Include typical tile accessories and a control joint.
 2. Maintain mock-up during construction for workmanship comparison; remove and legally dispose of mock-up when no longer required.
 3. Accepted mock-ups may remain as part of the work; the number of mock-ups shall not be restricted.
- C. Provide full system mock-up panels, minimum 12 square feet, illustrating color, texture and finish, and demonstrating the minimum standard for the Work.
 1. Mock-up will demonstrate quality of work, construction methods, color and texture of tile, flatness of installation, joint spacing and color of grout. Include typical tile accessories and a control joint.
 2. Maintain mock-up during construction for workmanship comparison; remove and legally dispose of mock-up when no longer required.
 3. Accepted mock-ups may remain as part of the work; the number of mock-ups shall not be restricted.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Delivery and Acceptance Requirements:
 1. Do not deliver items to the site, until all specified submittals have been submitted to, and approved by, the Architect.
 2. Deliver tile in manufacturer's sealed cartons, grade-sealed by the manufacturer in accordance with ANSI A 137.1, with grade-sealed unbroken, and clearly marked as to contents, color, and quantity.
 3. Deliver and store tile setting materials in original, sealed, containers showing manufacturer's identification, year of production, net weight, date of packaging, and location of packaging.
- B. Storage and Handling Requirements:
 1. Store and handle materials following manufacturer's recommended procedures, and in accordance with material safety data sheets.
 2. Store and protect containers above floor level, keep dry until ready for use.
 3. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions. Store mortar and grouts at 70 degrees Fahrenheit (21° C) temperature for 24 hours prior to use.

1.9 SITE CONDITIONS

- A. Environmental conditions:
 1. General: Maintain ambient temperatures between 50 (10° C) and 80 (26° C) degrees Fahrenheit in tiled areas, for 24 hours prior to installation, during installation and for 7 days after completion.
 2. Special environmental conditions for setting materials: Maintain ambient temperatures between 65 degrees Fahrenheit (18° C) and 80 degrees Fahrenheit (27° C) in tiled areas, for 24 hours prior to installation, during installation and for 7 days after completion.
 3. When temperature of substrate exceeds 90 (32° C) degrees Fahrenheit, contact manufacturer for instructions.

- B. Do not install setting or grouting materials in a closed, unventilated environment. Ventilate propane or fossil fuel heaters to prevent damage to tile work from carbon-dioxide build up.

1.10 WARRANTY

- A. General: Submit warranties under provisions of Section 017800 - CLOSEOUT SUBMITTALS.
- B. Manufacturer Warranty: The manufacturer of installation systems, adhesives, grouts and mortars shall provide a comprehensive non pro-rated written five (5) year warrantee against defective products which covers replacement materials and labor costs for demolition, tile accessories, and installation systems.
 - 1. Warranty to provide for tile lifting or separation from substrate, and setting bed/grout deterioration, when products have been installed with referenced TCNA setting systems using specified setting and grout materials.
 - 2. Warranty excludes structural failure, movement or cracking of substrate materials, and workmanship performed not in accordance with manufacturer's instructions and industry standard guidelines.
- C. Special Warranty: Provide 2 year, non pro-rated warranty which shall include provisions for cracking, breakage or failure of tile due to defective workmanship
 - 1. Materials must be compatible and from one source, single source responsibility for waterproofing, installation, mortars and grouts. Job-site mixtures of sand portland cement and site dilution of additives shall not be permitted.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering similar products are limited to the following:
 - 1. Porcelain wall, floor, and base tile: Daltile, <https://daltile.com>.
 - 2. Mortars, adhesives & Grouts:
 - a. Custom Building Products, Inc., Seal Beach, CA.
 - b. Laticrete International, Inc., Bethany, CT
 - c. Mapei Corporation, Elk Grove, IL.
 - 3. Cementitious tile backer board ("Cement board"):
 - a. Basis of Design: National Gypsum Company, Charlotte, NC. Product: "PermaBASE".
 - b. Custom Building Products, Inc., Seal Beach, CA.
 - c. Fin Pan, Inc., Hamilton, OH.
 - d. United States Gypsum Company, Chicago, IL.
 - 4. Edging materials: Schlüter Systems L.P., Plattsburgh, NY.

2.2 TILE

- A. Porcelain Wall Tile, install as indicated on the Drawings. Acceptable products include the following or approved equal:
 - 1. Basis of Design: Daltile, product "ARTICULO" series, porcelain tile with the following characteristics:
 - a. Color: Refer to ID0.01.
 - b. Finish: Refer to ID0.01.
 - c. Size: 6" x 18".

2.3 SETTING MATERIALS

- A. Epoxy mortar: complying the requirements of ANSI A118.3. Acceptable products include the following or approved equal:
 - 1. Mapei product: "Kerapoxy".
 - 2. Laticrete product "Latapoxy 300".
 - 3. Custom Building Products "EBM-Lite".

2.4 GROUTING MATERIALS

- A. Epoxy grout: Multi-component epoxy grout, stain resistant, conforming to ANSI 118.3.
 - 1. Epoxy Grout shall be non-toxic, non-flammable, non-hazardous during storage, mixing, application and when cured and shall meet the following minimum physical requirements in compliance with ANSI A118.3 test methods:
 - a. Compressive Strength: 6600 psi (464 kg/cm²) min.
 - b. Shear Bond Strength: 100 psi (70kg/cm²) min.
 - c. Water Absorption: 1/2% max.
 - d. Service Temperature: up to 230°F (110°C)
 - 2. The finished Epoxy grout shall be chemically and stain resistant to catsup, mustard, tea, coffee, milk, soda, beer, wine, bleach (5% solution), ammonia, juices, vegetable oil, brine, sugar, cosmetics, and blood. It shall also be chemically resistant to dilute acids and alkalis, gasoline, turpentine, and mineral spirits.
 - 3. Acceptable products are limited to:
 - a. Mapei product: "Kerapoxy, KER 400" series.
 - b. Laticrete product "Latapoxy 2000". Series.
 - c. Custom Building Products, product "100% Solids Epoxy".

2.5 ACCESSORIES

- A. Edge protection shall be Schluter, product: "Jolly - #A100ATGB".
 - 1. Size: 3/8 inch.
 - 2. Finish: EB-Brushed stainless steel.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Inspect all surfaces and verify that they are in proper condition to receive the work of this Section.
 - 1. Verify that all concrete substrates are at least 28 calendar days old, completely cured and free of negative hydrostatic conditions or moisture problems.
- B. Beginning of installation means acceptance of substrate and site conditions.

3.2 PREPARATION

- A. During the operation of work of this Section, protect surrounding in situ materials and finishes against undue soilage and damage by the exercise of reasonable care and precautions. Clean, or repair all surfaces which are soiled or otherwise damaged by Work of this Section, to match indicated profiles and specified finishes. Materials and finishes which cannot be cleaned, or repaired shall be removed and replaced with new work in conformance with the Contract Documents.
- B. Ensure that all anchors, plugs, electrical and mechanical work to be in or underneath tile have been installed.
- C. Vacuum clean substrate surfaces.
- D. Seal concrete substrate cracks with filler; level concrete substrate to acceptable flatness tolerances.
 - 1. The use of PVA bonding agents or gypsum based leveling materials is prohibited.
- E. Apply conditioner or primer to surfaces as recommended by adhesive manufacturer.

3.3 INSTALLATION - GENERAL

- A. Installation Standards: The American National Standard Specifications for the Installation of Ceramic Tile, 1992 edition (ANSI A108), is hereby made a part of this specification. All work of this Section shall be installed in accordance with the requirements contained in referenced ANSI A108 standards, and as additionally specified below, and in accordance with the manufacturer's specifications of those products used.

- B. Installation Methods: Schedule of substrate conditions, generic type of tile used, with appropriate setting and grouting methods are listed at end of this Section.
 - 1. Use trowel shapes and sizes as recommended by setting materials manufacturer.
 - 2. Back-butter tiles as required to provide coverage indicated, except for tiles exceeding 144 square inches which require a complete back application of mortar (100% coverage).
- C. Tile Patterns and types: Tile patterns are shown on the Drawings, if more information is required, obtain the necessary information from the Architect. Do not interrupt tile pattern around openings.
- D. Tile Layout and installation
 - 1. Layout tile on room axis, leaving equal sized border units of not less than one-half tile width.
 - 2. Cut and fit tile tight to penetrations through tile. Form corners and bases neatly. Align base and wall joints.
 - 3. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make joints watertight, full without voids, cracks, excess mortar, or excess grout.
 - 4. Do not align joints of base units and lowest course of tile, offset joints by one-half of unit width.

3.4 INSTALLATION OF CEMENT BOARD

- A. Wall framing substrate: Do not install cement board directly over protrusions from stud plane such as heavy brackets or fastener heads.
- B. Make necessary cut-outs. Install cement board horizontally leaving 1/8 to 3/16 space at all joints, including joints with dissimilar materials. Stagger board joints with those of adjacent rows.
- C. Fasten cement board with 1-1/4 inch length type S bugle head screw. Fasten boards every 8 inches on center in field and along edges. At edge conditions, locate fasteners between 1/2 inch to 2 inches from board edge.
- D. At all joints and corners, fill gap solidly with dry-set or latex-modified, portland cement mortar and imbed 2 inch mesh fiberglass table and smooth material over joint and corner.

3.5 INSTALLATION - CUTTING

- A. Glass and Porcelain Stone Tile: For small tile, glass cutters (score and snap) shall be used in conjunction with a new scoring wheel. For larger tile, continuous rim diamond tip blades which are designed to cut porcelain tile and glass shall be used in conjunction with wet saws. Blades which are designed for cutting ceramic tile will create chips and irregularities along the cutting line and shall not be used.
 - 1. To avoid course cuts, scoring wheels shall be replaced as needed and diamond blades shall be re-dressed with an abrasive dressing stone, or replaced.
- B. Sharp edges and corners shall be smoothed and dulled with a diamond hand pad (white stone) or carbide paper as recommended by the manufacturer.
- C. In the event that the above instructions are not followed resulting in dissatisfactory appearance, the Owner and Architect reserve the right to require the tiling work to be replaced.

3.6 INSTALLATION - METAL EDGE TRIM AND TRANSITION STRIPS

- A. General: Install in accordance with ANSI A108.5, TCNA installation method number F113, and as additionally specified herein below. Apply materials in strict accordance with the written instructions and recommendations of setting materials manufacturer.
 - 1. Ensure that top surface of metal edge and transition strips align with surface plane of tile.
- B. Press perforated anchoring leg of trim into troweled dry set mortar bedding. Trowel additional mortar over perforated anchoring leg of trim to ensure full coverage and support of tile edges.
- C. Solidly embed tiles in manner that tiled surface is flush with top of trim profile. Tile may exceed trim height by 1/32 inch [1 mm] to 1/16 inch [1.5 mm], but tile may not be installed lower than

height of trim. Maintain a 1/8 inch [3 mm] minimum uniform joint width between edge of tile and metal trim to be filled by grout. Schluter/stainless jolly trim at top, bottom and outside corners of tile.

D. Grouting: Install in accordance with installation requirements of abutting tile.

3.7 INSTALLATION OF CONTROL JOINTS

A. General: Provide control joints where indicated on the Drawings, and as directed by the Architect. Where not indicated, provide joints per the following requirements in specific locations approved by Architect:

1. Interior tilework: 24 to 36 feet in each direction, except where exposed to direct sunlight or moisture.
2. Interior tilework exposed to direct sunlight or moisture: 12 to 16 feet in each direction.
3. Where tile abuts restraining surfaces such as perimeter walls, dissimilar floors, curbs, columns, pipes, and where changes occur in substrate materials.
4. At perimeter walls in rooms and spaces larger than 12 feet on one side.
5. As continuation of expansion joints, control joints, and seismic joints in the building structure which occur in tile areas.

B. Locations: Verify exact locations of joints with Architect prior to commencing tile installation.

C. Control joints:

1. Form control joints neat, straight, and uniformly wide equal to width of normal tile joint. Cut tile neatly and to accurate radius at exposed junction with pipes.
2. Extend control joints full thickness of tile, setting bed and reinforcing.

D. Keep open joints free of grout and debris until filled with sealant. Install non-contaminating temporary joint filler to maintain joints in clean condition until installation of joint backing and sealant under Section 079200 - Joint Sealants.

3.8 WALL TILE INSTALLATION - TCNA NUMBER W244C

A. General: Install in accordance with ANSI A108.5, TCNA installation method number W244C, and as additionally specified herein below. Apply materials in strict accordance with the written instructions and recommendations of setting materials manufacturer.

1. Setting materials: Latex modified Portland cement (ANSI A118.4).
2. Grout materials: Grout per ANSI A118.3.

B. Install latex/portland cement mortar bed to a nominal thickness of 3/32 inch.

C. Grouting:

1. Allow tile to fully set prior to grouting; do not grout in less than 24 hours after installation of tile.
2. Grout tile joints in accordance with ANSI A108.10 and as additionally specified.

3.9 INSTALLATION - GROUT

A. Remove spacers, ropes, glue, and similar foreign matter prior to grouting.

B. Force the maximum amount of the approved grout into joints in accordance with pertinent recommendations contained in ANSI A108.10.

C. Fill in joints of cushion-edge tile to depth of the cushion; fill joints of square-edge tile flush with the surface.

D. Fill all gaps and skips. Do not permit mortar or mounting mesh to show through grouted joints.

E. Provide hard finished grout which is uniform in color, smooth and without voids, pin holes, or low spots.

F. Remove all excess grout immediately after installation thereof, wash and rinse tile free from grout film, and tool grout to a uniform density throughout.

3.10 REPAIR

A. Replace cracked chipped, broken, and otherwise defective tiles.

- B. Remove work not complying with requirements of the Contract Documents or the referenced standards, and promptly replace with work which does comply.

3.11 CLEANING

- A. After completion of the work of this Section, remove equipment, and clean all wall, partition, and floor areas free from deposits of mortar, grout, and other materials installed under this Section, and wash completed tilework.
 - 1. Do not use acid or acid cleaners to clean tile.
 - 2. When tile is thoroughly clean and dry, polish glazed tile with clean dry cloths.

3.12 CURING

- A. Cover with clean non-staining 40 pound kraft paper. Do not use polyethylene sheets directly over tile on horizontal surfaces.

3.13 PROTECTION

- A. Do not permit traffic over finished floor surface until grout and tile materials are fully set, and not less than 72 hours. Protect floor surfaces with heavy red-rosin paper or kraft paper.

END OF SECTION

SECTION 095100
ACOUSTICAL CEILINGS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Furnish and install the following:
 - 1. Suspended acoustical tile ceiling including suspension system and associated edge moldings.
- B. Patching acoustical tile ceilings to match existing ceilings where disturbed by demolition and Work of this Contract. This Section includes both concealed and exposed spline ceilings, suspension systems and associated edge moldings.
 - 1. In rooms where existing partitions have been removed, instead of patching, the Contractor shall replace the entire ceiling and suspension system in the room with new.

1.2 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract and Division 01 Specification Sections apply to this Section.
- B. Section 016000 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- C. Section 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements for construction and demolition recycling.
- D. Section 083100 - ACCESS DOORS AND PANELS, and by trades requiring the same: Shop primed access panels, occurring in partitions and walls.
- E. Section 092216 - NON-STRUCTURAL METAL FRAMING: Metal ceiling and soffit framing for gypsum board, including hanger attachments, wire hangers, and screwable metal tee grid system.
- F. Section 092900 - GYPSUM BOARD: Suspended drywall construction ceilings and soffits.
- G. Section 079200 - JOINT SEALANTS: Sealant at gaps between new acoustical ceiling edge angles and all irregular walls.
- H. Division 21 - FIRE PROTECTION: Sprinkler heads in ceiling system.
- I. Division 23 - MECHANICAL: Air diffusion devices in ceiling.
- J. Division 26 - ELECTRICAL:
 - 1. Fire alarm and smoke detection equipment mounted in ceiling system.
 - 2. Light fixtures and independent hangers for suspended fixtures.

1.3 REFERENCE STANDARDS

- A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 014200 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. ASTM A641 - Zinc- Coated (Galvanized) Carbon Steel Wire
 - 2. ASTM C523 - Light reflectance of Acoustical Material by the Integrating Sphere Reflectometer.
 - 3. ASTM E84 - Surface Burning Characteristics of Building Material "UL Classified"
 - 4. ASTM E119 - Fire Tests of Building Construction and Materials "UL Classified".
 - 5. ASTM E413 - Classification for Rating Sound Insulation.
 - 6. ASTM E1264 - Classification of Acoustical Ceiling Products.
 - 7. ASTM E1414 - Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum. "UL Classified".
 - 8. All applicable federal, state and municipal codes, laws and regulations regarding flammability and smoke generation of interior finishes.

9. ASTM C423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method; 2017.
 10. ASTM C635/C635M - Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings; 2017.
 11. ASTM C636/C636M - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels; 2013.
 12. ASTM E580/E580M - Standard Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions; 2017.
 13. UL (FRD) - Fire Resistance Directory; Current Edition.
- B. General References The following reference materials are hereby made a part of this Section by reference thereto:
1. CISCA (Ceilings and Interior Systems Contractors Association) - Acoustical Ceilings: Use and Practice.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Coordinate the work of this Section with the respective trades responsible for installing interfacing and adjoining work for proper sequence of installation, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.
- B. Sequencing:
1. Field Measurements:
 - a. Take field measurements before preparation of shop drawings and fabrication, where possible, to ensure proper fitting of Work.
 - b. Allow for adjustments within specified tolerances wherever taking of field measurements before fabrication might delay Work.
 2. Coordinate the work of this Section with the respective trades responsible for installing interfacing work, to allow work which will be concealed by the ceilings to be completed prior to commencing installing the ceilings in such locations.
- C. Scheduling:
1. Install acoustical units after interior wet work is dry.
 2. Schedule work to ensure acoustical ceilings are not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated and overhead work is completed, tested and approved.

1.5 SUBMITTALS

- A. Information and Review Submittals: Submit the following under provisions of Section 013000 - ADMINISTRATIVE REQUIREMENTS:
1. Product Data: Manufacturer's product data sheets, specifications, performance data, physical properties for each item furnished hereunder.
 2. Shop Drawings:
 - a. 1/4 inch scale plans of each room or space; indicate grid layout and related dimensioning, junctions with other work or ceiling finishes, interrelation of mechanical and electrical items related to the system.
 - b. All drawings bearing dimensions of actual measurements taken at the project.
 - c. Large scale installation details of special conditions.
 3. Verification Samples:
 - a. 12 by 12 inch samples of acoustical units, illustrating material and finish.
 - b. 12 by 12 inch samples of existing acoustical units for comparison with supplied materials.
 - c. 12 inch long samples of suspension system components including main runners, cross runner and edge trim.
 - d. 12 inch long samples of existing exposed spline suspension system components including runners and edge trim for comparison with supplied materials.

- B. Closeout Submittals: Submit the following under provisions of Section 017800 - CLOSEOUT SUBMITTALS.
 - 1. Bonds and Warranty Documentation:
 - a. Manufacturer's Warranties and guarantees as specified elsewhere herein this Section.
- C. Maintenance Material Submittals: Submit the following under provisions of Section 017800 - CLOSEOUT SUBMITTALS. Clearly label and package extra materials securely to prevent damage.
 - 1. Provide to the Owner, extra ceiling panels: 5 percent of each type installed.
 - 2. Provide to the Owner, extra suspension components: 5 percent of each type installed.
 - 3. Provide to the Owner, all extra salvaged ceiling panel and suspension components which have not been utilized in the Work.

1.6 QUALITY ASSURANCE

- A. General: Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.
- B. Sole Source: Obtain products required for the Work of this Section from a single manufacturer, or from manufacturers recommended by the prime manufacturer of acoustical ceiling panels.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Delivery and Acceptance Requirements:
 - 1. Do not deliver items to the site, until all specified submittals have been submitted to, and approved by, the Architect.
 - 2. Do not deliver acoustical ceiling panels to the project until all concrete, masonry, plaster and other wet work has been completed and dry.
 - 3. Deliver acoustical ceiling panels in original, unopened packages and store protected in a fully enclosed space.
- B. Storage and Handling Requirements:
 - 1. Protect materials from damage due to moisture, direct sunlight, excessive temperatures, surface contamination, corrosion and damage from construction operations and other causes.
- C. Damaged material: Remove any damaged or contaminated materials from job site immediately, including materials in broken packages, packages containing water marks, or show other evidence of damage, unless Architect specifically authorizes correction thereof and usage on project.

1.8 SITE CONDITIONS

- A. Maintain uniform temperature of minimum of 60 degrees Fahrenheit and humidity of 20 to 40 percent prior to, during, and after installation.

1.9 WARRANTY

- A. General: Submit warranties under provisions of Section 017800 - CLOSEOUT SUBMITTALS.
- B. Manufacturer Warranty:
 - 1. In addition to the specific guarantee requirements of the GENERAL CONDITIONS and SUPPLEMENTAL GENERAL CONDITIONS, the Contractor shall obtain in the Owner's name the standard written manufacturer's guarantee of all materials furnished under this Section where such guarantees are offered in the manufacturer's published product data. All these guarantees shall be in addition to, and not in lieu of, other liabilities which the Contractor may have by law or other provisions of the Contract Documents.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Specified Manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on products specified in the following Articles. No substitutions will be accepted.
1. Acoustic Tiles/Panels:
 - a. Basis of Design: Armstrong World Industries, Inc: www.armstrong.com.
 2. Suspension Systems:
 - a. Basis of Design: Armstrong World Industries, Inc: www.armstrong.com.

2.2 DESCRIPTION

- A. General Description: Manufacturer's standard panels of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectance as indicated.

2.3 ACOUSTICAL UNITS

- A. Acoustical Units and Grid System - General:
1. ASTM E1264, Class A.
 2. Assemblies shall meet requirements for a Seismic Design Category is C and "Essential" Building Classification.
- B. Acoustical Tile Type (**ACT-1**): Painted mineral fiber, Armstrong ULTIMA Lay-In and Tegular: 1942, ASTM Type: IV, Form: 2, Pattern: E, consisting of the following physical characteristics:
1. Size: 24 inches by 24 inches by 3/4 inches.
 2. Edge: Beveled Tegular 15/16 inch.
 3. Acoustics: 0.75 NRC/ 35 CAC.
 4. Fire Performance: Class A (UL).
 5. Light Reflectance: 90%.
 6. Sq Ft (Sq Ft / Carton): 48.
 7. Pieces / Carton: 12.
 8. Grid System: Prelude XL 15/16 inch Exposed Tee Grid.
- C. Acoustical Tile Type (**ACT-2**): Painted mineral fiber, Armstrong ULTIMA Tegular, Model #1945; ASTM Type: IV, Form: 2, Pattern: E, consisting of the following physical characteristics:
1. Size: 24 inches by 24 inches by 1 inch.
 2. Edge: Beveled Tegular 15/16 inch.
 3. Acoustics: 0.80 NRC/ 35 CAC.
 4. Fire Performance: Class A (UL).
 5. Light Reflectance: 86%.
 6. Sq Ft (Sq Ft / Carton): 40.
 7. Pieces / Carton: 10.
 8. Grid System: Prelude XL 15/16 inch Exposed Tee Grid.
- D. Acoustical Tile Type (**ACT-3**): Armstrong Clean Room VL. Item #868, Color: White.
1. Grid System: Armstrong 15/16 inch Co-Extruded Exposed Clean Room Grade Tee Grid.
- E. Acoustical Tile Type (**ACT-4**): Armstrong Fine Fissured, Angled Tegular, Item #TBD.
1. Grid System: Prelude XL 15/16 inch Exposed Tee Grid.
- F. Acoustical Tile Type (**ACT-5**): Armstrong Fine Fissured, Angled Tegular, Item #TBD.
1. Grid System: Prelude XL 15/16 inch Exposed Tee Grid.
- G. Acoustical Tile Type (**SCT-1**): Armstrong Woodworks, Item: Natural Variations/Maple.
1. Grid System: Prelude XL 15/16 inch Exposed Tee Grid.

2.4 SUSPENSION SYSTEM(S)

- A. The suspension system shall support the ceiling assembly shown on the drawings and specified herein, with a maximum deflection of 1/360 of the span, in accordance with ASTM C 635.
- B. Hanger for suspension system shall be 1" x 3/16", galvanized steel flats or 1/4" diameter galvanized pencil rods spaced 4'-0" o.c. conforming to New York City Code requirements.
 - 1. Hangers: ASTM A641 Soft temper, pre-stretched galvanized carbon steel wire, with a yield stress of at least 3 times design load, but not less than 12 gage.
- C. Main carrying channels, to which suspension systems shall be fastened, shall be 1-1/2" cold rolled galvanized steel channel; spaced 4'-0" o.c., conforming to New York City Code requirements.
- D. Provide ceiling clips and inserts to receive hangers, type as recommended by suspension system manufacturer, sizes for pull-out resistance of not less than five (5) times the hanger design load, as indicated in ASTM C 635.
- E. Suspension systems shall conform to ASTM C 635, intermediate duty.
- F. Provide manufacturer's standard wall moldings with off-white baked enamel finish to match suspension systems. For circular penetrations of ceilings, provide edge moldings fabricated to diameter required to fit penetration exactly.

2.5 ACCESSORIES

- A. Drywall Grid: Armstrong, product as selected by Architect or as shown on the Drawings.
- B. Edge moldings: Standard edge trim: Grid system manufacturer's standard L-shape edge trim compatible with exposed grid system and color matched.
- C. Retention clips:
 - 1. Armstrong product number "0414," or approved equal.
- D. Sealant as specified in Section 079200 - JOINT SEALANTS:
 - 1. Joint Sealer Type AP, (Acrylic painters caulk).
 - 2. Joint Sealer Type SP, (Silicone, Paintable all purpose).

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Inspect all surfaces and verify that they are in proper condition to receive the work of this Section.
 - 1. Beginning of installation means acceptance of existing substrate and project conditions.

3.2 PREPARATION

- A. Protection of In-situ Conditions: During the operation of work of this Section, protect existing finishes against undue soilage and damage by the exercise of reasonable care and precautions. Clean, or repair all existing materials which are soiled or otherwise damaged by Work of this Section, to match original profiles and finishes. Existing materials and finishes which cannot be cleaned, or repaired shall be removed and replaced with new work to match existing.
- B. Surface Preparation:
 - 1. Carefully examine all receiving surfaces, to which attachments will be made hereunder, and determine the most practical way of making such attachments. Request Architect's approval of any attachment method which differs from that indicated on the approved shop drawings before proceeding with installation.
 - 2. Permit acoustical ceiling tile to reach room temperature and a stabilized moisture content prior to installation.
- C. Existing Acoustical Ceilings to be Salvaged or Patched:

1. Where existing ceilings are disturbed by the work of this Contract and are not scheduled to be replaced with new ceilings; remove ceilings including suspension system, as required. Remove only that portion of the acoustical materials and suspension system as is necessary for the required work. Coordinate with all trades to determine the extent of area to be removed.
2. Store materials in a neat manner and protect from damage and after all related work has been completed, reinstall the existing ceiling materials.
3. Where acoustical panels, acoustical tiles and suspension system have been removed because of new construction and cannot be reinstalled, install new material to match existing. All materials to be used for patching and matching shall be approved by the Architect in advance of work.

3.3 INSTALLATION

- A. Locate system on room axis, leaving equal sized border units of not less than one-half tile width.
- B. Install all components of the suspended grid systems in accordance with the manufacturer's instructions, the approved shop drawings, conforming to ASTM C-636 requirements. Ensure a deflection not to exceed 1/360 span of 48-inch simple span.
- C. Install specified edge moldings wherever ceilings intersect a wall or partition surface, and around all items having any dimension of 4 inches or more which penetrate the ceilings, including circular penetrations. Set moldings absolutely level, using as long lengths as practicable, and secure with fasteners recommended by manufacturer for the type of substrate.
 1. Sealant Bed: Apply continuous ribbon of acoustical sealant (type AA specified under Section 079200 - JOINT SEALANTS), concealed on back of vertical leg before installing moldings.
 2. Screw-attach moldings to substrate at intervals not over 16 inches on center. and not more than 3 inches from ends, leveling with ceiling suspension system to tolerance of 1/8 inch in 12'-0". Miter corners accurately and connect securely.
- D. Install hanger attachments to overhead construction in accordance with the approved shop drawings, spacing the attachments not more than 48 inches on centers over location of each main tee member.
 1. Aluminum Suspension Systems: Provide hangers spaced not more than 30 inches on center in each direction and not more than 8 inches from ends
 2. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers to span the extra distance.
 3. Install hanger wire to attachments with triple twists.
- E. Install main tees parallel to the long dimension of each area, spacing the tees 48 inches on centers. Secure the bottom of hanger wires through slots in the main tee members and tie with triple twists. Level the main tees as the work progresses.
- F. Uniformly space the cross tees at 24 inches on centers, and secure the cross tees into the main tees as recommended by the system manufacturer.
- G. Fit acoustical ceiling tile units in place, free from damaged edges or other defects detrimental to appearance and function. Install acoustical ceiling tile level, in uniform plane, and free from twist, warp or dents.
 1. Field cut tegular type tile with a tegular reveal at all edge conditions.
 2. Where required by governmental agencies having jurisdiction, install retention clips, provide two clips per ceiling panel installed on opposite sides of panel.

3.4 TOLERANCES

- A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet (3 mm in 3 m).
- B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

3.5 CLEANING

- A. Properly clean surfaces of panels and open grids free from dirt and handling marks. Wherever surfaces cannot be cleaned by normal methods or have defects, remove and replace with new components.
- B. Clean work under provisions of Section 017300 - EXECUTION.

3.6 PROTECTION

- A. Protect finished work under provisions of Section 015000 - TEMPORARY FACILITIES AND CONTROLS.

END OF SECTION

SECTION 096513
RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Prepare substrate to receive resilient base.
- B. Furnish and install the following:
 - 1. Coved resilient base as indicated.

1.2 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract and Division 01 Specification Sections apply to this Section.
- B. Section 016000 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- C. Section 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements for construction and demolition recycling.
- D. Section 015000 - TEMPORARY FACILITIES AND CONTROLS: Application of protection paper to finished resilient flooring.
- E. Section 024100 - DEMOLITION: Removal of existing finishes.
- F. Section 090506 - COMMON WORK RESULTS FOR FLOORING: General requirements for flooring preparation, installation and temporary protection.
- G. Section 093000 - TILING: Ceramic tile flooring and marble thresholds.
- H. Section 096516 - RESILIENT SHEET FLOORING: Sheet vinyl flooring.
- I. Section 096519 - RESILIENT TILE FLOORING: Tile vinyl flooring.
- J. Section 096523 - RUBBER FLOORING: Sheet rubber floor covering.
- K. Section 096543 - LINOLEUM FLOORING: Linoleum sheet & tile flooring.
- L. Section 096723 - RESINOUS FLOORING: Troweled seamless epoxy flooring system.

1.3 REFERENCES

- A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 014200 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. ASTM E 84 - Surface Burning Characteristics of Building Materials.
 - 2. ASTM F 1861 - Standard Specification for Resilient Wall Base
 - 3. All applicable federal, state and municipal codes, laws and regulations regarding flammability and smoke generation of interior finishes.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. General: Coordinate the work of this Section with the respective trades responsible for installing interfacing and adjoining work for proper sequence of installation, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.
- B. Sequencing:
 - 1. Sequence work to ensure resilient flooring is not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, wet work is dry and cured, and work overhead is completed.
 - 2. Ensure that installation of flooring and accessories occurs after other finishing operations, including painting.

1.5 SUBMITTALS

- A. Information and Review Submittals: Submit the following under provisions of Section 013000 - ADMINISTRATIVE REQUIREMENTS:
 - 1. Product Data: Manufacturer's product data sheets, specifications, performance data, physical properties and installation instructions.
 - a. Include certification of data indicating Volatile Organic Compound (VOC) content of all adhesives. Submit MSDS highlighting VOC limits.
 - 2. Selection Samples: Manufacturers' sample chain of colors available for selection by the Owner's Project Manager and the Architect.
 - 3. Verification Samples: Each type resilient base and color selected, 24 inches long.
- B. Maintenance Material Submittals: Submit the following under provisions of Section 017800 - CLOSEOUT SUBMITTALS. Clearly label and package extra materials securely to prevent damage.
 - 1. Extra Stock Materials: Upon completion of the Work of this Section, deliver to the Owner extra materials for future repairs and maintenance, an amount equal 24 linear feet for each color and type of resilient base installed.

1.6 QUALITY ASSURANCE

- A. General: Avoid color and pattern differential; provide base from one production run in any single room or contiguous areas.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Delivery and Acceptance Requirements:
 - 1. Do not deliver items to the site, until all specified submittals have been submitted to, and approved by, the Owner's Project Manager and the Architect.
 - 2. Deliver resilient base materials in original, unopened packages and store protected for three days prior to installation in area of installation to achieve temperature stability.
- B. Storage and Handling Requirements:
 - 1. Store materials in a clean dry, enclosed space off the ground and protected from the weather. Protect adhesives from freezing.

1.8 SITE CONDITIONS

- A. Maintain uniform temperature of minimum of 65 degrees Fahrenheit and humidity of 20 to 40 percent 48 hours prior to, during, and 48 hours after installation. Store resilient flooring materials and accessories in the spaces where they will be installed for at least 48 hours before beginning installation. Thereafter, maintain a minimum temperature of 55 degrees Fahrenheit in the areas where the work is completed.

1.9 WARRANTY

- A. General: Submit warranties under provisions of Section 017800 - CLOSEOUT SUBMITTALS.
- B. Manufacturer Warranty:
 - 1. Resilient Base: Provide manufacturer's standard one year limited product warranty for resilient base materials.
 - 2. Adhesives: Provide manufacturer's one year limited product warranty for adhesion reliability.

PART 2 - PRODUCTS

2.1 DESCRIPTION

- A. Regulatory Requirements:
 - 1. Provide materials and assemblies conforming to applicable building codes and regulatory agencies for flame/fuel/smoke rating requirements of base trim in accordance with ASTM E 84.

2.2 RESILIENT BASE

- A. Basis of Design (**WB-1**): Johnsonite Traditional Wall Base, ribbed back, rounded top complying with ASTM F-1861, Type TP, Thermoplastic Rubber (TBR). Rubber base shall be furnished in continuous lengths, approximately 120 feet long.
 - 1. Color: As selected by Architect unless otherwise indicated on the Drawings.
 - 2. Size: 4 inches high.
 - 3. Thickness: As selected by Architect.
 - 4. Coved base shall be used at all resilient flooring.
- B. Basis of Design (**WB-2**): Johnsonite, Millwork Wall Base, complying with ASTM F-1861, Type TP, Thermoplastic Rubber (TBR).
 - 1. Color: As selected by Architect unless otherwise indicated on the Drawings.
 - 2. Size: 4.5 inches high with surface reveal.
 - 3. Thickness: 1/4 inches.
- C. Base accessories: Pre-molded end stops of same material, size and color as base. Job-form all external and internal corners from base material, pre-molded corner pieces will not be acceptable.
 - 1. All wall base shall be coil product. Products that come in straight lengths are not acceptable.

2.3 ACCESSORIES

- A. Adhesives:
 - 1. General: Water resistant, low VOC, acceptable to the resilient flooring manufacturer, for substrate conditions.
 - a. Base Adhesives: Maximum VOC 50 [g/L less water]
 - 2. Acceptable manufacturers: As recommended by the manufacturer.
- B. Joint Sealer for between the top of wall base and irregular wall surfaces: Plastic filler as recommended by manufacturer.
- C. Cleaning material: Domestic neutral floor detergent having a pH 7 or pH 8, as recommended by the flooring manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Inspect all surfaces and verify that they are in proper condition to receive the work of this Section.
- B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive resilient base.
- C. Beginning of installation means acceptance of existing substrate and site conditions.

3.2 INSTALLATION

- A. Install all products in strict accordance with each manufacturer's written installation procedures and other provisions specified herein.
- B. Spread only enough adhesive to permit installation of materials before initial set.
- C. Install Resilient base: Install base on solid backing, bond to vertical substrate with continuous contact at horizontal and vertical surfaces. Apply wall base to walls, columns, casework and other permanent fixtures in areas where base is required.
 - 1. Install in lengths as long as practical.
 - 2. Scribe to fit to door frames and other interruptions.
 - 3. Form all external and internal corners in accordance with manufacturer's written instructions. Cope inside corners and fit neatly.
 - 4. Fill voids with plastic filler along the top edge of the resilient wall base on masonry surfaces or other similar irregular substrates.

3.3 CLEANING

- A. Daily clean work areas by sweeping and disposing of debris, and scraps.
- B. Post-installation Cleaning: As installation progresses, continually remove excess adhesive from floor, base and wall surfaces without damage.

END OF SECTION

SECTION 096516
RESILIENT SHEET FLOORING

PART 1 - GENERAL

1.1 SUMMARY

- A. The work of this Section consists of resilient tile flooring where shown on the Drawings, as specified herein, and as required for a complete and proper installation. Work includes, but is not limited to the following.
- B. Furnish and install the following:
 - 1. Sheet vinyl flooring with integral base where indicated.
 - 2. Vinyl transition strips wherever edges of vinyl composition flooring materials abut dissimilar flooring, where no thresholds occur.

1.2 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract and Division 01 Specification Sections apply to this Section.
- B. Section 016000 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- C. Section 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements for construction and demolition recycling.
- D. Section 015000 - TEMPORARY FACILITIES AND CONTROLS: Application of protection paper to finished resilient flooring.
- E. Section 090506 - COMMON WORK RESULTS FOR FLOORING: General requirements for flooring preparation, installation and temporary protection.
- F. Section 093000 - TILING: Ceramic tile flooring and marble thresholds.
- G. Section 096513 - RESILIENT BASE AND ACCESSORIES: Vinyl base and accessories.
- H. Section 096519 - RESILIENT TILE FLOORING: Vinyl tile flooring and accessories.
- I. Section 096523 - RUBBER FLOORING: Sheet rubber floor covering.
- J. Section 096543 - LINOLEUM FLOORING: Linoleum sheet and tile flooring

1.3 REFERENCES

- A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 014200 - REFERENCES.
 - 1. ASTM F-710 - Preparing Concrete Floors to Receive Resilient Flooring.
 - 2. ASTM F-1869 - Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
 - 3. NFPA 253 - Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source.
 - 4. All applicable federal, state and municipal codes, laws and regulations regarding flammability and smoke generation of interior finishes.

1.4 REGULATORY REQUIREMENTS

- A. Provide materials and assemblies conforming to applicable building codes and regulatory agencies for flame/fuel/smoke rating requirements of flooring and base trim in accordance with ASTM E 84.
- B. Provide flooring material to meet the following fire test performance criteria as tested by a recognized independent testing laboratory:
 - 1. ASTM E 648 (Critical Radiant Flux) of 0.45 watts per sq. cm. or greater, Class 1.
 - 2. ASTM E 662 (Smoke Generation) Maximum Specified Optical Density of 450 or less.

1.5 SUBMITTALS

- A. Submit the following under provisions of Section 013000 - ADMINISTRATIVE REQUIREMENTS:
1. Literature: Manufacturer's product data sheets, specifications, performance data, physical properties and installation instructions for each item furnished hereunder.
 - a. Furnish manufacturer's product literature on flooring adhesive, highlight adhesive properties, including VOC's and maximum moisture pressure limits for substrates.
 2. Submit the manufacturer's certification that the resilient flooring has been tested by an independent laboratory and complies with the required fire tests.
 3. Shop Drawings: 1/4 inch scale plans of each flooring area scheduled for Work of this Section; indicate layout of patterns, identify selected colors and patterns, show location of welded seams and joints with abutting materials. Drawings shall bear dimensions of actual measurements taken at the project.
 4. Verification Samples:
 - a. Sheet flooring: 12 inch by 12 inch illustrating color and pattern for each color and type of flooring selected.
 - b. Edging and transition strips: 12 inches long demonstrating profile, thickness, size, and color.
- B. Closeout Submittals: Submit the following under provisions of Section 017800 - CLOSEOUT SUBMITTALS.
1. Operation and Maintenance Data: Furnish cleaning and maintenance data. Include maintenance procedures, recommended maintenance materials, a suggested schedule for cleaning, stain removal methods, and polishing.
 2. Bonds and Warranty Documentation: Manufacturer's Warranties and Guarantees as specified elsewhere herein this Section.
- C. Maintenance Material Submittals: Submit the following under provisions of Section 017800 - CLOSEOUT SUBMITTALS. Clearly label and package extra materials securely to prevent damage.
1. Extra Stock Materials: Upon completion of the Work of this Section, deliver to the Owner extra flooring materials for future repairs and maintenance, from the same manufacturing runs as those installed, in the following amounts.
 - a. Flooring Material: 3 percent of each material in each color, and pattern installed.
 - b. Furnish a quantity of adhesive of each type used in sealed cans or containers sufficient to apply the above materials.

1.6 QUALITY ASSURANCE

- A. Provide each type of resilient sheet flooring and accessories from one manufacturer, including leveling and patching compounds, and adhesives, or as recommended by primary manufacturer of flooring.
- B. Avoid color and pattern differential; provide flooring from one production run in any single room or contiguous areas.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Deliver resilient flooring and base materials in original, unopened packages and store protected for three days prior to installation in area of installation to achieve temperature stability.
- B. Store materials in a clean dry, enclosed space off the ground and protected from the weather. Protect adhesives from freezing.

1.8 ENVIRONMENTAL CONDITIONS

- A. Maintain uniform temperature of minimum of 65 degrees Fahrenheit and humidity of 20 to 40 percent 48 hours prior to, during, and 48 hours after installation. Store resilient flooring materials and accessories in the spaces where they will be installed for at least 48 hours before

beginning installation. Thereafter, maintain a minimum temperature of 55 degrees Fahrenheit in the areas where the work is completed.

1.9 SEQUENCING AND SCHEDULING

- A. Sequence work to ensure resilient flooring is not installed until sufficient heat is provided, dust generating activities have terminated and work overhead is completed.
- B. Install flooring and base after interior wet work is dry.

1.10 WARRANTY

- A. Submit manufacturer's standard wear warranties for all flooring materials under provisions of Section 017800 - CLOSEOUT SUBMITTALS.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Specified Manufacturer (Basis of Design): To establish a standard of quality, design and function desired, Drawings and specifications have been based on the products and materials specified in the following Articles.
 - 1. Resilient Sheet Flooring, (**RS-1 & RS-2**); Basis of Design: Altro, <https://www.altrofloors.com>.

2.2 RESILIENT SHEET FLOORING RS-1 & RS-2

- A. Sheet Vinyl Flooring: Altro, product "Symphonia", heterogeneous sheet flooring, consisting of the following characteristics:
 - 1. Size: 6 feet 7 inches wide.
 - 2. Color/Pattern: As selected by Architect unless otherwise indicated on the Drawings.
 - 3. Class / ASTM F 1303 Type I, Grade 1.
 - 4. Wear Layer Thickness 20 mil or 0.020" (0.5 mm).
 - 5. Overall Thickness 0.086" (2.2mm).
 - 6. Backing Class 4-ply fused backing system.
 - 7. Finish ExoGuard™ Quartz-Enhanced Urethane.
 - 8. Added Antimicrobial Yes, FlorSept™.
 - 9. Slip Resistance / ASTM D 2047 >0.6.
 - 10. Static Load Limit / ASTM F 970 1500 psi
 - 11. Residual Indentation / ASTM F1914 Passes, < 8%.
 - 12. Flexibility / ASTM F 137 Passes.
 - 13. Resistance to Heat / ASTM F 1514 Passes.
 - 14. Resistance to Light / ASTM F 1515 Passes.
 - 15. Resistance to Chemicals / ASTM F 925 Passes.
 - 16. Resistance to Fungi / ASTM G21 Passes.
 - 17. Antibacterial Activity / AATCC 147 Passes.
 - 18. Radiant Flux / ASTM 648 Passes.
 - 19. Smoke Density / ASTM E 662 <450.

2.3 ACCESSORIES

- A. Filler for patching, smoothing and leveling subfloors and underlayments: Portland cement-based latex underlayment acceptable to flooring manufacturer, equal to the following:
 - 1. Ardex, Inc., products "Feather Flash" and "Ardex SD-P".
 - 2. Quikrete Companies, product "Fast-Set Underlayment 1248".
 - 3. Silpro Masonry Systems Inc., product "Profinish".
- B. Adhesives and Primers: Latex based, non-flammable in wet state, with NFPA, Class A rated, VOC compliant, as required or recommended by the resilient flooring manufacturer for the substrate and application intended to provide a complete and warranted flooring system.
- C. Transition Strips: Profiles required for thickness of abutting materials, as selected by the Architect unless otherwise indicated on the Drawings.

- D. Cleaning Material: Domestic floor detergent, as recommended by the flooring manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Inspect all surfaces and verify that they are in proper condition to receive the work of this Section. Ensure of the following:
1. Substrates shall be dry and clean.
 2. Substrates shall be free of depressions, raised areas, or other defects which would telegraph through installed flooring.
 3. Temperature of resilient flooring and substrate shall be within specified tolerances.
 4. Do not proceed with flooring installation if base cabinets or other built-in casework is present on the substrate.
- B. Insure that concrete substrate is dry having a maximum moisture content of 2.5 percent by weight. Perform moisture test in several locations using carbide method dampness meter.
- C. Beginning of installation means acceptance of substrate and site conditions.

3.2 PREPARATION

- A. General: Comply with flooring manufacturer's requirements for preparation of substrate to receive resilient flooring.
- B. Remove, by light sanding and grinding, all protruding edges, high spots. Ensure that substrate is free from paint, varnish, wax, oil, or other foreign matter.
- C. Fill minor or local low spots, cracks, joints, holes, and other defects with subfloor filler. Apply, trowel and float finish subfloor filler and leave a smooth, level, hard surface. Prohibit traffic from area until filler is cured.
- D. Vacuum clean substrate, and ensure that substrate is dry, clean and smooth prior to application of flooring.
- E. Apply primers as recommended by adhesive manufacturer's written instructions.

3.3 INSTALLATION - GENERAL

- A. Install all products in strict accordance with each manufacturer's written installation procedures and other provisions specified herein.
- B. Install resilient flooring and accessories after the other finishing operations, including painting, have been completed. Close spaces to traffic during the installation of the flooring. Do not install resilient flooring over concrete slabs until they have been cured and are sufficiently dry to achieve a bond with the adhesive, in accordance with the manufacturer's recommended bond and moisture test.
- C. Spread only enough adhesive to permit installation of materials before initial set.

3.4 INSTALLATION - SHEET VINYL FLOORING

- A. Install sheet vinyl using conventional full-spread method and heat welded seams. Application shall be performed by factory trained mechanics franchised by the manufacturer in accordance with the manufacturer's instructions, and using tools and techniques recommended by the flooring manufacturer.
- B. Cut sheet material into required lengths and sizes. Layout and cut to achieve minimum number of seams and for pattern match between abutting edges, Reverse every other sheet (if recommended by manufacturer)
1. Seams in corridors shall run perpendicular to corridor.
- C. Lay cut sheets flat and allow to come to room temperature prior to installation.
- D. Lay sheet vinyl flooring so as to ensure full uniform contact with substrate and to produce finished surfaces which are smooth, even and in true planes, free of buckles, waves, and other imperfections.

- E. Install the sheets and roll the floor surface to work wrinkles and air pockets out past the outer edges.
 - 1. Roll with a 100-pound (45.36 kilogram) roller in the field areas. Hand-roll flooring at the perimeter and the seams to assure adhesion. Refer to specific rolling instructions of the flooring manufacturer
- F. Fit the sheet vinyl neatly and tightly into breaks and recesses, against bases, around pipes and penetrations, under saddles and thresholds, and around permanent cabinets and equipment.
- G. Weld seams with welding rods, as recommended by flooring manufacturer. When routing for seams, do not rout or groove through the flooring. Check temperature and speed of application to prevent charring, replace all damaged flooring. Weld seams in two pass method to prevent concave seaming. Use trim plates or sleds when making trimming first pass seam, use sharpened tools with second pass, trimming in a smooth continuous motion, resulting in a smooth seam.
- H. Provide integral base where scheduled on Drawings or Finish Legend.
 - 1. Flash sheet vinyl flooring up the walls forming an integral coved base at wall surfaces. The height of the base at walls shall be 4 inches unless otherwise indicated on the drawings.
 - 2. Install continuous coved fillet strip behind sheet vinyl at the intersection of vertical surfaces and floor surfaces for walls and casework; cut, fit, and miter-weld at internal and external corners.
 - 3. Install continuous vinyl cap strip at top edge of sheet vinyl base at walls; securely fastened in place, with top edge of trim level, and with all trim joints mitered. Cap strip will not be required at underside of toe space.
 - 4. Install integral base at sides and at toe space of cabinets. The height of the integral base at casework shall match that of the toe space.
 - 5. All interior and exterior corners of the integral base shall be formed without hardware.
- I. Install reducer strips wherever new resilient sheet flooring terminates at carpeting and elsewhere as required to terminate flooring.

3.5 INSTALLATION OF ACCESSORIES

- A. Resilient edge and transition strips:
 - 1. Install edge strips at all edges of flooring which would otherwise be exposed.
 - 2. Place resilient edge strips tightly butted to flooring and secure with adhesive recommended by the edge strip manufacturer.

3.6 CLEANING

- A. General: Clean work under provisions of Section 017000 - EXECUTION.
 - 1. Control accumulation of waste materials and trash. Daily clean work areas by sweeping and disposing of debris, and scraps.
 - 2. After completion of the work of this Section, remove equipment, and clean all wall, partition, and floor areas free from deposits of flooring adhesives and other materials installed under this Section.
- B. Waste Management: Recycle or dispose of off-site waste materials and trash at intervals approved by the Owner, and in compliance with waste management procedures specified in Section 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.
- C. As installation progresses, continually remove excess adhesive from floor, base and wall surfaces without damage.
- D. Sweep floors to remove all loose dirt and debris.
- E. Not sooner than five days after installation, clean all materials installed hereunder with a non-abrasive commercial detergent approved by the material manufacturers, and thoroughly rinse with clear water.

- F. After cleaning, ensure that the flooring is be protected with heavy kraft paper.

3.7 PROTECTION

- A. General: Protect finished work under provisions of Section 090506 - COMMON WORK RESULTS FOR FLOORING.
- B. Prohibit traffic on finished floor areas until flooring adhesive has fully set. Protect installed flooring as recommended by the flooring manufacturer against damage from rolling loads, other trades, or the placement of fixtures and furnishings.
- C. Prohibit washing, scrubbing or other similar 'wet' operations to occur on finished floor areas for a minimum period of 5 calendar days after installation.
- D. Provide protection of completed flooring areas from construction traffic until Substantial Completion of the General Contract.

END OF SECTION

SECTION 096519
RESILIENT TILE FLOORING

PART 1 - GENERAL

1.1 SUMMARY

- A. The work of this Section consists of resilient tile flooring where shown on the Drawings, as specified herein, and as required for a complete and proper installation. Work includes, but is not limited to the following.
- B. Furnish and install the following:
 - 1. Vinyl tile flooring.
 - 2. Vinyl transition strips wherever edges of resilient tile flooring materials abut dissimilar flooring, where no thresholds occur.

1.2 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract and Division 01 Specification Sections apply to this Section.
- B. Section 016000 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- C. Section 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements for construction and demolition recycling.
- D. Section 015000 - TEMPORARY FACILITIES AND CONTROLS: Application of protection paper to finished resilient flooring.
- E. Section 024100 - DEMOLITION: Removal of existing finishes.
- F. Section 090506 - COMMON WORK RESULTS FOR FLOORING: General requirements for flooring preparation, installation and temporary protection
- G. Section 093000 - TILING: Ceramic tile flooring and marble thresholds.
- H. Section 096513 - RESILIENT BASE AND ACCESSORIES: Resilient base.
- I. Section 096516 - RESILIENT SHEET FLOORING: Sheet vinyl flooring and integral base.
- J. Section 096523 - RUBBER FLOORING: Sheet rubber floor covering.
- K. Section 096813 - TILE CARPETING: Carpet tile and transition strips.

1.3 REFERENCES

- A. Reference Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 014200 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. ASTM E 648 Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source
 - 2. ASTM E 662 Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials
 - 3. ASTM E 84 - Surface Burning Characteristics of Building Materials.
 - 4. ASTM F-710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.
 - 5. ASTM F-1066 - Vinyl Composition Floor Tile.
 - 6. ASTM F-2982 Standard Specification for Polyester Composition Floor Tile.
 - 7. ASTM F-1482, Standard Guide to Wood Underlayment Products Available for Use Under Resilient Flooring.
 - 8. ASTM F-1861 Standard Specification for Resilient Wall Base.
 - 9. ASTM F-1869 - Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.

10. FS SS-T-312 - Tile, Floor: Asphalt, Rubber, Vinyl, Vinyl Composition.
11. NFPA 253 - Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source.
12. All applicable federal, state and municipal codes, laws and regulations regarding flammability and smoke generation of interior finishes.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 1. Coordinate work of this Trade Contract with that of other trades, affecting or affected by this work, and cooperate with the other trades as is necessary to assure the steady progress of work.
 2. Coordinate the work of this Section with the respective trades responsible for installing interfacing work.
- B. Sequencing:
 1. Do not order or deliver any materials until all submittals, required in the listed Specification Sections included as part of this Trade Contract, have been received and approved by the Architect.
 2. Sequence work to ensure resilient flooring is not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, wet work is dry and cured, and work overhead is completed.
 3. Ensure that installation of flooring and accessories occurs after other finishing operations, including painting.
- C. Scheduling:
 1. Phasing: Refer to Section 011000 - SUMMARY, and Drawings for phasing and milestone completion requirements which affect the Construction Manager's Work and the Work of this Trade Contract.

1.5 SUBMITTALS

- A. Information and Review Submittals: Submit the following under provisions of Section 013000 - ADMINISTRATIVE REQUIREMENTS:
 1. Product Data: Manufacturer's product data sheets, specifications, performance data, physical properties and installation instructions for each item furnished hereunder.
 - a. Furnish manufacturer's product literature on flooring adhesive, highlight adhesive properties, including VOC's and maximum moisture pressure limits for substrates.
 2. Shop drawings: 1/4 inch scale plans of each flooring area scheduled for Work of this Section. Drawings shall bear dimensions of actual measurements taken at the project.
 - a. Identify each flooring type, colors and patterns, indicate layout of tile units and direction of tile patterns.
 - b. Where more than one adhesive type is specified or otherwise required by flooring manufacturer, identify on shop drawings areas for each adhesive type.
 3. Selection samples: Manufacturers' sample chain of colors and patterns available for selection by Architect.
 4. Verification samples:
 - a. Full sized flooring tile, illustrating color, and pattern for each color and type of tile selected.
 - b. Edging: 12 inches long demonstrating profile, thickness, size and color.
 5. Certificates:
 - a. Submit the manufacturer's certification that the resilient flooring has been tested by an independent laboratory and complies with the required fire tests.
- B. Closeout Submittals: Submit the following under provisions of Section 017800 - CLOSEOUT SUBMITTALS.
 1. Operation and Maintenance Data: Furnish cleaning and maintenance data.
 2. Bonds and Warranty Documentation:

- a. Manufacturer's Warranties and Guarantees as specified elsewhere herein this Section.
 - C. Maintenance Material Submittals: Submit the following under provisions of Section 017800 - CLOSEOUT SUBMITTALS. Clearly label and package extra materials securely to prevent damage.
 1. Extra Stock Materials: Upon completion of the Work of this Section, deliver to the Owner extra flooring materials for future repairs and maintenance, from the same manufacturing runs as those installed, in the following amounts.
 - a. Vinyl composition tile: 3 percent of each material in each color, and pattern installed.
 - b. Furnish a quantity of adhesive of each type used in sealed cans or containers sufficient to apply the above materials.
- 1.6 QUALITY ASSURANCE
- A. General: Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.
 1. Provide types of resilient tile and accessories supplied by one manufacturer, including leveling and patching compounds, and adhesives.
 2. Avoid color and pattern differential; provide flooring from one production run in any single room or contiguous areas.
- 1.7 MOCK-UPS
- A. Provide mock-up under provisions of Section 014000 - QUALITY REQUIREMENTS.
 - B. Provide mock-up areas using accepted paint colors, minimum 50 square feet, illustrating color, texture and finish, and demonstrating the minimum standard for the Work.
 - C. Locate mock-ups where directed and include all surfaces and materials scheduled to receive a field applied finish.
 - D. Maintain mock-up during construction for workmanship comparison; remove and legally dispose of mock-up when no longer required.
 - E. Accepted mock-ups may [not] remain as part of the work; the number of mock-ups shall not be restricted.
- 1.8 DELIVERY, STORAGE AND HANDLING
- A. Delivery and Acceptance Requirements:
 1. Do not deliver items to the site, until all specified submittals have been submitted to, and approved by, the Architect.
 2. Deliver resilient flooring materials in original, unopened packages and store protected for three days prior to installation in area of installation to achieve temperature stability.
 - B. Storage and Handling Requirements:
 1. Store and handle materials following manufacturer's recommended procedures, and in accordance with material safety data sheets. Store materials in a clean dry, enclosed space off the ground and protected from the weather
 2. Protect materials from damage due to moisture, direct sunlight, excessive temperatures, surface contamination, corrosion and damage from construction operations and other causes.
 3. Protect adhesives from freezing.
- 1.9 SITE CONDITIONS
- A. Maintain uniform temperature of minimum of 65 degrees Fahrenheit and humidity of 20 to 40 percent 48 hours prior to, during, and 48 hours after installation. Store resilient flooring materials and accessories in the spaces where they will be installed for at least 48 hours before beginning installation. Thereafter, maintain a minimum temperature of 55 degrees Fahrenheit in the areas where the work is completed.

1.10 WARRANTY

- A. General: Submit warranties under provisions of Section 017800 - CLOSEOUT SUBMITTALS.
- B. Manufacturer Warranty: provide manufacturer's standard wear warranties for all flooring and stair tread materials installed under this Section.

PART 2 - PRODUCTS

2.1 LUXURY VINYL TILE FLOORING

- A. Luxury Vinyl Tile:
 - 1. Basis of Design (**RT-4 & RT-5**): Adore Floors, <https://www.adorefloors.com>. Product "Naturelle +".
 - a. Style: NAT Series.
 - b. Installation Type: Glue Down.
 - c. Wear Layer: 22 mil.
 - d. Size: 7.2 inches by 48 inches.
 - e. Overall Thickness: 3 mm.
 - f. Warranty: Commercial - 25 Years.
 - g. Color: As selected by Architect and as indicated on the Drawings.
- B. Accessories:
 - 1. Filler for patching, smoothing and leveling subfloors and underlayments: Portland cement-based latex underlayment acceptable to flooring manufacturer, equal to the following:
 - a. Ardex, Inc., products "Feather Flash" and "Ardex SD-P".
 - b. Quikrete Companies, product "Fast-Set Underlayment 1248".
 - c. Silpro Masonry Systems Inc., product "Profinish".
- C. Adhesives:
 - 1. General: Water resistant, as required or recommended by the resilient flooring manufacturer for substrate conditions to provide a complete and warranted flooring system.
- D. Transition and edge strips:
 - 1. General: Homogeneous vinyl, of profiles required for thickness of abutting materials.
 - 2. Edge strips: Tapered or bull nose edge.
 - 3. Colors: Match or contrast with the flooring, as selected by the Architect from standard colors available, of width shown on the drawings.
- E. Cleaning material: Domestic neutral floor detergent having a pH 7 or pH 8, as recommended by the flooring manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Inspect all surfaces and verify that they are in proper condition to receive the work of this Section.
 - 1. Verify concrete substrate has been cured and is sufficiently dry to achieve a bond with the adhesive, in accordance with the manufacturer's recommended bond and moisture test.
 - a. Insure that concrete substrate has a moisture content of not more than 3.5 percent by weight. Perform moisture test in several locations using carbide method dampness meter.
 - 2. Beginning of installation means acceptance of existing substrate and site conditions.

3.2 PREPARATION

- A. General: Comply with flooring manufacturer's requirements for preparation of substrate to receive resilient flooring.
 - 1. Close spaces to traffic during the installation of the flooring.

B. Protection of In-situ Conditions: During the operation of work of this Section, protect surrounding materials and finishes against undue soilage and damage by the exercise of reasonable care and precautions. Clean, or repair all existing surfaces which are soiled or otherwise damaged by Work of this Section, to match indicated profiles and specified finishes. Materials and finishes which cannot be cleaned, or repaired shall be removed and replaced with new work in conformance with the Contract Documents.

C. Surface Preparation:

1. Remove by mechanical means (light sanding and grinding), all protruding edges, high spots. Ensure that substrate is free from paint, varnish, wax, oil, or other foreign matter. Do not use solvents.
2. Fill minor or local low spots, cracks, joints, holes, and other defects with subfloor filler. Apply, trowel and float finish subfloor filler and leave a smooth, level, hard surface. Prohibit traffic from area until filler is cured.
3. Apply troweled subfloor filler and leveler to provide finished concrete surface smooth, with no more than 1/8 inch variation from plane within 10 feet in any direction.
 - a. Prohibit traffic until filler and leveler is cured.
4. Vacuum clean substrate, and ensure that substrate is dry, clean and smooth prior to application of flooring.

3.3 INSTALLATION - GENERAL

- A. Install all products in strict accordance with each manufacturer's written installation procedures and other provisions specified herein.
 1. Apply primers as recommended by adhesive manufacturer's written instructions.
- B. Spread only enough adhesive to permit installation of materials before initial set.
- C. Mix tile to ensure that concentration of surface patterns is uniform throughout. Use tile from cartons in same sequence as manufactured and packaged, if so numbered.
- D. Maintain reference markers, holes and openings that are in place or have been marked for future cutting; repeat markers on flooring as marked on substrate. Use non-permanent marking devices which may be cleaning washed off when no longer required.

3.4 INSTALLATION - FLOOR TILE

- A. Lay flooring in a square grid pattern, with joints and seams parallel to building lines. Lay tile flooring in pattern as indicated on the drawings with pattern-grain running in singular direction. Lay tile with joints straight and continuous in both directions and with border tile not less than 1/2 the width of the tile.
- B. Neatly fit resilient materials to all intersecting surfaces, and make joints as inconspicuous as possible.
- C. Terminate flooring at centerline of door in closed position where adjacent floor finish is of different material or color.
- D. Apply resilient materials to have uniform contact with receiving surfaces throughout, with tight joints, and with all finish surfaces smooth, in true plane, free from buckles, waves, and other imperfections.
- E. Extend resilient flooring to wall lines beneath all movable equipment and movable casework. Fit resilient flooring onto breaks and recesses, against non-resilient bases, around pipes and other protrusions, under saddles, and to and around other fixed surfaces, making neat cuts in the flooring and minimizing joints.

3.5 INSTALLATION OF ACCESSORIES

- A. Resilient edge and transition strips:
 1. Install edge strips at all edges of flooring which would otherwise be exposed.
 2. Place resilient edge strips tightly butted to flooring and secure with adhesive recommended by the edge strip manufacturer.

3.6 PROTECTION

- A. General: Protect finished work under provisions of Section 015000 - TEMPORARY FACILITIES AND CONTROLS.
- B. Prohibit traffic on finished floor areas until flooring adhesive has fully set.
- C. Prohibit washing, scrubbing or other similar 'wet' operations to occur on finished floor areas for a minimum period of 5 calendar days after installation.
- D. Provide protection of completed flooring areas from construction traffic until Substantial Completion of the General Contract. After cleaning and polishing, cover all resilient tile floor surfaces with non-staining heavyweight kraft paper and overlay with red-rosin paper, taping the edges to maintain position of the protection paper. Reapply papers as required to maintain floor protection.

END OF SECTION

SECTION 096523
RUBBER FLOORING

PART 1 - GENERAL

1.1 SUMMARY

- A. Furnish and install the following:
 - 1. Rubber tile installed as seamless flooring.
 - 2. Rubber stair treads, risers and landings.
 - 3. Transition strips wherever edges of resilient rubber flooring materials abut dissimilar flooring, where no thresholds occur.

1.2 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract and Division 01 Specification Sections apply to this Section.
- B. Section 016000 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- C. Section 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements for construction and demolition recycling.
- D. Section 015000 - TEMPORARY FACILITIES AND CONTROLS: Application of protection paper to finished resilient flooring.
- E. Section 024100 - DEMOLITION: Removal of existing finishes and materials.
- F. Section 090506 - COMMON WORK RESULTS FOR FLOORING: General requirements for flooring preparation, installation and temporary protection.
- G. Section 096513 - RESILIENT BASE AND ACCESSORIES: Resilient base.
- H. Section 096516 - RESILIENT SHEET FLOORING: Sheet vinyl flooring.
- I. Section 096543 - LINOLEUM FLOORING: Linoleum tile and sheet flooring.
- J. Section 096723 - RESINOUS FLOORING: Troweled seamless epoxy flooring system.

1.3 REFERENCES

- A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 014200 - REFERENCES. The standards referenced herein are included to establish recognized minimum quality only. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. ASTM E 84 - Surface Burning Characteristics of Building Materials.
 - 2. ASTM F-710 - Preparing Concrete Floors to Receive Resilient Flooring.
 - 3. ASTM F-1344 - Specification for Rubber Floor Tile.
 - 4. All applicable federal, state and municipal codes, laws and regulations regarding flammability and smoke generation of interior finishes.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Pre-installation Meetings: Installer of the Work of this Section is required to attend pre-installation conference specified under Section 090506 - COMMON WORK RESULTS FOR FLOORING

1.5 SUBMITTALS

- A. Information and Review Submittals: Submit the following under provisions of Section 013000 - ADMINISTRATIVE REQUIREMENTS:
 - 1. Data: Manufacturer's product data sheets, specifications, performance data, physical properties and installation instructions for each item furnished hereunder.
 - a. Furnish manufacturer's product literature on flooring adhesive, highlight adhesive properties, including VOC's and maximum moisture pressure limits for substrates.

2. Shop Drawings: 1/4 inch scale plans of each flooring area scheduled for Work of this Section. Drawings shall bear dimensions of actual measurements taken at the project.
 - a. Identify each flooring type, colors and patterns, indicate layout of tile units and direction of tile patterns.
 - b. Where more than one adhesive type is specified or otherwise required by flooring manufacturer, identify on shop drawings areas for each adhesive type.
 3. Selection Samples: Manufacturers' sample chain of colors and patterns available for selection by Architect.
 4. Verification Samples:
 - a. Full sized flooring tile, illustrating color, and pattern for each color and type of tile selected.
 - b. Stair treads: 12 inch lengths of stair treads, illustrating color.
 - c. Edging: 12 inches long demonstrating profile, thickness, size and color.
 5. Certificates: Submit the manufacturer's certification that the resilient flooring has been tested by an independent laboratory and complies with the required fire tests.
 6. Qualification Submittals: Installer/Applicator's work experience documentation.
- B. Closeout Submittals: Submit the following under provisions of Section 017800 - CLOSEOUT SUBMITTALS.
1. Operation and Maintenance Data: Furnish cleaning and maintenance data. Include maintenance procedures, recommended maintenance materials, a suggested schedule for cleaning, stain removal methods, and polishing.
 2. Bonds and Warranty Documentation: Manufacturer's Warranties and Guarantees as specified elsewhere herein this Section.
- C. Maintenance Material Submittals: Submit the following under provisions of Section 017800 - CLOSEOUT SUBMITTALS. Clearly label and package extra materials securely to prevent damage.
1. Extra Stock Materials: Upon completion of the Work of this Section, deliver to the Owner extra flooring materials for future repairs and maintenance, from the same manufacturing runs as those installed, in the following amounts.
 - a. Rubber Tile Flooring: 3 percent of each material in each color, and pattern installed.
 - b. Furnish a quantity of adhesive of each type used in sealed cans or containers sufficient to apply the above materials.

1.6 QUALITY ASSURANCE

- A. General: Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.
- B. Sole Source Materials: For each type of flooring required for the work of this Section, provide primary materials which are the products of one manufacturer. Provide secondary materials which are acceptable to the manufacturer of the primary materials. Comply with applicable regulations regarding VOC (volatile organic compound) content of adhesives.
- C. Color Matching: Provide resilient flooring products, including accessories, from one manufacturer to ensure color matching.
 1. Avoid color and pattern differential; provide flooring from one production run in any single room or contiguous areas.
- D. Qualifications:
 1. Manufacturers: Provide flooring manufactured by a firm with a minimum of 10 years experience in the fabrication of resilient flooring of types equivalent to those specified.
 - a. Manufacturer capable of providing field service representation.
 2. Installer/Applicator: Installer experienced (minimum of 3 years) to perform work of this section who has specialized in the installation of work similar to that required for this project and who is acceptable to the product manufacturer.

- E. Preconstruction Testing: Perform testing for relative humidity, moisture vapor emission, and pH tests on in situ concrete slabs as specified under Section 090506 - COMMON WORK RESULTS FOR FLOORING.

1.7 FIELD SAMPLES

- A. Provide mock-up samples under provisions of Section 014000 - QUALITY REQUIREMENTS for purpose of verifying selected colors, surface texture and sheen.
- B. Provide on-site samples, locate where directed. Each field sample shall be minimum 24 square feet, illustrating selected floor finish.
- C. Accepted samples will be used to determine the remainder of work, and may not remain as part of the work.

1.8 DELIVERY, STORAGE AND HANDLING

- A. Delivery and Acceptance Requirements:
 - 1. Do not deliver items to the site, until all specified submittals have been submitted to, and approved by, the Architect.
 - 2. Do not deliver flooring materials to the project until all concrete, masonry, plaster and other wet work has been completed and dry.
 - 3. Deliver flooring and setting materials in original unopened packages, containers or bundles bearing brand name, and identification of manufacturer, production run information with labels and package seals intact and legible.
- B. Storage and Handling Requirements:
 - 1. Store and handle materials following manufacturer's recommended procedures, and in accordance with material safety data sheets.
 - 2. Protect materials from damage due to moisture, direct sunlight, excessive temperatures, surface contamination, corrosion and damage from construction operations and other causes.
 - 3. Store materials in a clean dry, enclosed space off the ground and protected from the weather. Protect adhesives from freezing.
 - 4. Store protected for three days prior to installation in area of installation to achieve temperature stability.
- C. Packaging Waste Management: Comply with packaging requirements specified under Section 016000 - PRODUCT REQUIREMENTS.
 - 1. Shipping materials: Manufacturer shall utilize to the greatest extent possible packaging materials which are biodegradable and recyclable.
 - 2. Jobsite packaging waste management: Recycle packaging materials coordinated with general construction waste management specified under Section 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.
- D. Damaged material: Remove any damaged or contaminated materials from job site immediately, including materials in broken packages, packages containing water marks, or show other evidence of damage, unless Architect specifically authorizes correction thereof and usage on project.

1.9 SITE CONDITIONS

- A. Temperature and Humidity: Maintain uniform temperature of minimum of 65 degrees Fahrenheit and humidity of 20 to 50 percent 48 hours prior to, during, and 48 hours after installation. Store resilient flooring materials and accessories in the spaces where they will be installed for at least 48 hours before beginning installation. Thereafter, maintain a minimum temperature of 55 degrees Fahrenheit in the areas where the work is completed.

1.10 WARRANTY

- A. Under the provisions of Section 017800 - CLOSEOUT SUBMITTALS, provide manufacturer's standard wear warranties for all flooring and stair tread materials installed under this Section.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following:
1. Basis of Design: Freudenberg Building Systems Inc., Lawrence, MA.

2.2 RUBBER TILE FLOORING

- A. Rubber tile flooring, (Designated as **RT-1, RT-2 & RT-7** on the Drawings): Smooth surface synthetic rubber flooring, 2.0 mm (0.08 inches) overall thickness.
1. Acceptable Product:
 - a. Freudenberg Building Systems Inc., Lawrence, MA.; product "Nora Environcare", Article 1370. Tile size: Nominal 24 by 24 inches.
 2. Material: Synthetic rubber free from reground rubber, natural rubber or coarse fillers.
 3. Abrasion Resistance: Taber abrasion test, ASTM C501, H-18 wheel, 500 gram load, 1000 cycles, gram weight loss not greater than the following: 0.70.
 4. Hardness: ASTM D 2240, Shore A, not less than 85.
 5. Slip Resistance: Static coefficient of friction (James Test), ASTM D 2047, equal to or greater than 0.6, ADA guidelines compliance.
 6. Flammability: ASTM E 648 or NFPA 253, result to be not less than 0.45 watts per square centimeter, Class 1.
 7. Smoke Density: ASTM E 662, NFPA 258, NBS smoke density, less than 450.
 8. Burn Resistance: Cigarette and solder burn resistance.
 9. PVC-Free: Products shall contain no polyvinyl chloride
 10. Halogen-Free: Products shall contain no halogens.
 11. Asbestos-Free: Products shall contain no asbestos.
 12. Indoor Air Quality: Products shall meet GreenGuard and CHPS (Collaborative for High Performance Schools) 01350. Requirements.
 13. Color: As selected by Architect from manufacturer's full range of colors.

2.3 RUBBER STAIR TREADS/RISERS AND LANDINGS

- A. Floor and stair treads (**ST-1**): One piece nosing-tread-riser combination, Norament Satura, Article 463/479/468/469, hammered surface design, 2 inches/5 mm overall thickness.
1. Material: Synthetic rubber free from reground rubber, natural rubber or coarse fillers.
 2. Back of Tile: Smooth, double-sanded back.
 3. Wear Warranty: 5 years.
 4. Slip Resistance: Static coefficient of friction (James Test), ASTM D 2047, equal to or greater than 0.6, ADA guidelines compliance.
 5. Color: As selected.

2.4 ACCESSORIES

- A. Visually Impaired Strips:
1. As manufactured by Freudenberg Building Systems Inc.
 2. Smooth surface rubber striping to be inserted into one-piece nosing-tread riser stairtread.
 3. Width of strip: ~2 inches, (50.8mm).
- B. Filler for patching, smoothing and leveling subfloors and underlayments: Portland cement-based latex underlayment acceptable to flooring manufacturer, equal to the following:
1. Ardex, Inc., products "Feather Flash" and "Ardex SD-P".
 2. Quikrete Companies, product "Fast-Set Underlayment 1248".
 3. Silpro Masonry Systems Inc., product "Profinish".
- C. Adhesives and primers: Water resistant, acceptable by the resilient flooring manufacturer.
1. Adhesive for rubber stair treads and landings: 2-part epoxy adhesive.

- D. Transition/reducing strips: Provide tapered profiles required for transition to abutting materials, in colors and material as selected by the Architect.
 - 1. Provide resilient edge strips of width shown on the drawings, of equal gage to flooring having tapered or bull nose edge, with color(s) to match (or contrast) flooring as selected by the Architect from full range of manufacturer's available colors.
- E. Cleaning material: Domestic floor detergent, as recommended by the flooring manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Inspect all surfaces and verify that they are in proper condition to receive the work of this Section.
 - 1. Substrates shall be dry and clean.
 - 2. Substrates shall be free of depressions, raised areas, or other defects which would telegraph through installed flooring.
 - 3. Temperature of resilient flooring and substrate shall be within specified tolerances as required by flooring and adhesive manufacturers.
 - 4. Concrete Substrates:
 - a. Verify concrete substrate has cured for at least 60 days.
 - b. Preinstallation Testing: Perform relative humidity, moisture vapor emission, and pH tests as specified in Section 090506 - COMMON WORK RESULTS FOR FLOORING.
 - 5. Do not proceed with flooring installation if base cabinets or other built-in casework is present on the substrate.
- B. Beginning of installation means acceptance of existing substrate and project conditions.

3.2 PREPARATION

- A. Protection of In-situ Conditions: During the operation of work of this Section, protect surrounding materials and finishes against undue soilage and damage by the exercise of reasonable care and precautions. Clean, or repair all existing surfaces which are soiled or otherwise damaged by Work of this Section.
- B. Surface Preparation: Comply with requirements of flooring manufacturer, and general requirements specified in Section 090506 - COMMON WORK RESULTS FOR FLOORING.

3.3 INSTALLATION - GENERAL

- A. General: Install all products in strict accordance with each manufacturer's written installation procedures and other provisions specified herein.
 - 1. Flooring Manufacturer's Specifications: The floor system manufacturer's Technical Specifications shall be considered a part of this specification and should be used as a reference for specific application procedures and recommendations. Where a conflict does exist between the manufacturer's written specifications and those procedures specified in this Section, the more stringent requirements meeting the Manufacturer's minimum requirements for the provided warranty shall apply.
- B. Install flooring and accessories after the other finishing operations, including painting, have been completed. Close spaces to traffic during the installation of the flooring.
- C. Do not install flooring over concrete slabs until they have been cured and are sufficiently dry to achieve a bond with the adhesive, in accordance with specified and manufacturer's recommended bond and moisture testing.
- D. Spread only enough adhesive to permit installation of materials before initial set.

3.4 INSTALLATION - RUBBER TILE FLOORING

- A. Install rubber tile flooring using conventional full-spread method. Application shall be performed by factory trained mechanics franchised by the manufacturer in accordance with the

manufacturer's instructions, and using tools and techniques recommended by the flooring manufacturer.

1. Cut tile into required lengths and sizes. Layout and cut to achieve minimum number of seams and for pattern match between abutting edges. Lay resilient flooring with arrows in the same direction.
 2. Layout resilient flooring to provide equal size at perimeter. Adjust layout as necessary to eliminate resilient flooring which is cut to less than half full width.
 3. Lay tile flat and allow to come to room temperature prior to installation. Seams in corridors shall run perpendicular to corridor.
 4. Lay tile so as to ensure full uniform contact with substrate and to produce finished surfaces which are smooth, even and in true planes, free of buckles, waves, and other imperfections.
 5. Install the tile and roll the floor surface to work wrinkles and air pockets out past the outer edges.
 6. Fit the tile neatly and tightly into breaks and recesses, against bases, around pipes and penetrations, under saddles and thresholds, and around permanent cabinets and equipment.
 7. Do not install resilient flooring over building expansion joints.
- B. Reducer Strips: Install reducer strips wherever new rubber tile flooring terminates at carpeting and elsewhere as required to terminate flooring.

3.5 INSTALLATION OF ACCESSORIES

- A. Resilient edge and transition strips:
1. Install edge strips at all edges of flooring which would otherwise be exposed.
 2. Place resilient edge strips tightly butted to flooring and secure with adhesive recommended by the edge strip manufacturer.

3.6 TOLERANCES

- A. Maximum variation from plumb or level: 1/8 inch.
- B. Maximum offset from true dimensional alignment: 1/8 inch.

3.7 CLEANING

- A. General: Clean work under provisions of Section 017000 - EXECUTION.
1. Control accumulation of waste materials and trash. Daily clean work areas by sweeping and disposing of debris, and scraps.
 2. After completion of the work of this Section, remove equipment, and clean all wall, partition, and floor areas free from deposits of flooring adhesives and other materials installed under this Section.
- B. Waste Management: Recycle or dispose of off-site waste materials and trash at intervals approved by the Owner, and in compliance with waste management procedures specified in Section 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.
- C. As installation progresses, continually remove excess adhesive from floor, base and wall surfaces without damage.
1. Protect installed flooring as recommended by the flooring manufacturer against damage from rolling loads, other trades, or the placement of fixtures and furnishings.
- D. Sweep floors daily to remove all loose dirt and debris.
- E. Not sooner than five days after installation, clean all materials installed hereunder with a non-abrasive commercial detergent approved by the material manufacturers, and thoroughly rinse with clear water.
- F. After cleaning and polishing, ensure that the flooring is protected with heavy kraft paper.

3.8 PROTECTION

- A. General: Protect finished work under provisions of Section 090506 - COMMON WORK RESULTS FOR FLOORING.

END OF SECTION

SECTION 096536
STATIC-CONTROL RESILIENT FLOORING

PART 1 - GENERAL

1.1 SUMMARY

- A. Furnish and install the following:
 - 1. Static dissipative tile (SDT) resilient flooring.
 - 2. Vinyl transition strips wherever edges of resilient tile flooring materials abut dissimilar flooring, where no thresholds occur.

1.2 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract and Division 01 Specification Sections apply to this Section.
 - 1. Section 015000 - TEMPORARY FACILITIES AND CONTROLS: Protection of finished flooring.
- B. Section 016000 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- C. Section 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements for construction and demolition recycling.
 - 1. Section 024119 - SELECTIVE DEMOLITION: Removal of existing floor finishes.
- D. Section 090506 - COMMON WORK RESULTS FOR FLOORING: General requirements for flooring preparation, installation and temporary protection.
- E. Section 093000 - TILING: Tile flooring and marble thresholds.
- F. Section 096513 - RESILIENT BASE AND ACCESSORIES: Resilient base.
- G. Section 096516 - RESILIENT SHEET FLOORING: Sheet vinyl flooring and integral base.
- H. Section 096523 - RUBBER FLOORING: Rubber flooring and accessories.

1.3 REFERENCES

- A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 014200 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. ASTM D2240 - Standard Test Methods for Rubber Property – Durometer Hardness
 - 2. ASTM D3389 - Standard Test Methods for Coated Fabrics Abrasion Resistance.
 - 3. ASTM E84 - Surface Burning Characteristics of Building Materials.
 - 4. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source.
 - 5. ASTM E662 - Smoke Generation Characteristics of Solid Materials
 - 6. ASTM F50 - Standard Test Method for Electrical Resistance of Conductive and Static Dissipative Resilient Flooring
 - 7. ASTM F710 - Preparing Concrete Floors to Receive Resilient Flooring.
 - 8. ASTM F970 - Standard Test Method for Static Load Limit.
 - 9. ASTM F1700 - Standard Specification for Solid Vinyl Floor
 - 10. ASTM F1869 - Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
 - 11. NFPA 99 - Standard for Health Care Facilities
 - 12. UL 779 - Standard for Safety for Electrically Conductive Floorings
 - 13. All applicable federal, state and municipal codes, laws and regulations regarding flammability and smoke generation of interior finishes.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Pre-installation Meetings: Installer of the Work of this Section is required to attend pre-installation conference specified under Section 090506 - COMMON WORK RESULTS FOR FLOORING.

1.5 SUBMITTALS

- A. Information and Review Submittals: Submit the following under provisions of Section 013000 – ADMINISTRATIVE REQUIREMENTS:
 - 1. Product Data: Manufacturer's product data sheets, specifications, performance data, physical properties and installation instructions for each item furnished hereunder.
 - a. Furnish manufacturer's product literature on conductive flooring adhesive, highlight adhesive properties, including VOC's and maximum moisture pressure limits for substrates.
 - b. Shop Drawings: 1/4 inch scale plans of each flooring area scheduled for Work of this Section. Drawings shall bear dimensions of actual measurements taken at the project.
 - 1) Identify each flooring type, colors and patterns, Indicate layout of tile units and direction of tile patterns.
 - 2) Where more than one adhesive type is specified or otherwise required by flooring manufacturer, identify on shop drawings areas for each adhesive type.
 - c. Selection Samples: Manufacturers' sample chain of colors and patterns available for selection by Architect.
 - d. Verification Samples:
 - 1) Full sized flooring tile, illustrating color, and pattern for each color and type of tile selected.
 - 2) Edging: 12 inches long demonstrating profile, thickness, size and color.
 - e. Certificates:
 - 1) Submit the manufacturer's certification that the resilient flooring has been tested by an independent laboratory and complies with the required fire tests, electrical conductivity tests.
- B. Closeout Submittals: Submit the following under provisions of Section 017800 - CLOSEOUT SUBMITTALS.
 - 1. Operation and Maintenance Data: Furnish cleaning and maintenance data. Include maintenance procedures, recommended maintenance materials, a suggested schedule for cleaning, stain removal methods, and polishing.
 - 2. Bonds and Warranty Documentation:
 - a. Manufacturer's Warranties and Guarantees as specified elsewhere herein this Section.
- C. Maintenance Material Submittals: Submit the following under provisions of Section 017800 - CLOSEOUT SUBMITTALS. Clearly label and package extra materials securely to prevent damage.
 - 1. Extra Stock Materials: Upon completion of the Work of this Section, deliver to the Owner extra flooring materials for future repairs and maintenance, from the same manufacturing runs as those installed, in the following amounts.
 - a. Flooring Tile: 5 percent of each material in each color, and pattern installed.
 - b. Furnish a quantity of adhesive of each type used in sealed cans or containers sufficient to apply the above materials.

1.6 QUALITY ASSURANCE

- A. General: Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.
- B. Sole Source Materials: For each type of flooring required for the work of this Section, provide primary materials which are the products of one manufacturer. Provide secondary materials

which are acceptable to the manufacturer of the primary materials. Comply with applicable regulations regarding VOC (volatile organic compound) content of adhesives.

- C. Color Matching: Provide resilient flooring products, including accessories, from one manufacturer to ensure color matching.
 - 1. Avoid color and pattern differential; provide flooring from one production run in any single room or contiguous areas.
- D. Qualifications:
 - 1. Manufacturers: Provide flooring manufactured by a firm with a minimum of 10 years experience in the fabrication of resilient flooring of types equivalent to those specified.
 - a. Manufacturer capable of providing field service representation.
 - b. Installer/Applicator: Installer experienced (minimum of 5 years) to perform work of this section who has specialized in the installation of work similar to that required for this project and who is acceptable to the product manufacturer.
- E. Preconstruction Testing: Perform testing for relative humidity, moisture vapor emission, and pH tests on in situ concrete slabs as specified under Section 090506 – COMMON WORK RESULTS FOR FLOORING.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Delivery and Acceptance Requirements:
 - 1. Do not deliver items to the site, until all specified submittals have been submitted to, and approved by, the Architect.
 - 2. Do not deliver flooring materials to the project until all concrete, masonry, plaster and other wet work has been completed and dry.
 - 3. Deliver flooring and setting materials in original unopened packages, containers or bundles bearing brand name, and identification of manufacturer, production run information with labels and package seals intact and legible.
- B. Storage and Handling Requirements:
 - 1. Store and handle materials following manufacturer's recommended procedures, and in accordance with material safety data sheets.
 - 2. Protect materials from damage due to moisture, direct sunlight, excessive temperatures, surface contamination, corrosion and damage from construction operations and other causes.
- C. Packaging Waste Management: Comply with packaging requirements specified under Section 016000 - PRODUCT REQUIREMENTS.
 - 1. Shipping materials: Manufacturer shall utilize to the greatest extent possible packaging materials which are biodegradable and recyclable.
 - 2. Jobsite packaging waste management: Recycle packaging materials coordinated with general construction waste management specified under Section 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

1.8 SITE CONDITIONS

- A. Temperature and Humidity: Maintain uniform temperature of minimum of 65 degrees Fahrenheit and humidity of 20 to 50 percent 48 hours prior to, during, and 48 hours after installation. Store resilient flooring materials and accessories in the spaces where they will be installed for at least 48 hours before beginning installation. Thereafter, maintain a minimum temperature of 55 degrees Fahrenheit in the areas where the work is completed.

1.9 WARRANTY

- A. Under the provisions of Section 017800 - CLOSEOUT SUBMITTALS, provide manufacturer's standard wear warranties for all flooring and stair tread materials installed under this Section.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Specified Manufacturer (**RT-6**): To establish a standard of quality, design and function desired, Drawings and specifications have been based on Basis of Design: Freudenberg Building Systems Inc., Lawrence, MA.

2.2 PERFORMANCE/DESIGN CRITERIA

- A. Regulatory Requirements:
1. Provide materials and assemblies conforming to applicable building codes and regulatory agencies for flame/fuel/smoke rating requirements of flooring in accordance with ASTM E84.
 2. Provide flooring material to meet the following fire test performance criteria as tested by a recognized independent testing laboratory:
 - a. ASTM E648 (Critical Radiant Flux) of 0.45 watts per sq. cm. or greater, Class 1.
 - b. ASTM E662 (Smoke Generation) Maximum Specified Optical Density of 450 or less.

2.3 STATIC DISSIPATIVE TILE FLOORING

- A. Basis of Design (**RT-6**): Basis of Design: Freudenberg Building Systems Inc., Lawrence, MA, Product: "ENVIRONCARE ED" flooring that shall comply with the following minimum standards for physical characteristics and electrical properties when installed according to manufacturer's instructions with the required adhesive:
1. Size and Color: As selected by Architect from manufacturer's full range of available options, unless otherwise indicated on the Drawings.
 2. Flexibility: Meet Federal Specification SS-T-312B(1), Type IV, Composition 1, Vinyl tile.
 3. Electrical resistance: ASTM F150 between 106 and 109 ohms.
 4. Static Decay: Less than 0.2 second tested per FTMS 4046 (101C) 5,000 to 0 volts.
 5. Static Propensity: Less than 100 volts with conductive footwear at 20% relative humidity per AATCC-134.
 6. Smoke Density: 450 or less per ASTM E662/NFPA 258.
 7. Flammability: Class 1 per ASTM E648/NFPA 253.

2.4 ACCESSORIES

- A. Filler for patching, smoothing and leveling subfloors and underlayments: Portland cement-based latex underlayment acceptable to flooring manufacturer, equal to the following:
1. Ardex, Inc., products "Feather Flash" and "Ardex SD-P".
 2. Quikrete Companies, product "Fast-Set Underlayment 1248".
 3. Silpro Masonry Systems Inc., product "Profinish".
 4. Adhesives and primers:
 - a. Adhesives for SDT flooring: Conductive epoxy Armstrong S-202 Static Dissipative Tile Adhesive with 2 inches (5.08 cm) wide by 24 inches (60.96 cm) long copper ground-connection strips under the tile.
 - b. Transition/reducing strips and edge strips: Provide tapered profiles required for transition to abutting materials, in colors and material as selected by the Architect.
 - c. Provide edge strips of width shown on the drawings, of equal gage to flooring having tapered or bull nose edge, with color(s) to match (or contrast) flooring as selected by the Architect from full range of manufacturer's available colors.
 - d. Copper ground-connection strips as provided by flooring manufacturer.
 - e. Cleaning material: Domestic neutral floor detergent having a pH 7 or pH 8, as recommended by the flooring manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Inspect all surfaces and verify that they are in proper condition to receive the work of this Section.
 - 1. Substrates shall be dry and clean.
 - 2. Substrates shall be free of depressions, raised areas, or other defects which would telegraph through installed flooring.
 - 3. Temperature of resilient flooring and substrate shall be within specified tolerances as required by flooring and adhesive manufacturers.
 - 4. Concrete Substrates:
 - a. Verify concrete substrate has cured for at least 60 days.
 - b. Preinstallation Testing: Perform relative humidity, moisture vapor emission, and pH tests as specified in Section 090506 - COMMON WORK RESULTS FOR FLOORING.
 - c. Do not proceed with flooring installation if base cabinets or other built-in casework is present on the substrate.
- B. Beginning of installation means acceptance of existing substrate and project conditions.

3.2 PREPARATION

- A. Protection of In-situ Conditions: During the operation of work of this Section, protect surrounding materials and finishes against undue soilage and damage by the exercise of reasonable care and precautions. Clean, or repair all existing surfaces which are soiled or otherwise damaged by Work of this Section.
- B. Surface Preparation: Comply with requirements of flooring manufacturer, and general requirements specified in Section 090506 – COMMON WORK RESULTS FOR FLOORING.

3.3 INSTALLATION - GENERAL

- A. General: Install all products in strict accordance with each manufacturer's written installation procedures and other provisions specified herein.
 - 1. Flooring Manufacturer's Specifications: The floor system manufacturer's Technical Specifications shall be considered a part of this specification and should be used as a reference for specific application procedures and recommendations. Where a conflict does exist between the manufacturer's written specifications and those procedures specified in this Section, the more stringent requirements meeting the Manufacturer's minimum requirements for the provided warranty shall apply.
- B. Install flooring and accessories after the other finishing operations, including painting, have been completed. Close spaces to traffic during the installation of the flooring.
- C. Do not install flooring over concrete slabs until they have been cured and are sufficiently dry to achieve a bond with the adhesive, in accordance with specified and manufacturer's recommended bond and moisture testing.
- D. Spread only enough adhesive to permit installation of materials before initial set.

3.4 FLOORING INSTALLATION

- A. Lay flooring in a square grid pattern, with joints and seams parallel to building lines. Lay tile flooring in pattern as indicated on the drawings with pattern-grain running in singular direction. Lay tile with joints straight and continuous in both directions and with border tile not less than 1/2 the width of the tile.
- B. Neatly fit resilient materials to all intersecting surfaces and make joints as inconspicuous as possible.
- C. Terminate flooring at centerline of door in closed position where adjacent floor finish is of different material or color.

- D. Apply resilient materials to have uniform contact with receiving surfaces throughout, with tight joints, and with all finish surfaces smooth, in true plane, free from buckles, waves, and other imperfections.
 - 1. Set flooring, roll and cross roll with 150 pound sectional roller while adhesive is still wet.
- E. Extend resilient flooring to wall lines beneath all movable equipment and movable casework. Fit resilient flooring onto breaks and recesses, against non-resilient bases, around pipes and other protrusions, under saddles, and to and around other fixed surfaces, making neat cuts in the flooring and minimizing joints.

3.5 GROUNDING

- A. Connect copper grounding strip provided by flooring manufacturer to a stranded ground wire (provided under Division 16), cut off excess and recess into the wall. Or attach ground strip to building columns in accordance with manufacturer's instructions.
- B. Lay the balance of the grounding strip into the adhesive covering it with additional adhesive. Install the flooring over the grounding strip.

3.6 INSTALLATION OF ACCESSORIES

- A. Transition/reducing strips and edge strips:
 - 1. Install transition/reducing strips where abutting different flooring conditions.
 - 2. Install edge strips at all edges of flooring which would otherwise be exposed.
 - 3. Place resilient edge strips tightly butted to flooring and secure with adhesive recommended by the edge strip manufacturer.

3.7 TOLERANCES

- A. Maximum variation from plumb or level: 1/8 inch.
- B. Maximum offset from true dimensional alignment: 1/8 inch.

3.8 CLEANING

- A. General: Clean work under provisions of Section 017000 – EXECUTION AND CLOSEOUT REQUIREMENTS.
 - 1. Control accumulation of waste materials and trash. Daily clean work areas by sweeping and disposing of debris, and scraps.
 - 2. After completion of the work of this Section, remove equipment, and clean all wall, partition, and floor areas free from deposits of flooring adhesives and other materials installed under this Section.
- B. Waste Management: Recycle or dispose of off-site waste materials and trash at intervals approved by the Owner, and in compliance with waste management procedures specified in Section 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.
- C. As installation progresses, continually remove excess adhesive from floor, base and wall surfaces without damage.
 - 1. Protect installed flooring as recommended by the flooring manufacturer against damage from rolling loads, other trades, or the placement of fixtures and furnishings.
- D. Sweep floors daily to remove all loose dirt and debris.
- E. Not sooner than five days after installation, clean all materials installed hereunder with a non-abrasive commercial detergent approved by the material manufacturers, and thoroughly rinse with clear water.
- F. After cleaning and polishing, ensure that the flooring is protected with heavy kraft paper.

3.9 PROTECTION

- A. Protect finished work under provisions of Section 090506 - COMMON WORK RESULTS FOR FLOORING.

END OF SECTION

UNIVERSITY OF VERMONT MEDICAL CENTER
Outpatient Surgery Center
South Burlington, VT 05403

E4H Environments for Health Architecture
Project No. 2021073
January 27, 2023

SECTION 096543
LINOLEUM FLOORING

PART 1 - GENERAL

1.1 SUMMARY

- A. The work of this Section consists of resilient flooring where shown on the Drawings, as specified herein, and as required for a complete and proper installation. Work includes, but is not limited to the following.
- B. Furnish and install the following:
 - 1. Linoleum tile flooring.
 - 2. Vinyl transition strips wherever edges of resilient flooring materials abut dissimilar flooring, where no thresholds occur.

1.2 RELATED REQUIREMENTS

- A. Section 015000 - TEMPORARY FACILITIES AND CONTROLS: Application of protection paper to finished resilient flooring.
- B. Section 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements for construction and demolition recycling.
- C. Section 024100 - DEMOLITION: Removal of existing finishes.
- D. Section 033000 - CAST-IN-PLACE CONCRETE: Concrete substrate for resilient flooring, and concrete sealers.
- E. Section 090506 - COMMON WORK RESULTS FOR FLOORING: General requirements for flooring preparation, installation and temporary protection.
- F. Section 096513 - RESILIENT BASE AND ACCESSORIES: Coved base.
- G. Section 096516 - RESILIENT SHEET FLOORING: Sheet vinyl flooring with integral base and welded seams.

1.3 REFERENCES

- A. Reference Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 014200 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. ASTM E 84 - Surface Burning Characteristics of Building Materials.
 - 2. ASTM F-710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.
 - 3. ASTM F-1869 – Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
 - 4. ASTM F-2034 – Sheet Linoleum Floor Covering
 - 5. ASTM F-2195 –Linoleum Floor Tile
 - 6. NFPA 253 - Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source.
 - 7. All applicable federal, state and municipal codes, laws and regulations regarding flammability and smoke generation of interior finishes.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. General: Coordinate the work of this Section with the respective trades responsible for installing interfacing and adjoining work for proper sequence of installation, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.

- B. Pre-installation Meetings: Installer of the Work of this Section is required to attend pre-installation conference specified under Section 09 05 06 - Common Work Results for Flooring.
- C. Sequencing:
 - 1. Do not order or deliver any materials until all submittals, required in the listed Specification Sections included as part of this Filed-Subcontract, have been received and approved by the Architect.
 - 2. Sequence work to ensure resilient flooring is not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, wet work is dry and cured, and work overhead is completed.
 - 3. Sequence flooring installation when base cabinets or other built-in casework is present on the substrate.
 - 4. Ensure that installation of flooring and accessories occurs after other finishing operations, including painting.

1.5 SUBMITTALS

- A. Information and Review Submittals: Submit the following under provisions of Section 013000:
 - 1. Product Data: Manufacturer's product data sheets, specifications, performance data, physical properties and installation instructions for each item furnished hereunder.
 - a. Furnish manufacturer's product literature on flooring adhesive, highlight adhesive properties, including VOC's and maximum moisture pressure limits for substrates.
 - 2. Shop drawings: 1/4 inch scale plans of each flooring area scheduled for Work of this Section. Drawings shall bear dimensions of actual measurements taken at the project.
 - a. Indicate layout of tile units and direction of tile patterns.
 - b. Identify selected colors and patterns.
 - c. Show locations and types of reducer and edge strips.
 - d. Where more than one adhesive type is specified or otherwise required by flooring manufacturer, identify on shop drawings areas for each adhesive type.
 - 3. Selection samples: Manufacturers' sample chain of colors and patterns available for selection by Architect.
 - 4. Verification samples:
 - a. Full sized flooring tile, illustrating color, and pattern for each color and type of tile selected.
 - b. Edging: 12 inches long demonstrating profile, thickness, size and color.
 - 5. Certificates:
 - a. Submit the manufacturer's certification that the resilient flooring has been tested by an independent laboratory and complies with the required fire tests.
 - 6. Qualification Submittals: Installer/Applicator's work experience documentation.
- B. Closeout Submittals: Submit the following under provisions of Section 017800 - CLOSEOUT SUBMITTALS.
 - 1. Operation and Maintenance Data: Furnish cleaning and maintenance data.
 - 2. Bonds and Warranty Documentation:
 - a. Manufacturer's Warranties and Guarantees as specified elsewhere herein this Section.
- C. Maintenance Material Submittals: Submit the following under provisions of Section 017800 - CLOSEOUT SUBMITTALS. Clearly label and package extra materials securely to prevent damage.
 - 1. Extra Stock Materials: Upon completion of the Work of this Section, deliver to the Owner extra flooring materials for future repairs and maintenance, from the same manufacturing runs as those installed, in the following amounts.
 - a. Linoleum flooring: 3 percent of each material in each color, and pattern installed.

- b. Furnish a quantity of adhesive of each type used in sealed cans or containers sufficient to apply the above materials.

1.6 QUALITY ASSURANCE

- A. General: Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.
 - 1. Provide types of resilient flooring and accessories supplied by one manufacturer, including leveling and patching compounds, and adhesives, as available or as otherwise recommended by flooring manufacturer.
 - 2. Avoid color and pattern differential; provide flooring from one production run in any single room or contiguous areas.
- B. Qualifications:
 - 1. Installer/Applicator: Minimum of 3 years documented experience demonstrating previously successful work of the type specified herein.

1.7 MOCK-UPS

- A. Provide mock-up area using accepted flooring, a minimum 100 square feet, illustrating color, texture and finish, and demonstrating the minimum standard for the Work.
- B. Locate mock-ups where directed and include all surfaces and materials scheduled to receive a field applied finish.
- C. Maintain mock-up during construction for workmanship comparison; remove and legally dispose of mock-up when no longer required.
- D. Accepted mock-ups may remain as part of the work; the number of mock-ups shall not be restricted.

1.8 DELIVERY, STORAGE AND HANDLING

- A. Delivery and Acceptance Requirements:
 - 1. Do not deliver items to the site, until all specified submittals have been submitted to, and approved by, the Architect.
 - 2. Deliver resilient flooring materials in original, unopened packages and store protected for three days prior to installation in area of installation to achieve temperature stability.
- B. Storage and Handling Requirements:
 - 1. Store and handle materials following manufacturer's recommended procedures, and in accordance with material safety data sheets. Store materials in a clean dry, enclosed space off the ground and protected from the weather
 - 2. Protect materials from damage due to moisture, direct sunlight, excessive temperatures, surface contamination, corrosion and damage from construction operations and other causes.
 - 3. Protect adhesives from freezing.

1.9 SITE CONDITIONS

- A. Maintain uniform temperature of minimum of 65 degrees Fahrenheit and humidity of 20 to 40 percent 48 hours prior to, during, and 48 hours after installation. Store resilient flooring materials and accessories in the spaces where they will be installed for at least 48 hours before beginning installation. Thereafter, maintain a minimum temperature of 55 degrees Fahrenheit in the areas where the work is completed.

1.10 WARRANTY

- A. General: Submit warranties under provisions of Section 017800 - CLOSEOUT SUBMITTALS.
- B. Manufacturer Warranty: provide manufacturer's standard wear warranties for all flooring and stair tread materials installed under this Section.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Specified Manufacturer, (**RS-3, RS-4 & RT-3**): To establish a standard of quality, design and function desired, Drawings and specifications have been based on Forbo, Product: "Marmoleum". No substitution will be accepted.
- B. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - 1. Leveling filler:
 - a. Ardex, Inc., Coraopolis, PA.
 - b. Quikrete Companies., Atlanta, GA.
 - c. Silpro Masonry Systems Inc., Ayer MA.

2.2 DESCRIPTION

- A. Regulatory Requirements:
 - 1. Provide materials and assemblies conforming to applicable building codes and regulatory agencies for flame/fuel/smoke rating requirements of flooring in accordance with ASTM E 84.
 - 2. Provide flooring material to meet the following fire test performance criteria as tested by a recognized independent testing laboratory:
 - a. ASTM E 648 (Critical Radiant Flux) of 0.45 watts per sq. cm. or greater, Class 1.
 - b. ASTM E 662 (Smoke Generation) Maximum Specified Optical Density of 450 or less.
- B. Sustainability Requirements:
 - 1. Biobased Material: Consisting of oxidized linseed or other vegetable drying oil and rosin, mixed with ground cork or wood flour, mineral filler, and natural pigments. Mixture shall be bonded and keyed to a burlap (jute) or other suitable fibrous backing so that backing is partially embedded in mixture.
 - 2. Product shall be completely biodegradable.

2.3 LINOLEUM TILE FLOORING

- A. Linoleum tile flooring: Marbleized linoleum, all natural resilient, self-sanitizing, bactericidal flooring of primarily natural materials consisting of linseed oil, wood flour, and rosin binders, mixed and calendared onto a polyester backing. Total construction non-asbestos. Pattern and color shall extend throughout total thickness of wear surface. Products which may be incorporated in the work include the following:
- B. Linoleum Tile Physical Characteristics:
 - 1. Size, (Sheet): 6'-7" Wide.
 - 2. Size (Tile): 9.8"x39.4".
 - 3. Gauge: 0.080" (2.0 mm).
 - 4. Backing: Polyester backing.
- C. Static Load Limit: 1,500 pounds per square inch when tested in accordance with ASTM F 970-00, Standard Test Method for Static Load Limit.
- D. Slip Resistance: Meets or exceeds the industry recommendation of >0.5 for flat surfaces when tested in accordance with ASTM D 2047, Standard Test Method for Static Coefficient of Friction.
- E. Castor Resistance: Suitable for office chairs with castors when tested in accordance with EN 425, Castor Chair Test.
- F. Impact Sound Reduction: 6db when tested in accordance with ISO 717-2, Impact Sound Insulation Test.
- G. Fire Testing:

1. Class 1 when tested in accordance with ASTM E 648/NFPA 253, Standard Test Method for Critical Radiant Flux.
 2. Meets 450 or less when tested in accordance with ASTM E 662/ NFPA 258, Standard Test Method for Smoke Density.
- H. Chemical Resistance, (Exposure Time One Hour):
1. Diluted Acids – Sulfuric, Nitric, Hydrochloric, Acetic, Lactic, Citric: No Change. Isopropyl Alcohol (70%): No Change.
 2. Sodium Hydroxide (5%): Softening.
 3. Ammonia (5%), Acetone: Possible Softening/Staining.
 4. Phenol (5%): No Change.
 5. Soda Solution, Soap Solution (Slightly Alkaline): No Change.
 6. Gasoline, Kerosene, White Spirit, Paraffin: No Change.
 7. Benzene, Toluene, Methyl Alcohol, Ethyl Acetate: No Change.
 8. Methyl Ethyl Ketone, Ether: No Change.
 9. Mineral Oil, Olive Oil, Vegetable Oil, Animal Fat: No Change.
 10. Blood, Urine, Excrement: No Change.
 11. Lipstick: No Change.
 12. Formaldehyde, Hydrogen Peroxide 3%: No Change.
 13. Hot Chili Paste, Iodine, Betadine, Hair Dye: No Change.
 14. Shoe Polish: Staining.
 15. Silver Nitrate: Staining/Possible Softening.
 16. Bitumen, Salt Water: No Change.
 17. Methylene Blue: Staining.
 18. Gel-Based Hand Sanitizer, Bleach: No Change.
- I. Color and patterns as indicated on Drawings, (where not indicated, as selected by Architect from full available range).

2.4 ACCESSORIES

- A. Filler for patching, smoothing and leveling subfloors and underlayments: Portland cement-based latex underlayment acceptable to flooring manufacturer, equal to the following:
1. Ardex, Inc., products “Feather Flash” and “Ardex SD-P”.
 2. Quikrete Companies, product “Fast-Set Underlayment 1248”.
 3. Silpro Masonry Systems Inc., product “Profinish”.
- B. Adhesive for linoleum tile flooring: Polyurethane based, NFPA Class A rated and VOC compliant.
1. Forbo T 940, Forbo Sustain 885m, Forbo Sustain 1195 or Forbo Sustain 1299 adhesives, as recommended by the manufacturer.
- C. Transition and edge strips:
1. General: Homogeneous vinyl, of profiles required for thickness of abutting materials.
 2. Edge strips: Tapered or bull nose edge.
 3. Colors: Match or contrast with the flooring, as selected by the Architect from standard colors available, of width shown on the drawings.
- D. Cleaning material: Domestic neutral floor detergent having a pH 7 or pH 8, as recommended by the flooring manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Inspect all surfaces and verify that they are in proper condition to receive the work of this Section.
1. Concrete substrates: Verify concrete substrate has been cured and is sufficiently dry to achieve a bond with the adhesive, in accordance with the manufacturer's recommended bond and moisture test.

- a. Insure that concrete substrate has a moisture content of not more than 3.5 percent by weight. Perform moisture test in several locations using carbide method dampness meter.
 2. Beginning of installation means acceptance of existing substrate and site conditions.
- B. Pre-installation Testing, Evaluation and Assessment: Moisture testing of concrete substrate, refer to Specification Section 090506 - COMMON WORK RESULTS FOR FLOORING.

3.2 PREPARATION

- A. General: Comply with flooring manufacturer's requirements for preparation of substrate to receive resilient flooring.
1. Close spaces to traffic during the installation of the flooring.
- B. Protection of In-situ Conditions: During the operation of work of this Section, protect surrounding materials and finishes against undue soilage and damage by the exercise of reasonable care and precautions. Clean, or repair all existing surfaces which are soiled or otherwise damaged by Work of this Section, to match indicated profiles and specified finishes. Materials and finishes which cannot be cleaned, or repaired shall be removed and replaced with new work in conformance with the Contract Documents.
- C. Surface Preparation:
1. Remove by mechanical means (light sanding and grinding), all protruding edges, high spots. Ensure that substrate is free from paint, varnish, wax, oil, or other foreign matter. Do not use solvents.
 2. Fill minor or local low spots, cracks, joints, holes, and other defects with subfloor filler. Apply, trowel and float finish subfloor filler and leave a smooth, level, hard surface. Prohibit traffic from area until filler is cured.
 3. Apply troweled subfloor filler and leveler to provide finished concrete surface smooth, with no more than 1/8 inch variation from plane within 10 feet in any direction.
 - a. Prohibit traffic until filler and leveler is cured.
 4. Vacuum clean substrate, and ensure that substrate is dry, clean and smooth prior to application of flooring.
- D. Pre-installation off-gassing ventilation: Ventilate flooring products prior to installation. Open packaging, or remove from packaging, and ventilate flooring in a secure, dry, well-ventilated space free from contaminant sources and residues. Provide a temperature range of 60 degrees F minimum to 90 degree F maximum continuously for not less than 72 hours.
1. Do not ventilate within limits of Work unless otherwise approved by Architect.

3.3 INSTALLATION - GENERAL

- A. Install all products in strict accordance with each manufacturer's written installation procedures and other provisions specified herein.
1. Apply primers as recommended by adhesive manufacturer's written instructions.
- B. Spread only enough adhesive to permit installation of materials before initial set.
- C. Mix tile to ensure that concentration of surface patterns is uniform throughout. Use tile from cartons in same sequence as manufactured and packaged, if so numbered.
- D. Maintain reference markers, holes and openings that are in place or have been marked for future cutting; repeat markers on flooring as marked on substrate. Use non-permanent marking devices which may be cleaning washed off when no longer required.

3.4 INSTALLATION - FLOOR TILE

- A. Lay flooring in a square grid pattern, with joints and seams parallel to building lines. Lay tile flooring in pattern as indicated on the drawings or if not indicated as such, lay pattern-grain in singular direction. Lay tile with joints straight and continuous in both directions and with border tile not less than 1/2 the width of the tile.

- B. Neatly fit resilient materials to all intersecting surfaces, and make joints as inconspicuous as possible.
- C. Terminate flooring at centerline of door in closed position where adjacent floor finish is of different material or color. Where flooring pattern continues through door openings, continue established pattern with no interruption.
- D. Apply resilient materials to have uniform contact with receiving surfaces throughout, with tight joints, and with all finish surfaces smooth, in true plane, free from buckles, waves, and other imperfections.
- E. Extend resilient flooring to wall lines beneath all movable equipment and movable casework. Fit resilient flooring onto breaks and recesses, against non-resilient bases, around pipes and other protrusions, under saddles, and to and around other fixed surfaces, making neat cuts in the flooring and minimizing joints.

3.5 INSTALLATION OF ACCESSORIES

- A. Resilient edge and transition strips:
 - 1. Install edge strips at all edges of flooring which would otherwise be exposed.
 - a. Secure metal edge strips to the substrate with countersunk stainless steel anchors, complying with the edge strip manufacturer's recommendations.
 - 2. Place resilient edge strips tightly butted to flooring and secure with adhesive recommended by the edge strip manufacturer.

3.6 CLEANING

- A. General: Comply with requirements of Section 017300 - EXECUTION for periodic and final cleaning, and as additionally specified herein. Comply with requirements of Section 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL for handling and disposition of all construction and demolition waste.
 - 1. Daily clean work areas by sweeping and disposing of debris, and scraps.
- B. Post-installation Cleaning:
 - 1. As installation progresses, continually remove excess adhesive from floor, and wall surfaces without damage.
 - a. Protect installed flooring as recommended by the flooring manufacturer against damage from rolling loads, other trades, or the placement of fixtures and furnishings.
 - 2. Sweep floors to remove all loose dirt and debris.
 - 3. After specified waiting period, clean all materials installed hereunder with a non-abrasive commercial detergent approved by the material manufacturers, and thoroughly rinse with clear water.
 - a. Linoleum floors: Wait at least 5 full days following completion of installation before commencing with cleaning.
- C. Final Cleaning:
 - 1. General: Perform final cleaning not before 4 days prior to Owner's intended occupancy date.
 - 2. Linoleum floors:
 - a. Scrub floors using a one disc scrubbing machine with green nylon pad and water to which a neutral cleaning agent (less than pH9) has been added.
 - b. Rinse thoroughly and let dry
 - c. Apply manufacturer's recommended spray cleaning fluid containing 5 percent natural wax and no polymers. Dust wipe or dry mop.

3.7 PROTECTION

- A. General: Protect finished work under provisions of Section 090506 – COMMON WORK RESULTS FOR FLOORING.
- B. Prohibit traffic on finished floor areas until flooring adhesive has fully set.

- C. Prohibit washing, scrubbing or other similar 'wet' operations to occur on finished floor areas for a minimum period of 5 calendar days after installation.
- D. Provide protection of completed flooring areas from construction traffic until Substantial Completion of the General Contract. After cleaning and polishing, cover all resilient floor surfaces with non-staining heavyweight kraft paper and overlay with red-rosin paper, taping the edges to maintain position of the protection paper. Reapply papers as required to maintain floor protection.

END OF SECTION

SECTION 096723
RESINOUS FLOORING

PART 1 - GENERAL

1.1 SUMMARY

- A. Prepare surfaces to receive resinous flooring with integral sloping base.
 - 1. Base heights as indicated on the Drawings.
 - 2. Apply troweled seamless epoxy flooring system and subsequent touch-up and repairs.

1.2 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract and Division 01 Specification Sections apply to this Section.
- B. Section 016000 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- C. Section 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements for construction and demolition recycling.
- D. Section 015000 - TEMPORARY FACILITIES AND CONTROLS: Application of protection paper to finished resilient flooring.
- E. Section 079200 - JOINT SEALANTS: Requirements for sealants and backing materials.
- F. Section 090506 - COMMON WORK RESULTS FOR FLOORING: General requirements for flooring preparation, installation and temporary protection.
 - 1. Section 096229 - CORK FLOORING: Cork tile flooring and accessories.
- G. Section 096513 - RESILIENT BASE AND ACCESSORIES: Resilient base.
- H. Section 096516 - RESILIENT SHEET FLOORING: Sheet vinyl flooring.
- I. Section 096519 - RESILIENT TILE FLOORING: Resilient tile and plank flooring.
- J. Section 096523 - RUBBER FLOORING: Rubber sheet flooring, rubber composition tile, Rubber one-piece stair tread/riser with matching landing material and wall base.
- K. Section 096543 - LINOLEUM FLOORING: Linoleum tile and sheet flooring.

1.3 REFERENCES

- A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 014200 - REFERENCES.
 - 1. ASTM E 84 - Surface Burning Characteristics of Building Materials.
 - 2. All applicable federal, state and municipal codes, laws and regulations for flammability and smoke generation of interior finishes.

1.4 SUBMITTALS

- A. Submit the following:
 - 1. Submit the following: Manufacturer's warranties: Include coverage of materials and installation and resultant damage from failure of installation to resist penetration of moisture.

1.5 QUALIFICATIONS

- A. Applicator: Company specializing in performance of the work of this Section with 5 years minimum documented experience and trained by manufacturer in installing resinous flooring types similar to that required for this Project, and who is acceptable to manufacturer of primary materials.

1.6 QUALITY ASSURANCE

- A. Single-Source Responsibility: Obtain resinous flooring materials, including primers, resins, and finish coats, from a single manufacturer.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Deliver products to site in sealed and labeled containers; container labeling shall include manufacturer's name, type of paint, color mix designation, expected coverage, surface preparation instructions, instructions for mixing and reducing, drying time, and clean-up recommendations.
- B. Store materials, conforming with applicable codes and fire regulations, in designated spaces. Keep storage area secure when direct access is not required or when not performing work under this Section. Take precautionary measures to prevent fire hazards and spontaneous combustion, maintain a dry-chemical type fire extinguisher in all areas where materials of this Section are being stored or used.
- C. Store materials in a well-ventilated area at minimum ambient temperature of 45 degrees Fahrenheit and a maximum of 90 degrees Fahrenheit.
- D. Do not use the sanitary system for mixing or disposal of refuse material. Carry water to mixing rooms and dump waste material in a suitable refuse receptacle. Remove oily rags and waste each day.

1.8 PROJECT CONDITIONS

- A. Provide continuous ventilation and heating facilities to maintain surface and ambient temperatures above 50 degrees Fahrenheit for 24 hours before, during and 48 hours after application of finishes, unless required otherwise by manufacturer's instructions.
- B. Apply flooring materials within temperature and humidity range specified by coating manufacturer.
- C. Provide sufficient lighting to maintain 80 foot-candles measured mid-height at substrate surface.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Specified Manufacturer, (**CMP-1**): To establish a standard of quality, design and function desired, Drawings and specifications have been based on Dur-a-flex Inc., East Hartford, CT, product: "Dur-A Quartz Floor System".
- B. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering similar products include the following:
 - 1. Dur-a-flex Inc., East Hartford, CT.
 - 2. Stonhard Inc., Maple Shade, NJ.
 - 3. General Polymers Corporation, Cincinnati, OH.

2.2 FLOORING SYSTEM

- A. Troweled, three-component epoxy mortar system, consisting of an epoxy resin, amine curing agent, and selected, graded aggregates blended with inorganic pigments, having the following minimum standards for physical characteristics:
 - 1. Compressive strength:
 - a. Per ASTM C-579 - 12,500 psi.
 - b. Per ASTM D-695 - 17,500 psi, after 7 days.
 - 2. Tensile strength:
 - a. Per ASTM C-307: 2,600 psi.
 - b. Per ASTM D-638: 4,000 psi.
 - 3. Tensile Elongation ASTM D-638 7.50%
 - 4. Flexural strength per ASTM C-790: 6,250 psi.
 - 5. Flexural strength per ASTM C-580: 4,000 psi.
 - 6. Flexural modulus of elasticity per ASTM C-790: 6.2×10^5
 - 7. Hardness per ASTM D-2240, Shore D: 75 to 80.
 - 8. Linear Expansion ASTM D-696 2×10^{-5}

9. Bond Strength to Concrete ASTM D-4541 400 psi substrate fails.
10. Indentation per ML D-3134: .025 MAX.
11. Impact Resistance per ML D-3134: Pass.
12. Heat Resistance Limitation: 140°F - 200°F.
13. Flame Spread/NFPA 101 per ASTM E-84: Class A.
14. Abrasion resistance, (CS17 Wheel 1000 GM Load 1000 Cycles) per ASTM D-4060, 24 mg loss.
15. Flammability per ASTM E-648: Class I.
16. Flammability ASTM D-635: Self Extinguishing.
17. Water absorption per ASTM D-570: 0.4%.
18. VOC Content: 0 g/l.
19. Coefficient of friction per ASTM D-2047:
20. Standard Slip-Resistant: 0.9.
21. Orange Peel: 0.8.
22. Smooth: 0.7.

2.3 PRODUCT MIXING

- A. Mix on site with manufacturer supplied mix and measure apparatus to ensure a timely, accurate mix ratio and minimize waste.

2.4 ACCESSORIES

- A. Wall base: Stainless steel base cap as manufactured by Schlüter Systems L.P., Plattsburgh, NY.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Inspect all surfaces and verify that they are in proper condition to receive the work of this Section. Notify Contractor of any condition that may potentially affect proper application of coatings.
 1. Do not proceed with flooring installation if base cabinets or other built-in casework is present on the substrate.
- B. Measure moisture content of surfaces, do not apply finishes unless moisture content of surfaces are below the following maximums:
 1. Masonry or concrete: 12 percent.
- C. Beginning Work of this Section means acceptance of existing substrate surfaces and site conditions.

3.2 PREPARATION - GENERAL

- A. Mix and prepare coatings in strict accordance with manufacturer's written instructions. Thoroughly mix to ensure uniformity of color and mass, unless otherwise directed by the manufacturer of the specific coating used. Except for epoxy mixtures, strain previously opened materials to remove skins, coating lumps, and other foreign matter prior to painting. Dispose of epoxy materials which have begun to set.

3.3 APPLICATION - GENERAL

- A. Apply all materials in strict accordance with the approved manufacturer's printed instruction, and in accordance with the best trade practices. Each coat shall be reviewed and approved by the Architect before succeeding coats are applied.
- B. Do not apply successive coating until the preceding coat is thoroughly dry, except as otherwise specified, and in no case in less than minimum period of time recommended by manufacturer.

3.4 SURFACE PREPARATION

- A. Upon acceptance of completed existing surfaces, thoroughly remove all dust and debris by sweeping or by vacuum cleaning.

- B. Remove laitance, curing sealers, existing adhesives and other foreign matter from concrete surfaces with necessary techniques such as shot blasting, muriatic acid etching, surface freezing and power scarification.
- C. If a curing compound exists on concrete slab, thoroughly etch concrete surfaces using well mixed solution consisting of two parts by volume water diluted with one part by volume 30 percent commercial grade hydrochloric acid at a rate of one quart per ten square feet. Apply evenly to thoroughly saturated areas and scrub into surfaces using stiff-bristled broom. Allow solution to activate undisturbed for not less than five minutes or for duration of boiling effect.
- D. Thoroughly remove etching solution by washing down surfaces with clean water; flooded at least three separate times at a rate of two gallons per ten square feet; thoroughly remove all contaminants that may be engrained or latent in surfaces.
- E. Perform a test application of a square foot in three locations, such as beneath casework. Allow to set for 72 hours, and test adhesion as recommended by the manufacturer.

3.5 FLOOR SURFACING

- A. Work shall be done only under optimum conditions as recommended by manufacturer. Surfaces over which matrix is to be applied shall be completely dry and thoroughly clean. Substrate and ambient temperature shall be 50 degrees F or above; if below 60 degrees F, temperature must be stable or rising.
- B. Allow surfacing to set undisturbed for a minimum period of 48 hours. Maintain temperature at 50 degrees F minimum until floor surfacing has completely cured.
- C. Finished surfaces shall be uniform in texture and pattern, and level within a degree of tolerance of 1/4 inch in 10'-0" in any direction.

3.6 INSTALLATION

- A. If curing compound exists on substrate, brush or trowel epoxy bonding coat if required by manufacturer based on results of test installations.
- B. System shall be seamless, and installed in accordance with the manufacturer's specifications. Include the following minimum applications:
 - 1. Apply basecoat and broadcast colored quartz aggregate.
 - 2. Allow basecoat to set and remove excess aggregate.
 - 3. After surfacing has cured, apply epoxy top coating uniformly on all surfaces in accordance with manufacturer's instructions.
- C. Apply all coats to floor surfaces, and to cove material 4 inches up on abutting vertical bases, and vertical surfaces of casework and permanent items.
- D. Allow surfacing to set undisturbed for a minimum period of 48 hours. Maintain temperature at 50 degrees F minimum until floor surfacing has completely cured.

3.7 CLEANING

- A. Upon completion of the work in each area, remove all coating splatters from glass, prefinished surfaces, bright metals, and from other surfaces that have not been painted or finished hereunder. Do not use abrasive paper or abrasive cleaner on any prefinished surface or bright metal. Remove all materials and debris; leave work area in a clean condition.

3.8 PROTECTION AND TOUCH-UP

- A. Clean up the work area at end of each work day. Remove all cartons, debris, emptied containers, as the work progresses, and finally at completion of work of this Section Legally dispose of same off the Site.
- B. During application of coatings, protect the work of other trades against undue soilage and damage by the exercise of reasonable care and precautions. Properly clean, repair or replace any work so damaged and soiled.

- C. Protect all finished surfaces against damage until the date of final acceptance of the work. The Architect will conduct a final review of all work performed. Re-coat or touch-up, all scratches and other blemishes on surfaces, and as directed by the Architect, any areas found which do not comply with the requirements of this Section, and bear all costs therefor.
- D. Any re-coating or touch-up work, required after the work of this Section has been reviewed and accepted by the Architect, will be paid for by the Contractor.

END OF SECTION

SECTION 097213
HIGH IMPACT WALL COVERINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. Rigid vinyl sheet wall covering.
- B. Adhesive.

1.2 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract and Division 01 Specification Sections apply to this Section.
- B. Section 016000 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- C. Section 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements for construction and demolition recycling.

1.3 REFERENCES

- A. ASTM D 1308 - Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes; 2007.
- B. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2005.
- C. ASTM G 21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 1996 (Reapproved 2002).
- D. ASTM G 22 - Standard Practice for Determining Resistance of Plastics to Bacteria; 1976 (Reapproved 1996).
- E. CAN/ULC-S102.2 - Standard Method of Test for Surface Burning Characteristics of Flooring, Floor Covering and Miscellaneous Materials and Assemblies; 2003.
- F. SAE J1545 - Instrumental Color Difference Measurement for Exterior Finishes, Textiles, and Colored Trim; Society of Automotive Engineers; 2005.

1.4 SUBMITTALS

- A. See Section 013000 - ADMINISTRATIVE REQUIREMENTS, for submittal procedures.
- B. Product Data: Manufacturer's complete and current product information, including installation instructions showing mounting details and recommended adhesives.
- C. Shop drawings: Show locations of joints, extent of wall covering and installation details. Show methods of attachment to adjoining construction.
- D. Certificate: Submit certification by manufacturer that products to be furnished comply with the requirements of this specification.
- E. Selection Samples: Color charts consisting of actual product pieces, illustrating full range of colors and textures available, for initial color selection.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years documented experience.
- B. Installer Qualifications: Installer specializing in performing the work of this section and approved by manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver to project site in manufacturer's packaging, properly labeled.
- B. Store materials flat in a clean, dry area.

1.7 PROJECT CONDITIONS

- A. Field Measurements: When project conditions permit, take field measurements of areas where assemblies will be located; note discrepancies between drawings and actual dimensions on submitted shop drawings.

1.8 ENVIRONMENTAL REQUIREMENTS

- A. Maintain storage temperature at or above 50 degrees F (10 degrees C).
- B. Acclimatize materials and bring surfaces to receive wall covering to a temperature between 65 and 85 degrees F (18 and 29 degrees C) for not less than 48 hours prior to installation.
- C. Maintain surfaces to receive wall covering at a temperature between 65 and 85 degrees F (18 and 29 degrees C) during installation.
- D. Maintain relative humidity at 80 percent or less during installation.
- E. Do not expose walls to direct sunlight for 48 hours after installation to avoid high temperatures that could cause blistering or distortion.

1.9 MAINTENANCE MATERIALS

- A. See Section 016000 - Product Requirements, for additional provisions.
- B. Provide maintenance materials comprising 5 percent, but not less than two complete sheets of each type of wall covering installed, for use by Owner.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Construction Specialties, www.c-sgroup.com
- B. IPC/InPro Corporation, www.inprocorp.com
- C. Approved equal.

2.2 WALL COVERING, (WP-1 & WP-2):

- A. PVC-Free Thermoplastic, consisting of the following.
 - 1. Basis of Design: Inpro; Product: "Palladium Rigid Sheet" www.c-sgroup.com.
 - 2. Materials: Engineered PETG: Rigid sheet shall be high impact Acrovyn 4000 with nominal .060" (1.52mm) thickness and supplied in 4' x 8' or 10' (1.22m x 2.44m or 3.05m) sheet sizes in Suede texture.
 - 3. Surface Burning Characteristics: Flame spread index of 25 or less; smoke developed index of 450 or less when tested in accordance with ASTM E 84 or CAN/ULC-S102.2 in 0.06 inch (1.5 mm) thickness using adhesive recommended by manufacturer.
 - 4. Self Extinguishing: CC1 classification when tested in accordance with ASTM D 635.
 - 5. Impact Strength: 30.4 ft-lbs/inch of thickness when tested in accordance with ASTM D 256.
 - 6. Chemical and Stain Resistance: Stain resistant when tested in accordance with ASTM D 1308.
 - 7. Fungal and Bacterial Resistance: Demonstrated not to support fungal or bacterial growth by testing in accordance with ASTM G 21 and ASTM G 22.
 - 8. Thickness: .060".
 - 9. Sheet Size: Use the largest sheet size available, minimizing seams.
 - 10. Color: Color as scheduled.
 - 11. Color Consistency: Controlled to Delta E not greater than 1.0, measured in accordance with SAE J1545.

2.3 WALL COVERING, (WP-3):

- A. Basis of Design: IPC/InPro Corporation, www.inprocorp.com
 - 1. Basis of Design Product: Ricochet/Wayfair.
 - 2. Characteristics: *TBD*.

2.4 ACCESSORIES

- A. Adhesives: As recommended or supplied by manufacturer of high impact wall covering.
- B. Sealant: Refer to Section 079200 for tamper-proof caulking.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that walls are in proper condition to receive installation of high impact wall covering.
- B. Verify that environmental conditions specified herein have been achieved and can be maintained.

3.2 PREPARATION

- A. Clean substrate to remove dust, debris and loose particles.

3.3 INSTALLATION

- A. Install high impact wall covering in full compliance with manufacturer's installation instructions; arrange for manufacturer's representative to review installation instructions with installer prior to starting work.
- B. Follow manufacturer's instructions regarding sheet size, use of rolled material, maximum dimension between seams, and adhesive application.
- C. Install panels with expansion gap of 1/16 inch (1.6 mm) between sheets, at door frames, baseboards, and other fixed elements. Cut oversized holes when installing fixtures through wall covering.
- D. Install with vertical seams plumb and horizontal seams level.
- E. Provide special curved cuts as indicated using templates and laser cutting tools.
 - 1. Do not install trim on laser cut curved edges.
- F. Wood grain pattern to be installed in a vertical direction unless otherwise indicated.

3.4 CLEANING

- A. Clean wall covering and accessories of adhesive and other surface blemishes, using materials and methods recommended by manufacturer.

3.5 PROTECTION

- A. Protect installed units after installation from damage from construction operations.
- B. If damage occurs, remove and replace damaged components or entire unit as required to provide unit in its original, undamaged condition.

END OF SECTION

SECTION 097223
HYGENIC WALL COVERINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Hygienic wall covering.

1.2 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract and Division 01 Specification Sections apply to this Section.
- B. Section 016000 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- C. Section 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements for construction and demolition recycling.

1.3 REFERENCES

- A. General: Standards listed by reference, including revisions by issuing authority, form a part of this specification section to extent indicated. Standards listed are identified by issuing authority, authority abbreviation, designation number, title or other designation established by issuing authority. Standards subsequently referenced herein are referred to by issuing authority abbreviation and standard designation.
- B. American Society for Testing & Materials (ASTM):
 - 1. ASTM E 84-05 Standard Test Method for Surface Burning Characteristics of Building Materials. CLASS A.
 - 2. ASTM D5420 Standard Test Method for Impact Resistance of Flat, Rigid Plastic Specimen by Means of a Striker Impacted by a Falling Weight (Gardner Impact)

1.4 SUBMITTALS

- A. Product Data: Submit manufacturer's current printed product literature, specifications, installation instructions, and field reports in accordance with Section 013000 - ADMINISTRATIVE REQUIREMENTS.
- B. Shop Drawings: Submit shop drawings to indicate materials, details, and accessories in accordance with 013000 - ADMINISTRATIVE REQUIREMENTS including but limited to the following:
 - 1. Submit a layout diagram indicating the location of each panel and joining method.
- C. Samples: Submit duplicate sample pieces of Altro Whiterock material, as well as accessory pieces in accordance with Section 013000 - ADMINISTRATIVE REQUIREMENTS.
- D. Quality Assurance Submittals: Submit the following:
 - 1. Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.
 - 2. Manufacturer's Instructions: Current published manufacturer's installation and maintenance instructions.
- E. Samples: For each type of wall covering and for each color, pattern, texture, and finish specified, full width by 36-inch- (914-mm-)long in size.
- F. Informational submittals: Product test reports.
- G. Closeout submittals: Maintenance data.

1.5 DELIVERY, STORAGE & HANDLING

- A. Ordering: Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays.

- B. Deliver, store and handle Altro Whiterock wall panels in accordance with Section 016000 - PRODUCT REQUIREMENTS.
- C. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
- D. Store materials protected from exposure to harmful weather conditions, at temperature and humidity conditions recommended by manufacturer.
- E. Store panels in temperature controlled environments. Leave protective blue film on panel until ready to use.

1.6 PROJECT CONDITIONS

- A. Temperature Requirements: If storage temperature is below 65F (18C), the Altro Whiterock wall panel must be moved to a warmer place and allowed to reach this temperature before installation. For further information, refer to current Installation Guide.
- B. Maintain air temperature and structural base temperature at installation area between 65F (18C) and 80F (26C) for 48 hours before, during and 24 hours after installation.

1.7 WARRANTY

- A. Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to, and not a limitation of, other rights Owner may have under Contract Documents.
- B. Warranty period for product shall be 10 years commencing on Date of Substantial Completion

PART 2 - PRODUCTS

2.1 HYGIENIC WALL COVERING (DESIGNATED AS **WP-3 & WP-4** ON THE DRAWINGS)

- A. Basis of design: Altro, Wilmington, MA, Product: "Altro Whiterock" panel.
 - 1. General: Surface Burning Characteristics: Flame spread/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84.
 - 2. Construction: 100 percent pure homogenous vinyl, extruded, semi-rigid PVC sheet, containing no plasticizers or fillers.
 - 3. Thickness: 0.10 inch (2.5 mm).
 - 4. Panel Width: 4 feet (1.22m).
 - 5. Panel Height: 8 feet (2.5m).
 - 6. Weight: 24 lbs (10.4 kg);
 - 7. Color: As selected by the Architect from the manufacturer's full available range of options and as indicated on the Drawings.

2.2 ACCESSORIES

- A. Vinyl welding rod: Manufacturer's compatible welding rod, other products are not acceptable.
- B. Joint Strips:
 - 1. 1-Part Joint Strip - [G831/25 White] Length 98.5 inches.
 - 2. 1-Part Joint Strip - [G831/30 White] Length 118 inches.
 - 3. 2-Part Joint Strip - [A831/25 White] [A831/25/* Colors] Length 98.5 inches.
 - 4. 2-Part Joint Strip - [A831/30 White] [A831/30/* Colors] Length 118 inches.
- C. Cut-Tile Transition Strips:
 - 1. 1-Part Transition Strip - [G832/25 White] Length 98.5 inches.
 - 2. 2-Part Joint Strip - [A832/25 White] [G831/30/* Colors] Length 98.5 inches.
 - 3. C4 CAP Strip - [C4 CAP White] Length 72 inches.
- D. Start and Edge Trim:
 - 1. 1-Part Start and Edge Trim - [G833/25 White] Length 98.5"
 - 2. 1-Part Start and Edge Trim - [G833/30 White] Length 118"
 - 3. 2-Part Start and Edge Trim - [A833/25 White] [A833/25/* Colors] Length 98.5"
 - 4. 2-Part Start and Edge Trim - [A833/30 White] [A833/30/* Colors] Length 118"

- E. Stainless Steel Accessories:
 - 1. Stainless Steel Corner Protector - A861/12 Brushed Steel] Dimensions: 4" x 2 ½ x 2 ½"
 - 2. 1-Part Stainless Steel Joint Strip - A855 Brushed Steel] Length 7'
 - 3. Stainless Steel Capping - A865 Brushed Steel] Length 8'
 - 4. 18 Gauge Stainless Steel 304 Sheet - W123/20 Brushed Steel] 6'6" X3'3"
 - 5. 18 Gauge Stainless Steel 304 Sheet - W123/25 Brushed Steel] 8'2" X4'
- F. Polyurethane Adhesive: The default adhesive for most installations, suitable for wet area, non-climate controlled areas, and non-absorbent surfaces, a two-part resin-based polyurethane adhesive as recommended by manufacturer.
 - 1. Product: AltroFix W39.
- G. Caulking and Mastic Compounds and Tools:
 - 1. FlexiJoint Coil - [FJ101/white] [FJ* Colors] Length 164 linear feet.
 - 2. FlexiJoint Steel Spacers (engineered steel).
 - 3. Parabond Mastic - [AP600] 10 oz.
 - 4. Mastic Caulking - [A802 White/A803 Clear/A806* Colors] 10.5 oz

PART 3 - EXECUTION

3.1 PREPARATION

- A. Comply with manufacturer's written instructions for surface preparation.
- B. All surfaces must be free from dust and cleaned prior to installation. The working environment must also be dust free. Failure to comply with these conditions will reduce the bond strength between the adhesive and substrate, and may cause the panels to debond.
- C. Very absorbent / porous substrates (particularly plaster finishes and unprimed sheetrock) must have a proprietary sealer e.g. PVA primer or similar, applied to the surface a minimum of 12 hours prior to the installation.
- D. All electrical switches, power points etc., should be in a first fix / installation state. All electrical equipment should only be moved or altered by a qualified electrician.
- E. All plumbing should have pipe-work removed to a first fix or installation state and "tails" left protruding from the substrate. Panels can then be drilled and slid over the pipe tails. All holes should be drilled 1/8 inch (3mm) oversize to allow for expansion, then sealed with AltroMastic caulking. Plumbing should always be done by a qualified plumber.
- F. Hot pipes and steam pipes should be insulated and a 1/8" to 1/4" (3-6mm) expansion gap should be created when installing panels around these pipes, then sealed with AltroMastic caulking.
- G. All pipes, fixing bolts, etc. extending through the panels should have a minimum 1/8 inch (3mm) expansion gap and be sealed using AltroMastic caulking.
- H. If fitting to door frames, these must be in place prior to installation of panels.
- I. Prior to installation, it is advisable to complete any painting which comes in contact with panels as sealant used at junctions is non-paintable.
- J. Panels should be stored flat and be pre-conditioned a minimum of 24 hours in ambient temperatures similar to the prevailing operational conditions.
- K. The panels must be stored on a level flat surface off the ground (risk of condensation on the panels if stored on damp surfaces). Storage on uneven surfaces could cause the panels to distort prior to installation.
- L. First, check the room using a 6 foot (2 m) level to ensure all walls are flat, paying particular attention to the corners, window reveals, and door entrances. These need to be inspected to ensure they are free of any debris or irregularities, which could prevent the panels laying flat to the substrate after the adhesive has been applied and the panel installed.

3.2 INSTALLATION

- A. Hygienic Wall Installation: Install system in strict accordance with the current published Manufacturer's Installation Guide and as additionally detailed on the Drawings. All joints should be joined by approved methods as detailed in the installation guide. Failure to install system in strict accordance with recommended procedures will void the Manufacturer's Limited Product Warranty.

3.3 CLEANING

- A. Surfaces shall be cleaned with a diluted soap/detergent solution, such as Altro 44 Cleaner.
- B. When cleaning the surface, the temperature of water shall not exceed 140° F (60° C).
- C. Pressure cleaning with hot water may be used with the pressure nozzle a minimum of 2 feet (600mm) away from the surface.
- D. To reduce the buildup of static, cleaning the panels with an anti-static solution is recommended.
- E. AltroClean 44 cleaner or equivalent alkaline cleaner shall be used for severe stains.

END OF SECTION

SECTION 098100
ACOUSTICAL INSULATION

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. The work of this Section consists of acoustical insulation where shown on the Drawings, as specified herein, and as required for a complete and proper installation. Work includes, but is not limited to the following.
- B. Furnish and install:
 - 1. Acoustical insulation as scheduled and where indicated on the Drawings.

1.2 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract and Division 01 Specification Sections apply to this Section.
- B. Section 016000 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- C. Section 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements for construction and demolition recycling.
- D. Section 024119 - SELECTIVE DEMOLITION: Removal of existing partitions, walls and related insulation.
- E. Section 061000 - ROUGH CARPENTRY: Wood blocking, nailers.
- F. Section 092216 - NON-STRUCTURAL METAL FRAMING.
- G. Section 092900 - GYPSUM BOARD: Installation of wall board over acoustical insulation.
- H. Division 23 - HEATING, VENTILATING AND AIR CONDITIONING: Ductwork and piping insulation.

1.3 REFERENCES

- A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 014200 - References. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. ASTM C 518 - Thermal Transmission Properties by Means of the Heat Flow Meter.
 - 2. ASTM C 553 - Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.
 - 3. ASTM C 665 - Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
 - 4. ASTM E 84 - Surface Burning Characteristics of Building Materials.
 - 5. ASTM E 96 - Water Vapor Transmission of Materials.

1.4 SUBMITTALS

- A. Information and Review Submittals: Submit the following under provisions of Section 013000 - ADMINISTRATIVE REQUIREMENTS:
 - 1. Product Data: Manufacturer's product data sheets, specifications, performance data, physical properties for each item furnished hereunder.
 - 2. Certificates:
 - a. Provide manufacturer's written certification of recycled slag content in mineral wool insulation.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Delivery and Acceptance Requirements:
 - 1. Deliver materials in original packages, containers or bundles bearing brand name and identification of manufacturer or supplier.

2. Do not deliver items to the site, until all specified submittals have been submitted to, and approved by, the Architect.
- B. Storage and Handling Requirements:
1. Store materials under cover and in manner to keep them dry, protected from weather, direct sunlight and damage from construction traffic and other causes.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering similar products include the following:
1. Acoustical mineral fiber insulation:
 - a. Fibrex Insulations Inc., Sarnia, Ontario
 - b. Thermafiber Inc., Wabash, IN.
 - c. Roxul, Inc., Milton, Ontario. (formerly Rock Wool Manufacturing Company).

2.2 MATERIALS

- A. Acoustical batt insulation: Mineral wool fiber insulation batts, conforming to ASTM C665 Type 1, and ASTM C553 with a nominal density of 2.5 pounds per cubic foot, nominally 3-1/2 inches thick unless otherwise noted in the Drawings.
1. Flame Spread Classification: Class A (less than 25, per testing by NFPA 255, ASTM E-84 or UL 723).
 2. Recycled content of slag in mineral wool insulation: Use maximum available percentage of material (slag). Mineral wool insulation products incorporated into the work shall contain not less than 75 percent of recycled material (slag) by weight.
 3. Acceptable products include:
 - a. Fibrex Insulations Inc. product: "Fibrex Sound Attenuation Fire Batt (SAFB)".
 - b. Roxul, Inc., product "Roxul AFB".
 - c. Thermafiber, Inc. product "Thermafiber SAFB".
- B. Staples, tape, adhesives and fasteners required for the proper and complete installation for work of this Section shall be as recommended by each respective manufacturers of each insulation type.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install insulation in accordance with insulation manufacturer's instructions.
- B. Install in interior walls, and ceiling spaces where indicated. Trim insulation neatly to fit spaces. Fit insulation tight in spaces. Leave no gaps or voids.

3.2 CLEANING

- A. Daily clean work areas by sweeping and disposing of debris and scraps.
- B. Upon completion of the work of this Section in any given area, remove tools, equipment and all rubbish and debris from the work area; leave area in broom-clean condition.

END OF SECTION

SECTION 099100
PAINTING AND COATING

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Section Includes: This Section consists of painting work where shown on the Drawings, as specified herein, and as required for a complete and proper installation. Painting work includes, but is not limited to, the surface preparation and application of coated finishes, and subsequent touch-up, of interior items and surfaces as indicated on the Contract Drawings and as scheduled herein.
- B. Surfaces and Materials: In general, without limiting the generality thereof, the following surfaces, fixtures and equipment require a painted finish:
 - 1. New, existing and repaired gypsum board partition and wall surfaces, ceilings and soffits, including all surfaces disrupted and repaired in the process of installing new building systems and components.
 - 2. New and existing metal doors and frames.
 - 3. New and existing interior wood trim.
 - 4. Access panels and frames.
 - 5. Other items noted on the Drawings.
- C. DO NOT PAINT the following surfaces and materials.
 - 1. Concealed from view surfaces, except as indicated otherwise in the Contract Documents or as specified herein.
 - 2. Chrome or nickel plating, stainless steel, bronze, brass.
 - 3. Aluminum other than mill finished or factory primed.
 - 4. Factory finished mechanical and electrical equipment, pumps, machinery and similar items which occur in mechanical, storage or equipment rooms or areas.
 - 5. Factory finished materials, specialties, and accessories unless otherwise specified.
 - 6. Ceramic tile, acoustical tile, resilient flooring, and other integrally finished floor, wall and ceiling finishes.
 - 7. Prefinished millwork items.
 - 8. Fire resistant testing and certification labels, code required labels, safety warning labels, performance rating plates, nomenclature plates, identification plates, and similar other labels.

1.2 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract and Division 01 Specification Sections apply to this Section.
- B. Section 016000 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- C. Section 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements for construction and demolition recycling.
- D. Section 017329 - CUTTING AND PATCHING: Procedural and administrative requirements for cutting and patching.
- E. Section 024100 - DEMOLITION: Removal of existing finishes.
- F. Section 062000 - FINISH CARPENTRY: Wood trim items, setting and filling of nails, sanding of wood trim.
- G. Section 079200 - JOINT SEALANTS: Requirements for sealant and backing materials.
- H. Section 081113 - HOLLOW METAL DOORS AND FRAMES: Shop priming of metal frames and steel doors.

- I. Section 083100 - ACCESS DOORS AND PANELS: Shop primed access panels, occurring in partitions and walls.
- J. Section 092900 - GYPSUM BOARD: Drywall partitions, ceilings and soffits, including joint treatment and sanding.
- K. Section 099123 - INTERIOR PAINTING SCHEDULE.
- L. Section 104400 - FIRE PROTECTION SPECIALTIES: Shop priming of cabinet doors and frames; shop finishing of cabinet.
- M. Division 22 - PLUMBING: Prefinished items such as plumbing fixtures, sprinkler heads, convectors, anemostates and similar surfaces and materials.
- N. Division 26 - ELECTRICAL: Prefinished items such as light fixtures, switch gear, electrical distribution cabinets and similar surfaces and materials.

1.3 REFERENCE STANDARDS

- A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 014200 - REFERENCES. The standards referenced herein are included to establish recognized minimum quality only. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern. Equivalent quality and testing standards will be acceptable, subject to their timely submission, review and acceptance by the Architect.
 - 1. All applicable federal, state and municipal codes, laws and regulations for flammability and smoke generation of interior finishes.
 - 2. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications; 2016.
- B. Definitions:
 - 1. "Paint" includes coating systems materials, primers, emulsions, enamels, stains, sealers and fillers, and other applied materials specified herein, whether used as prime, intermediate or finish coats.
 - 2. Sheen: Specular gloss readings in accordance with ASTM D16.
 - a. Flat: less than 5 (measured at 85 degrees).
 - b. Eggshell: 5 - 20 (measured at 60 degrees).
 - c. Satin: 15-35 (measured at 60 degrees).
 - d. Low Luster: 25 - 35 (measured at 60 degrees).
 - e. Semi-Gloss: 30 -65 (measured at 60 degrees).
 - f. Gloss: 65 or more (measured at 60 degrees).

1.4 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
 - 1. Literature: Manufacturer's product data sheets, specifications, performance data, physical properties, material compositions, and application instructions for all finishing products to be applied hereunder.
 - a. Include certification of data indicating Volatile Organic Compound (VOC) content of all paint materials.
 - 2. Samples:
 - a. Manufacturer's color selector for custom mixed colors for Architect's color scheduling.
 - b. Opaque coatings: Two 9 x 12 inch finished samples on hardboard of each color scheduled in each finish for review and approval. Identify boards with finish type, color mix number and scheduled substrate surfaces or materials.
 - c. Transparent finishes and stains: Two 9 x 12 inch finished samples on same species of solid wood and plywood to be furnished under Section 062000 - Finish Carpentry, of each color scheduled in each finish for review and approval. Identify boards with finish type, color mix number and scheduled substrate surfaces or materials.
- B. Submit the following under provisions of Section 017800 - CLOSEOUT SUBMITTALS:

1. Color chips: After final approval of all colors and tints by the Architect, submit to the Owner, color chips of all coatings used, with manufacturer's name and mix designation of the coating for the purpose of future re-ordering of coatings. Color chips shall be at least six (6) square inches in size, for each color and tint.

1.5 QUALITY ASSURANCE

- A. Applicator Qualifications: Company specializing in performing the type of work specified with minimum three documented years experience.
- B. Single Source Responsibility: Provide primers and other undercoat paint produced by same manufacturer as finish coats. Use only thinners approved by paint manufacturer, and use only within recommended limits.
- C. Environmental Requirements for Volatile Chemicals:
 1. For interior applications use paints and coatings that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA method 24) and the following chemical restrictions:
 - a. Flat Paints and Coatings: VOC not more than 50 g/L.
 - b. Non-Flat Paints and Coatings: VOC not more than 150 g/L.
 - c. Anti-Corrosive Coatings: VOC not more than 250 g/L.
 - d. Clear wood finishes:
 - 1) Varnishes: VOC not more than 350 g/L.
 - 2) Lacquer: VOC not more than 550 g/L
 - e. Floor coatings: VOC not more than 100 g/L
 - f. Sealers:
 - 1) Waterproofing sealers: VOC not more than 250 g/L.
 - 2) Sanding sealers: VOC not more than 275 g/L.
 - 3) All other sealers: VOC not more than 200 g/L.
 - g. Stains: VOC not more than 250 g/L.
 2. Do not use water based paints formulated with aromatic hydrocarbons (organic solvent with a benzene ring in its molecular structure), formaldehyde, halogenated solvents, mercury or mercury compounds, or tinted with pigments of lead, cadmium, chromium VI and their oxides. Water based paints shall be low VOC and shall have a flash point of 61 degrees C or greater.
 3. Where it is necessary to use solvent-based paints, with less than 1.0 percent by weight total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).
 4. The following shall be low VOC and not be formulated with aromatic hydrocarbons (organic solvent with a benzene ring in its molecular structure).
 - a. High performance water based acrylic coatings.
 - b. Pigmented acrylic sealers.
 - c. Catalyzed epoxy coatings.
 - d. High performance silicone grafted epoxy coatings.
 5. Restricted Components: Paints and coatings used on this Project shall not contain any of the following compounds. (Excluded from this restriction are residual quantities of naturally occurring elements and chlorinated organics which are found in chlorinated water supplies; contaminate levels shall be below that of the National Primary Drinking Water Standard):
 - a. 1,2-dichlorobenzene
 - b. Alkylphenol ethoxylates (APEs)
 - c. Formaldehyde-donors
 - d. Heavy metals, including lead, mercury, cadmium, hexavalent chromium and antimony in the elemental form or compounds
 - e. Phthalates
 - f. Triphenyl tins (TPT) and tributyl tins (TBT).

1.6 FIELD SAMPLES

- A. Provide field samples under provisions of Section 014000 - QUALITY REQUIREMENTS for purpose of verifying selected colors.
- B. Paint on-site sample areas, minimum 40 square feet, illustrating selected color, and tint.
- C. Locate samples where directed. The Contractor shall provide in the base Contract, a total amount of samples equal to one sample per room.
- D. Accepted samples may remain as part of the work.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site in sealed and labeled containers; container labeling shall include manufacturer's name, type of paint, color mix designation, expected coverage, surface preparation instructions, instructions for mixing and reducing, drying time, and clean-up recommendations.
- B. Store materials, conforming with applicable codes and fire regulations, in designated spaces. Keep storage area secure when direct access is not required or when not performing work under this Section. Take precautionary measures to prevent fire hazards and spontaneous combustion, maintain a dry-chemical type fire extinguisher in all areas where materials of this Section are being stored or used.
- C. Store paint materials in a well ventilated area at minimum ambient temperature of 45 degrees Fahrenheit and a maximum of 90 degrees Fahrenheit.
- D. Do not use the sanitary system for mixing or disposal of refuse material. Carry water to mixing rooms and dump waste material in a suitable refuse receptacle. Remove oily rags and waste each day.

1.8 PROJECT CONDITIONS

- A. Provide continuous ventilation and heating facilities to maintain surface and ambient temperatures above 45 degrees Fahrenheit for 24 hours before, during and 48 hours after application of finishes, unless required otherwise by manufacturer's instructions.
- B. Apply paints and finishes above minimum temperature conditions in strict accordance with manufacturer's instructions.
- C. Provide sufficient lighting to maintain 80 foot-candles measured mid-height at substrate surface.

1.9 SEQUENCING AND SCHEDULING

- A. The applicator of work specified herein is responsible to ensure that all paints, enamels, and coatings, proposed to be applied hereunder, are compatible with coatings used for shop-primed items and items which have been prime-coated under the work of other trades.
- B. Immediately notify the Architect in writing of conditions which may require a change in the specifications of this Section before proceeding with the work. Failure to do so, in a timely fashion, so as not to interfere with the schedule of work of this Contract, shall be construed as acceptance of the coatings specified. Perform all corrective measures, at no cost to the Owner, for any defects in the work, resulting from the use of such materials.
- C. Painting work should be scheduled so as to minimize touch-ups. Interior painting is to be without flashmarks. Should flashmarks occur due to touch-ups, the Contractor shall be required to redo the entire surrounding wall surface.
- D. Do not order materials until all required schedules have been properly submitted, reviewed by the Contractor and Approved by Architect.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - 1. Paints and general finishes, stains and clear finishes for wood:
 - a. Basis of Design: Benjamin Moore & Company, Montvale, NJ.

2.2 PAINTS AND COATINGS - GENERAL

- A. Paints and Coatings: Ready mixed, except for field catalyzed coatings with good flow and brushing properties; capable of drying or curing free of streaks or sags. Color pigments shall be processed to a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating. Provide best quality grade, where manufacturer makes more than one grade of any material specified.

2.3 ACCESSORIES

- 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. Cleaning Materials: Tri-Sodium Phosphate (TSP) substitute. Acceptable products include the following, or approved equal:
 - 1. Savogran, Norwood MA, products "TSP-PF", or "Liquid TSP Substitute".
 - 2. Custom Building Products, Seal Beach, CA., product "Custom T.S.P. Substitute".
 - 3. DAP Inc., Baltimore MD., product "T.S.P. Substitute Heavy Duty Cleaner".

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Inspect all surfaces and verify that they are in proper condition to receive the work of this Section. Notify Contractor of any condition that may potentially affect proper application of coatings.
- B. Measure moisture content of surfaces, do not apply finishes unless moisture content of surfaces are below the following maximums:
 - 1. Gypsum board and joint treatment: 12 percent.
 - 2. Portland Cement plaster: 15 percent.
 - 3. Masonry or concrete: 12 percent.
 - 4. Interior wood: 15 percent.
- C. Beginning Work of this Section means acceptance of existing substrate surfaces and site conditions.

3.2 PREPARATION

- A. Furnish and lay suitable drop cloths in all areas where coating work is being done to protect floors and all other surfaces from damage during the work. Protect adjoining surfaces with painters mask tape.
- B. Prior to preparing surfaces or finishing, remove all finish hardware for painting doors and frames, except hinges and locks on exterior door; remove electrical plates, light fixture trim and fittings. Re-install hardware and other removed items after painted surfaces are thoroughly dry.
- C. Mix coatings thoroughly, unless otherwise directed by the manufacturer of the specific coating used, to ensure uniformity of color and mass. Strain previously opened coatings to remove skins, lumps, and other foreign matter prior to painting.
- D. Thin or reduce materials only as recommended by the specific material manufacturer, and only with the approval of the Architect.

- E. Impervious surfaces: Remove mildew by scrubbing with solution of tri-sodium phosphate and bleach. Rinse with clean water and allow surface to thoroughly dry.
- F. Previously painted surfaces to receive wall covering:
 - 1. Sand with 320 grit waterproof paper until surfaces are uniformly abraded.
- G. New interior wood items scheduled to receive paint finish.
 - 1. Smooth minor defects and remove all foreign matter by sanding, and if necessary, steel wool.
 - 2. Wash sap spots and knots with mineral spirits. When dry, touch up knots, pitch streaks, and sappy sections with commercial stain sealer.
 - 3. Fill up nail holes and cracks with wood putty or plastic wood after primer of first coat of finish is dry, and sand smooth.
- H. Existing interior wood items scheduled to receive paint finish.
 - 1. Smooth minor defects by sanding. Remove all foreign matter with mineral spirits and fine sandpaper or steel wool.
 - 2. Touch up knots and pitch streaks with commercial stain sealer.
 - 3. Fill up nail wood defects, chips in layers of paint, and cracks with spackle. Ease edges of existing paint by application of spackle and sanding smooth.
- I. Gypsum board surfaces, new and existing: Fill minor defects with latex based spackle. Spot-seal all compound surfaces and repair areas in gypsum board, with specified first coat material before application of the first coat.

3.3 APPLICATION

- A. Apply all materials in strict accordance with the approved manufacturer's printed instruction, and in accordance with the best trade practices. Each coat shall be reviewed and approved by the Architect before succeeding coats are applied.
- B. Do not apply successive coating until the preceding coat is thoroughly dry, and in no case in less than 24 hours after the preceding coat.
- C. Number of coats is indicated under Painting Schedules. Number of coats is indicated as a minimum number to be applied over scheduled substrates. An additional coat or coats may be required for proper color coverage of substrate as determined by the Architect, at no additional cost to the Owner. Examples of these conditions include, but are not limited to:
 - 1. Dark colored substrates may require an additional primer or intermediate coat to stabilize color, if final applied top-coat color is light.
 - 2. Pre-finished or pre-primed products may require an additional field applied coat to stabilize the shop/factory applied base color prior to application of top-coat finishes.
 - 3. Dark color top coat finishes may require additional finish coat over white or light colored substrates to obtain correct color density.
- D. Apply each coat to a uniform finish; Apply primer and first coat of slightly lighter in color tint than the scheduled color of the final coat.
- E. Sand lightly between coats to achieve required finish and remove sanding dust prior to applying succeeding coat.
- F. Where clear finishes are required, tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.
- G. Prime back surfaces of all interior and exterior woodwork scheduled for painted finish with primer.
- H. Prime back surfaces of interior woodwork scheduled to receive stain or varnish finish with gloss varnish reduced 25 percent with mineral spirits.

3.4 CLEANING

- A. Upon completion of the work in each area, remove all coating splatters from glass, prefinished surfaces, bright metals, and from other surfaces that have not been painted or finished

hereunder. Do not use abrasive paper or abrasive cleaner on any prefinished surface or bright metal. Remove all materials and debris; leave work area in a clean condition.

3.5 PROTECTION AND TOUCH-UP

- A. During painting work, protect the work of other trades against undue soilage and damage by the exercise of reasonable care and precautions. Properly clean, repair or replace any work so damaged and soiled.
- B. Protect all painted and finished surfaces against damage until the date of final acceptance of the work. The Architect will conduct a final review of all work performed hereunder. Re-coat or touch-up, all scratches and other blemishes on surfaces, and as directed by the Architect, any areas found which do not comply with the requirements of this Section, and bear all costs therefore.
- C. Any re-coating or touch-up work, required after the work of this Section has been reviewed and accepted by the Architect, will be paid for by the Contractor.

3.6 PAINTING SCHEDULE

- A. Colors: The Architect will furnish a schedule of colors for each area and surface. Tinting and matching shall be to the satisfaction of the Architect. No limit is placed on the number of colors that may be required, or the number of colors in any one room, area, or surface. Premium paints of deep-hued, bright, pigment intensive, accent and primary colors may be scheduled for up to 25 percent of all interior and exterior surfaces without additional cost to the Owner.
 - 1. Colors of priming coats (and body coats where specified) shall be lighter in tint than those of finish coat.
 - 2. Colorants: Pure, non-fading pigments, mildew-proof, ultra-violet resistant, finely ground in approved medium; and be limeproof, when used in coatings to be applied on masonry, concrete, plaster, and gypsum board surfaces.
- B. Paint schedule for interior surfaces and materials: Refer to Section 099123 - INTERIOR PAINTING SCHEDULE.

END OF SECTION

SECTION 099113
EXTERIOR PAINTING SCHEDULE

GENERAL PROVISIONS

- 1.1 GENERAL: NUMBER OF COATS SCHEDULED HEREIN BELOW IS MINIMUM REQUIRED, REFER TO ARTICLE ENTITLED "APPLICATION" IN SPECIFICATION SECTION 099100 - PAINTING, REGARDING COVERAGE.
- 1.2 PAINTING SCHEDULE FOR EXTERIOR SURFACES AND MATERIALS
 - A. Exterior METAL, FERROUS, new, shop primed and existing:
 1. One coat rust inhibitive primer. (touch up bare metal at existing and shop primed surfaces).
 - a. Moore: "Universal Metal Primer" N°. P07.
 - b. Pittsburgh: "Speedhide Industrial Rust Inhibitive Primers", 7-852 Series .
 - c. Sherwin-Williams: "Kem Kromik Universal Metal Primer", B50Z Series.
 2. Two coats acrylic gloss enamel:
 - a. Moore: "Acrylic Gloss Enamel", N°. P28
 - b. Pittsburgh: "Pitt-Tech DTM Exterior Waterborne High Gloss Enamel", 90-300 Series.
 - c. Sherwin-Williams: "DTM Acrylic Gloss", B66 Series
 - B. Exterior METAL, RAILINGS, galvanized (handrails and guardrails) to receive high gloss finish:
 1. Touch-up cold galvanizing paint.
 2. One coat of epoxy primer (dry film coat 3.0 to 4.0 mils)
 - a. Moore: "Superspec HP Epoxy Metal Primer", P33 Series.
 - b. Pittsburgh: "Aquapon WB Epoxy Metal Primer", 98 Series
 - c. Sherwin-Williams: "Heavy Duty Epoxy", B67 Series / B60 V 3 @ 3 mils DFT.
 3. Two coats of gloss finish epoxy coating (dry film coat 1.5 to 2.0 mils).
 - a. Moore: "Superspec HP Aliphatic Acrylic Urethane", P74 Series.
 - b. Pittsburgh: "Pitt-Thane Ultra Urethane Enamel", 95-812 Series.
 - c. Sherwin-Williams: "Hi-Solids Polyurethane-Low VOC", B65 Series/B60 V 30 @ 3.5 mils DFT.

END OF SECTION

SECTION 099123
INTERIOR PAINTING SCHEDULE

PART 1 - GENERAL

- 1.1 GENERAL: NUMBER OF COATS SCHEDULED HEREIN BELOW IS MINIMUM REQUIRED, REFER TO ARTICLE ENTITLED "APPLICATION" IN SPECIFICATION SECTION 099100 - PAINTING, REGARDING COVERAGE.

PART 2 - PRODUCTS

2.1 PAINTING SCHEDULE FOR INTERIOR SURFACES AND MATERIALS

- A. Interior underside of metal decking, exposed to view joists, overhead steel, sprinkler piping, conduits, ducts and similar items:
 - 1. Two coats acrylic dry fall finish:
 - a. Basis of Design: Benjamin Moore: Dryfall Latex Flat No 395.
- B. Interior gypsum board (drywall) partitions and walls, previously painted:
 - 1. Two coats eggshell paint:
 - a. Benjamin Moore: Regal Select Pearl No 550.
- C. Interior gypsum board (drywall) partitions, including toilet rooms:
 - 1. One coat latex primer:
 - a. Basis of Design: Benjamin Moore: Super Spec Undercoater and Primer Sealer No 253.
 - 2. Two coats pearl paint:
 - a. Basis of Design: Benjamin Moore: Regal Select Pearl No 550 .
- D. Interior gypsum board (drywall) partitions, ceilings, janitor's closets, soiled rooms, housekeeping rooms, food preparation and dishwashing areas for VOC compliant epoxy finish:
 - 1. One coat of primer sealer:
 - a. Benjamin Moore: Super Spec Undercoater and Primer Sealer No 253.
 - 2. Two coats (3 mils DFT each coat).
 - 3. Benjamin Moore: Corotech Pre-Cat Epoxy Eggshell No V341.
- E. Interior gypsum board (drywall) ceilings and underside of soffits, previously painted:
 - 1. Two coats flat paint:
 - a. Benjamin Moore: Ultra Spec 500 Flat No N536
- F. Interior gypsum board (drywall) ceilings and underside of soffits:
 - 1. One coat latex primer:
 - a. Benjamin Moore: Super Spec Undercoater and Primer Sealer No 253.
 - 2. Two coats flat paint:
 - a. Benjamin Moore: Ultra Spec 500 Flat No N536
- G. Interior metal, ferrous, excluding railings, to receive semi-gloss finish: (includes existing metal doors and frames):
 - 1. One coat of rust prohibitive primer for unfinished metal surfaces, and touch up bare metal at shop primed, existing and previously coated surfaces:
 - a. Benjamin Moore: Ultra Spec HP Acrylic DTM Low Lustre No HP25.
 - 2. Two coats:
 - a. Benjamin Moore: Ultra Spec 500 Semi-gloss No N539.
 - b. All new metal surfaces must be thoroughly cleaned with an Oil and Grease Emulsifier Corotech V600 to remove contaminants. New shiny non-ferrous metal surfaces that will be subject to abrasion should be dulled with very fine sandpaper or synthetic steel wool pad to promote adhesion.
- H. Interior metal, railings, (handrails and guardrails) to receive aliphatic acrylic polyurethane finish:
 - 1. First coat, epoxy undercoat:
 - a. Benjamin Moore: Corotech Polyamide Epoxy Primer No V150.

2. Second coat, high gloss aliphatic acrylic polyurethane coating:
 - a. Benjamin Moore: Corotech Aliphatic Acrylic Urethane No V500.
- I. Interior wood trim and other miscellaneous items, new, unfinished, to receive painted (Opaque) finish:
 1. One coat acrylic primer-sealer (undercoater):
 - a. For non-bleeding woods use Benjamin Moore Fresh Start Multi-Purpose Acrylic Primer No N023 or Fresh Start High-Hiding All-Purpose Primer No N046.
 - b. For Bleeding Woods, (ie.: redwood and cedar) use Benjamin Moore Fresh Start Multi-Purpose Alkyd Primer No 024
 2. Two coats:
 - a. Benjamin Moore: Ultra Spec 500 Semi-Gloss No N539.

2.2 PAINTING SCHEDULE FOR FIRE RESISTIVE AND RATED DESIGNATIONS

- A. In compliance with Section 703.6 of the 2009 International Building Code, and as additionally specified herein, provide identification for all fire walls, fire barriers, fire partitions, smoke barriers and smoke partitions and any other wall or partition which is required to have protected openings or penetrations.
 1. Application:
 - a. Apply to outside of fire rated shafts, and to both sides of partitions at intervals not to exceed 30'-0" for entire length of partition or wall, or once on any partition 30'-0 feet or less in length.
 - b. Locate identification in all accessible concealed floor, floor-ceiling and attic spaces. Locate identification within 12 to 18 inches above finished ceilings.
 - c. Apply stenciled lettering by spray or brush, or provide permanent signage.
 - 1) Identification shall be waterproof, fade-proof and non-combustible. Signage shall be mechanically fastened or permanently adhered to partition.
 - 2) Stencil character height: 1 inch minimum.
 - 3) Color: Easily identifiable color, contrasting with background, acceptable to (a) Owner.
 - d. Apply stenciled lettering to the following types of partitions using wording specified:
 - 1) Applied identification for 2 hour fire rated partitions shall read: "2 HOUR FIRE WALL - PROTECT ALL OPENINGS".
 - 2) Applied identification for 1 hour fire rated partitions shall read: "1 HOUR FIRE WALL - PROTECT ALL OPENINGS".
 - 3) Applied identification for Smoke barriers shall read: "1 HOUR SMOKE BARRIER (a) - PROTECT ALL OPENINGS".
 - 4) Applied identification for Smoke partitions shall read: "SMOKE BARRIER PARTITION - PROTECT ALL OPENINGS".

2.3 PAINTING SCHEDULE FOR MECHANICAL AND ELECTRICAL EQUIPMENT

- A. Refer to ID Sheets for painting of VAC registers, access panel, fire extinguisher cabinets, electrical panels, and other similar items.
- B. Paint dampers exposed behind louvers, grilles, and convector and baseboard cabinets to match face panels.
- C. Remove unfinished louvers, grilles, covers and access panels on and paint as scheduled above.
- D. Plywood backboards for electrical panels and other equipment. Paint both front and back surfaces and all edges of plywood backboards before backboards are installed.
 1. One coat latex primer-sealer (undercoater):
 - a. Benjamin Moore: Ultra Spec 500 Primer No N53400.
 2. Two coats fire retardant paint:
 - a. Benjamin Moore: Insl-X Fire Retardant Paint No FR110.

UNIVERSITY OF VERMONT MEDICAL CENTER
Outpatient Surgery Center
South Burlington, VT 05403

E4H Environments for Health Architecture
Project No. 2021073
January 27, 2023

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 101124
TACKABLE WALL SYSTEMS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Site-fabricated, fabric-covered tackable wall system.
- B. Accessories as required for complete installation.

1.2 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract and
- B. Division 01 Specification Sections apply to this Section.
- C. Section 016000 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- D. Section 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements for construction and demolition recycling.
- E. Section 061000 - ROUGH CARPENTRY: Wood blocking, and nailers.
- F. Section 092900 - GYPSUM BOARD: Gypsum drywall substrate.

1.3 REFERENCE STANDARDS

- A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 014200 - REFERENCES.
 - 1. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2016.
 - 2. ASTM C 209 - Test Methods for Cellulosic Fiber Insulating Board.
 - 3. ASTM C 518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
 - 4. ASTM D 1037 - Test Methods of Evaluating Properties of Wood-Base Fiber and Particle Panel Materials.
 - 5. UL listed, File R16381.

1.4 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide list of items proposed to be provided under this Section. Include manufacturer's specifications, installation instructions, and other data needed to demonstrate compliance with specified requirements.
- C. Shop Drawings: Provide Shop Drawings in sufficient detail to show fabrication, layout, installation, anchorage, and interface of the work of this Section with the work of adjacent trades.
- D. Samples: Fabric, 300 by 300 mm (six by six inches).

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
- B. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
- C. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.

1.6 SITE CONDITIONS

- A. Temperature: Maintain ambient temperature above 55 degrees Fahrenheit for 5 calendar days before, and during installation of architectural woodwork; maintain temperature after installation until Owner's Final Acceptance.
- B. Relative Humidity: Maintain a relative humidity between 25 and 55 percent for a minimum period of 5 calendar days before, and during, installation of architectural woodwork: maintain relative humidity after installation until Owner's Final Acceptance.

PART 2 - PRODUCTS

2.1 TACKABLE WALL SYSTEM

- A. Site-installed stretched fabric over tackable core and continuous perimeter and intermediate mounting extrusions applied directly to wall surface.
 - 1. Tackable Substrate:
 - a. Specified Manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Homasote, West Trenton, NJ, <http://www.homasote.com>.
 - b. Molded, 98% recycled post-consumer paper, cellulose fiber structural panel with kerfing on the underside, consisting of the following physical characteristics:
 - 1) Thickness: 1/2 inch (13 mm).
 - 2) Density: 26-28 pcf (416-448 kg/cu. m) tested in accordance with ASTM C 209.
 - 3) Tensile Strength: When tested in accordance with ASTM C 209:
 - (a) Parallel: 450-700 psi (3,100-4,830 kPa).
 - (b) Transverse: 750-1000 psi (5.1171-6.894 kPa).
 - 4) Hardness (Janka Ball): 230 lbs (104 kg) tested in accordance with ASTM D 1037.
 - 5) Water Absorption by Volume: When tested in accordance with ASTM C 209:
 - (a) 2 hour immersion: 7 percent maximum.
 - 6) Expansion: 50 to 90 percent relative humidity, 0.25 percent in accordance with ASTM C 209.
 - 7) Thermal Resistance: When tested in accordance with ASTM C 209 per ASTM C 518:
 - (a) R-value: 1.2 for 1/2 inch (13 mm) thick board.
 - (b) K-value: .512 Btu-in/ (h ft² °F).
 - (c) Noise reduction coefficient (NRC): 0.20
 - B. Fabric:
 - 1. Specified Manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Maharam, product "Tek-Wall" in color selected by Architect, unless otherwise noted on the Drawings.
 - 2. Criteria:
 - a. Weight: 12 oz/linear yard.
 - b. Backing: Acrylic.
 - c. ASTM E84 Class A / Class 1.
 - d. Meets Laboratory (UL) 1286 Flammability Requirements for Office Furnishings.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Beginning of installation means acceptance of existing substrate.
- B. Compliance: Comply with manufacturer's product data, including product technical bulletins, product catalog installation instructions, and product carton instructions for installation. Use concealed fasteners.

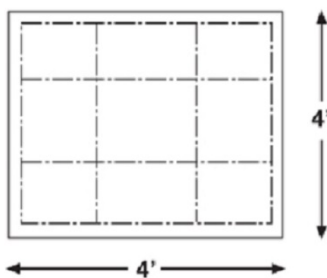
- C. Site Verification of Conditions: Verify substrate conditions (which have been previously installed under other sections) are acceptable for product installation in accordance with manufacturer's instructions (bond testing, etc.). Inspect surfaces and related construction to receive units. Partitions shall have reinforcing to receive fasteners. Verify type and placement of reinforcement.
- D. Material Inspection: In accordance with manufacturer's installation requirements, visually inspect materials prior to installation. Material with visual defects shall not be installed and shall not be considered as a legitimate claim.
- E. Verify that internal wall blocking or reinforcing plate blocking is ready to receive work of this Section.
- F. Verify that wall surfaces are true and plumb and are prepared and ready to receive boards.
 - 1. Substrate shall be sound, smooth, flat, permanently dry, clean, and free of all foreign materials including, but not limited to, dust, paint, grease, oils, solvents, curing and hardening compounds, sealers, asphalt and old adhesive residue.
- G. Do not proceed with the installation until reinforcement is in place and surfaces are flat.

3.2 PREPARATION

- A. Follow manufacturer's instructions by separating and allowing panels to be exposed to environmental temperature and humidity conditions for not less than 24 hours before start of installation.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install only clean dry panels. Do not install wet panels.
- C. Floor Panel Installation: Space panel joints 3/16 inch (5 mm) apart; 3/8 inch (10 mm) space at walls and partitions. Stagger joints. See manufacturer's installation procedures for specific finish floor systems.
- D. Gluing pattern:



**GLUING PATTERN
GRID-SIDE TO FLOOR**

- A. Concrete floor must be clean, dry and free of moisture issues such as sweating. A vapor barrier must be used with new concrete subfloors. Areas such as basements and other below grade installations must be moisture free. Any moisture sources and or problems must be addressed prior to the installation of the product.

3.4 CLEANING

- A. Clean exposed surfaces of tackable wall system, complying with manufacturer's instructions for cleaning and repair of minor finish damage. Remove and replace work that cannot be

successfully cleaned and repaired to permanently eliminate evidence of damage prior to Substantial Completion.

3.5 PROTECTION

- A. Protect installed product and finish surfaces from damage until completion of project.

END OF SECTION

SECTION 102113.17
PHENOLIC TOILET COMPARTMENTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Phenolic toilet compartments.
- B. Urinal screens.

1.2 RELATED REQUIREMENTS

- A. Section 055000 - Metal Fabrications: Concealed steel support members.
- B. Section 061000 - Rough Carpentry: Blocking and supports.
- C. Section 102813 - Toilet Accessories.

1.3 REFERENCE STANDARDS

- A. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.
- B. NFPA 286 - Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth; 2015.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Coordinate the work with placement of support framing and anchors in walls and ceilings.

1.5 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on panel construction, hardware, and accessories.
- C. Shop Drawings: Indicate partition plan, elevation views, dimensions, details of wall supports, door swings.
- D. Sample: Submit one sample of partition panels, at least 12 by 12 inch (305 by 305 mm) in size illustrating panel finish, color, and sheen.
- E. Manufacturer's Installation Instructions: Indicate special procedures.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Phenolic Toilet Compartments:
 - 1. All American Metal Corp - AAMCO: www.allamericanmetal.com/#sle.
 - 2. ASI Accurate Partitions: www.asi-accuratepartitions.com/#sle.
 - 3. Partition Systems International of South Carolina: www.psisc.com/#sle.
 - 4. Substitutions: Section 016200 - Product Substitutions.

2.2 PHENOLIC TOILET COMPARTMENTS

- A. Toilet Compartments: Factory fabricated doors, pilasters, and divider panels made of solid phenolic core panels with integral melamine finish, floor-mounted unbraced.
- B. Doors:
 - 1. Thickness: 3/4 inch (19 mm).
 - 2. Width: 24 inch (610 mm).
 - 3. Width for Handicapped Use: 36 inch (915 mm), out-swinging.
 - 4. Height: 58 inch (1473 mm).
- C. Panels:
 - 1. Thickness: 1/2 inch (13 mm).
 - 2. Height: 58 inch (1473 mm).

- D. Pilasters:
 - 1. Thickness: 3/4 inch (19 mm).
 - 2. Width: As required to fit space; minimum 3 inch (76 mm).
- E. Urinal Screens: Without doors; to match compartments; mounted to wall with two panel brackets with vertical support/bracing same as compartments.

2.3 ACCESSORIES

- A. Pilaster Shoes: Formed ASTM A666, Type 304 stainless steel with No. 4 finish, 3 inch (76 mm) high, concealing floor fastenings.
 - 1. Provide adjustment for floor variations with screw jack through steel saddles integral with pilaster.
- B. Head Rails: Hollow anodized aluminum, 1 inch by 1-1/2 inch (25 mm by 38 mm) size, with anti-grip profile and cast socket wall brackets.
- C. Wall and Pilaster Brackets: Polished stainless steel; manufacturer's standard type for conditions indicated on drawings.
- D. Attachments, Screws, and Bolts: Stainless steel, tamper proof type.
 - 1. For attaching panels and pilasters to brackets: Through-bolts and nuts; tamper proof.
- E. Hardware: Polished stainless steel:
 - 1. Pivot hinges, gravity type, adjustable for door close positioning; two per door.
 - 2. Door Latch: Slide type with exterior emergency access feature.
 - 3. Door strike and keeper with rubber bumper; mounted on pilaster in alignment with door latch.
 - 4. Coat hook with rubber bumper; one per compartment, mounted on door.
 - 5. Provide door pull for outswinging doors.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify correct spacing of and between plumbing fixtures.
- C. Verify correct location of built-in framing, anchorage, and bracing.

3.2 INSTALLATION

- A. Install partitions secure, rigid, plumb, and level in accordance with manufacturer's instructions.
- B. Maintain 3/8 inch to 1/2 inch (9 mm to 13 mm) space between wall and panels and between wall and end pilasters.
- C. Attach panel brackets securely to walls using anchor devices.
- D. Attach panels and pilasters to brackets. Locate head rail joints at pilaster center lines.
- E. Field touch-up of scratches or damaged finish will not be permitted. Replace damaged or scratched materials with new materials.

3.3 TOLERANCES

- A. Maximum Variation From True Position: 1/4 inch (6 mm).
- B. Maximum Variation From Plumb: 1/8 inch (3 mm).

3.4 ADJUSTING

- A. Adjust and align hardware to uniform clearance at vertical edge of doors, not exceeding 3/16 inch (5 mm).
- B. Adjust hinges to position doors in partial opening position when unlatched. Return out-swinging doors to closed position.

- C. Adjust adjacent components for consistency of line or plane.

END OF SECTION

SECTION 102133
CUBICAL CURTAINS AND TRACK

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Furnish and install the following:
 - 1. Suspended cubicle curtain track and Intravenous support system, and guides.
 - 2. Track suspension components and accessories.
- B. Furnish the following products to be installed under the designated Sections:
 - 1. Above ceiling anchor devices to support curtain track, installed by Section 055000 - METAL FABRICATIONS.

1.2 RELATED SECTIONS

- A. Drawings and general provisions of the Contract and Division 01 Specification Sections apply to this Section.
- B. Section 016000 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- C. Section 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural
- D. Section 061000 - ROUGH CARPENTRY: Wood blocking.
- E. Section 092900 - GYPSUM BOARD: Suspended gypsum board ceiling system to support track.
- F. Section 095100 - ACOUSTICAL CEILINGS: Suspended acoustical tile ceiling system to support track.

1.3 REFERENCES

- A. Comply with applicable requirements of the following standards and those others referenced in this Section.
 - 1. NFPA Publication 701 - Standard Methods of Fire Tests for Flame-resistance Textiles and Films.
 - 2. UL Publication 214 - Standard for Tests for Flame Propagation of Fabrics and Films.

1.4 PERFORMANCE REQUIREMENTS

- A. Fire performance characteristics; shade material tested in accordance with NFPA 701- Vertical Burn Test, rated "FR".

1.5 SUBMITTALS

- A. Product Literature: Manufacturer's product data sheets, specifications, performance data, physical properties and installation instructions for each item furnished hereunder.
 - 1. Provide additional information required for vane materials, including: Size limitations, fire resistance information.
 - 2. Note on submittals any deviations from specified requirements and the reasons thereof.
- B. Maintenance Information: Maintenance data and recommended cleaning materials, and cleaning and stain removal methods.
- C. Warranty: Provide sample copies of manufacturers' actual warranties for all materials to be furnished under this Section, clearly defining all terms, conditions, and time periods for the coverage thereof.
- D. Certification of compliance with current building code and environmental regulations: Manufacturer shall certify that materials proposed for use comply with applicable building code and environmental regulations.
- E. Shop drawings: Include complete installation details.
- F. Selection samples:

1. 3 by 5 inch size sample fabric swatches indicating Manufacturer's range of colors and patterns available for initial selection.
2. Provide additional samples, of size requested by Architect, to aid in the Architect's selection.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Do not deliver curtains and drapes to the project until all concrete, masonry, plaster and other wet work has been completed and is dry.
- B. Deliver curtains, drapes and track to site in labeled protective packages, uniquely identified for each intended location.
- C. Store materials in manner recommended by curtains and drapes manufacturer, inside, under cover, and in manner to keep them dry, protected from weather, direct sunlight, surface contamination, corrosion and damage from construction traffic and other causes.
- D. Maintain ambient temperature between 60 and 85 degrees Fahrenheit, and a relative humidity between 20 and 50 percent for a period starting 24 hours before installation of curtains and drapes, and maintain until Owner's Final Acceptance.

1.7 FIELD MEASUREMENTS

- A. Take field measurements before preparation of shop drawings and fabrication, where possible, to ensure proper fitting of Work.
- B. Allow for adjustments within specified tolerances wherever taking of field measurements before fabrication might delay Work.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Specified Manufacturer (Basis of Design): To establish a standard of quality, design and function desired, Drawings and specifications have been based on the products and materials specified in the following Articles approved by the New York State Office of Mental Health (OMH) guidelines.

2.2 DESCRIPTION

- A. Regulatory Requirements:
 1. Conform to applicable codes for flame/spread rating of 25 for curtains when tested in accordance with ASTM E 84. Provide certificate of compliance from authority having jurisdiction.

2.3 PERFORMANCE/DESIGN CRITERIA

- A. Capacities:
 1. Track: To support vertical test load of 50 pounds without visible deflection of track or damage to supports. Size track to support moving loads.
 2. Size track to support moving loads, sufficiently rigid to resist visible deflection and without permanent set.

2.4 CURTAIN SUPPORT TRACK

- A. Acceptable Manufacturer's Track models:
 1. Basis of Design: InPro Corporation (ClickEZE), product: "Ultra-Cube" track.
- B. Track shall be extruded aluminum having over-all dimensions of 1-3/8" x 3/4" x 0.062 inch minimum wall thickness. . Design for surface application with side projections to overcome ceiling irregularities and affording a method for scribing a tight, neat line to the ceiling..
- C. Track bends with minimum 12 inch radius, without deforming track section, or impeding movement of carriers. Fabricate in one continuous "L" shape where-ever practical.
- D. Provide extruded slip-on connectors and nylon end stops and gates.

- E. Provide switch for tracks in rooms shown with side by side beds, so that one cubicle can service two beds.
- F. Roller carriers: Canted wheeled nylon carrier with self-lubricating nylon wheels and nylon axle, to accurately fit track, designed to eliminate bind when curtain is pulled, and fitted to curtain to prevent accidental curtain removal.
 - 1. Basis of Design: InPro Corporation, Clickeze Pop Out Carrier.
 - 2. Install sufficient quantity of carriers for each curtain, minimum of one carrier for every 6 inches of track.
- G. Track ends: Positive stop to fit track extrusion.
- H. Suspension rods: Tubular aluminum sections, sized to support specified design loads and designed to receive attachment from track and either above ceiling or ceiling support as field conditions require.
- I. Finish for track and fittings: Clear anodized finish

2.5 CUBICLE CURTAINS

- A. Cubicle curtain shall meet the following criteria:
 - 1. Curtain: Momentum Textiles Aloft.
 - 2. Curtain shall be in accordance with NFPA 13 8.6.5.2.2.1.
 - 3. Curtains shall be supported by fabric mesh on ceiling track.
 - 4. Openings in the mesh shall be a minimum of 70 percent.
 - 5. Mesh shall extend a minimum of 22 inches down from ceiling.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Inspect all surfaces and above ceiling supports and verify that they are in proper condition to receive the work of this Section. Verify field measurements are as shown on shop drawings.
- B. Beginning of installation means acceptance of existing surfaces, supports and project conditions.

3.2 INSTALLATION

- A. Install units to comply with manufacturer's instructions for type of mountings and operations required. Provide units plumb and true, securely anchored in place with recommended hardware and accessories to provide smooth, easy operation.

3.3 TOLERANCES

- A. Maximum variation of gap at window opening perimeter: 1/4 inch.
- B. Maximum offset from level: 1/8 inch.

3.4 ADJUSTING

- A. Adjust units for smooth operation. Replace any units or components which do not operate smoothly and without hindrance.

END OF SECTION

SECTION 102226
OPERABLE PARTITIONS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Manually operated, individual panel operable partitions.

1.2 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract and Division 01 Specification Sections apply to this Section.
- B. Section 055000 - METAL FABRICATIONS: for supports that attach supporting tracks to overhead structural system.
- C. Section 092900 - GYPSUM BOARD: for fire-rated assemblies and sound barrier construction above the ceiling at track.

1.3 DEFINITIONS

- A. STC: Sound Transmission Class.

1.4 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Material descriptions, construction details, finishes, installation details, and operating instructions for each type of operable partition component, and accessory specified..
- C. Shop Drawings: Indicate location and extent of operable partitions. Include plans, elevations, sections, details, attachments to other construction, and accessories. Indicate dimensions, weights, conditions at openings, and at storage areas, and required installation, storage , and operating clearances. Indicate location and installation requirements for hardware and track, including floor tolerances required and direction of travel. Indicate blocking to be provided by others.
- D. Setting Drawings: Indicate embedded items and cutouts required in other work, including support beam punching template.
- E. Selection Samples: Provide full range for architect's selection for each type of exposed material, finish, covering, or facing
- F. Verification Samples: Provide three (3) samples of each:
 - 1. Panel Facing Material: Manufacturer's standard size unit, not less than 3 inches (75 mm) square.
 - 2. Panel Edge Material: Not less than 3 inches (75 mm) long.
- G. Delegated Design Documents: Drawings and calculations sealed by Designer. Include design calculation for seismic restraints that brace tracks to structure above.
- H. Manufacturer's qualification statement.
- I. Installer's qualification statement.
- J. Operation and Maintenance Data: For operable panel partition to include in maintenance manuals.
 - 1. In addition to items specified in Section 017800 - CLOSEOUT SUBMITTALS include the following:
 - a. Panel finish-facings and finishes for exposed trim and accessories. Include precautions for cleaning materials and methods that could be detrimental to finishes and performance.
 - b. Seals, hardware, track, track switches, carriers, and other operating components.
- K. Maintenance Materials: Furnish the following for Owner's use in maintenance of project:
 - 1. See Section 016000 - Product Requirements for additional provisions.

2. Panel Finish-Facing Material: Furnish full width in quantity to cover both sides of two panels when installed.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with at least three years of documented experience and be a certified ISO-9001-2015 company.
- B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience and approved by manufacturer.
- C. Acoustical Performance: Test operable partitions in an independent acoustical laboratory in accordance with ASTM E90 test procedure to attain no less than the STC rating specified. Provide a complete and unedited written test report by the testing laboratory upon request.
- D. Preparation of the opening shall conform to the criteria set forth per ASTM E557 "Standard Practice for Architectural Application and Installation of Operable Partitions."

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protectively package and sequence panels in order for installation. Clearly mark packages and panels with numbering system used on Shop Drawings. Do not use permanent markings on panels.
- B. Protect panels during delivery, storage, and handling to comply with manufacturer's directions and as required to prevent damage.

1.7 WARRANTY

- A. See Section 017800 - Closeout Submittals for additional warranty requirements.
- B. Suspension System Warranty: five-years from date of Substantial Completion.
- C. Special Warranty: Provide three-year warranty to repair or replace components that fail in materials or workmanship commencing on the Date of Substantial Completion. Complete forms in Owner's name and register with warrantor.
 1. Failures include, but are not limited to the following: Faulty operation of operable panel partitions and deterioration of metals, metal finishes, and other materials beyond normal use.

PART 2 PRODUCTS

2.1 MANUALLY OPERATED INDIVIDUAL PANEL OPERABLE PARTITION

- A. Basis-of-Design Product: Modernfold, Acousti-Seal Encore - Single Panel.
- B. Series of individual flat panels, manually operated, top supported with operable floor seals and automatic top seals. Final closure by horizontally expanding panel edge with removable crank.
 1. STC: Not less than 54.
- C. PANELS
 1. Panel Construction: As required to support panel from suspension components and with reinforcement for hardware attachment. Fabricate panels with tight hairline joints and concealed fasteners. Fabricate panels so finished in-place partition is rigid; level; plumb; aligned, with tight joints and uniform appearance; and free of bow, warp, twist, deformation, and surface and finish irregularities.
 2. Steel Frame: Steel sheet, manufacturer's standard nominal minimum thickness for uncoated steel.
 3. Steel Face/Liner Sheets: Tension-leveled steel sheet, manufacturer's standard minimum nominal thickness for uncoated steel.
 4. Panel widths: Equal widths.
 5. Panel Thickness: Nominal dimension of 4 inches.
 6. Panel Weight: 10 lb/sq ft maximum.

7. Panel Closure: Manufacturer's standard unless otherwise indicated. Initial Closure resilient, bulb shaped acoustical seal and final closure constant force, lever-operated mechanical closure expanding from panel edge to create a constant-pressure acoustical seal.

D. PANEL FINISHES

1. Finish Facing for panels that comply with indicated fire-test-response characteristics and that are factory applied to operable panel partitions with appropriate backing, using mildew-resistant nonstaining adhesive as recommended by facing manufacture's written instruction.
 - a. Apply one-piece, seamless facings free of air bubbles, wrinkles, blisters, and other defects, with no gaps or overlaps. Horizontal seams are not permitted. Tightly secure and conceal raw and selvage edges of facing for finished appearance.
 - b. Where facings with directional or repeating patterns or directional weave are indicated, mark facing top and attach facing in same direction.
 - c. Match facing pattern 72 inches (1830 mm) above finished floor.
2. Vinyl-Coated Fabric Wall Covering: Manufacturer's standard, mildew-resistant, washable, vinyl-coated fabric wall covering; complying with WA-101, Type III-Heavy Duty; Class A.
 - a. Antimicrobial Treatment: Additives capable of inhibiting growth of bacteria, fungi, and yeasts.
 - b. Color/Pattern:: As selected by Architect from manufacturer's full range.
3. Panel Trim: No exposed vertical or horizontal trim permitted on edges of panels; minimal groove appearance at panel joints.
4. Cap-Trimmed Edges: Protective perimeter-edge trim with tight hairline joints concealing edges of panel and finish facing, finished as follows
 - a. Steel, Painted: Finished with manufacturer's color as selected by Architect from manufacturer's full range
5. Hardware: Single consistent color as selected by Architect from manufacturer's full range.

2.2 SOUND SEALS

- A. Vertical Seals: Deep-nesting interlocking sound seals between panels. Roll-formed steel astragals, with tongue and groove configuration in each panel edge with continuous , resilient acoustical seal.
- B. Horizontal Top Seals: Automatic top seals, manual operated top seals not permitted.
- C. Horizontal Bottom Seals: Resilient, mechanical, retractable, constant-force-contact seal exerting uniform constant pressure on floor when extended, ensuring horizontal and vertical sealing and resisting panel movement.
 1. Automatically Operated for Acoustical Panels: Extension and retraction of bottom seal automatically operated by movement of partition with operating range not less that 2 inches (50 mm) between retracted seal and floor finish.

2.3 SUSPENSION SYSTEM

- A. Tracks: Steel with adjustable steel hanger rods for overhead support, designed for operation, size, and weight of operable panel partition indicated. Size track to support partition operation and storage without damage to suspension system, operable panel partitions, or adjacent construction. Limit track deflection to no more than 0.10 inch (2.54 mm) between bracket supports. Provide a continuous system of track sections and accessories to accommodate configuration and layout indicated for partition operation and storage
- B. Carriers: Trolley system as required for configuration type, size, and weight of partition and for easy operation; with ball-bearing wheels.
- C. Track Intersections, Switches, and Accessories: As required for operation, storage, track configuration, and layout indicated for operable panel partitions, and compatible with partition assembly specified. Fabricate track intersections and switches from steel.

- D. E. Steel Finish: Manufacturer's standard, factory-applied, corrosion-resistant, protective coating unless otherwise indicated.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine flooring, structural support, and opening, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of operable partitions. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with ASTM E557, operable partition manufacturer's written instructions and drawings and approved Shop Drawings.
- B. Install operable partition and accessories after other finishing operation, including painting have been completed.
- C. Match operable partitions by installing panels from marked packages in numbered sequence indicated in Shop Drawings.
- D. Broken, cracked, chipped, deformed or unmatched panels are not acceptable.
- E. Broken, cracked, deformed, or unmatched gasketing or gasketing with gaps at butted ends is not acceptable.

3.3 CLEANING

- A. Clean partition surfaces upon completing installation of operable partition to remove dust, dirt, adhesives, and other foreign materials according to manufacturer's written instructions.
- B. Adjust operable partitions to operate smoothly, easily, and quietly, free of binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction. Throughout entire operational range. Lubricate hardware and other moving parts.
- C. Verify that safety devices are properly functioning.
- D. Provide final protection and maintain conditions in a manner acceptable to the manufacturer and installer that ensure operable partitions are without damage or deterioration at time of Substantial Completion.

END OF SECTION

SECTION 102600
WALL AND DOOR PROTECTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Bumper / Crash rails.
- B. Corner guards.
- C. Handrails.

1.2 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract and Division 01 Specification Sections apply to this Section.
- B. Section 016000 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- C. Section 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements for construction and demolition recycling.
- D. Section 061000 - Rough Carpentry: Blocking for wall and corner guard anchors.

1.3 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2018.
- C. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2016a.

1.4 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: For each type of product.
- C. Shop Drawings: For each type of wall and door protection showing locations and extent.
 - 1. Include plans, elevations, sections, and attachment details. Show handrail design and support spacing required to withstand structural loads.
- D. Samples: For each exposed product and for each color and texture specified, 12 inches (300 mm) long.
- E. Product certificates.
- F. Material certificates.
- G. Sample warranty.
- H. Maintenance data.

1.5 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of wall- and door-protection units that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Wall and Corner Guards:
 - 1. Construction Specialties, Inc; Lebanon, NJ: www.c-sgroup.com.

2.2 COMPONENTS

- A. Corner and edge guards :
 - 1. Basis of Design (CG-1): Construction Specialties, Inc, surface mounted corner guard.

- a. Color: See finish notes on Drawings.
 - b. Dimensions: .080 inch (2mm) rigid vinyl cover with .070 inch (1.8mm) with aluminum retainer.
 - c. Leg length: 2 inch wing.
 - d. Angle: 90 degrees.
 - e. refer to Drawings for height.
2. Basis of Design (CG-2): Construction Specialties, Inc, surface mounted end guard.
 - a. Color: See finish notes on Drawings.
 - b. Dimensions: .080 inch (2mm) rigid vinyl cover with .070 inch (1.8mm) with aluminum retainer.
 - c. Leg length: 2 inch wing.
 - d. Angle: 90 degrees.
 - e. Align with top of door frame and caulk gap at top of corner guard.
- B. Crash Rails:
1. Basis of Design: C/S, model Acrovyn SCR/BCR-50N, crash rail.
 - a. Color: As selected by Architect.
- C. Hand Rails:
1. Basis of Design: C/S, model Acrovyn HRW-10C, hand rail.
 - a. Finish: As selected by Architect.
 - b. Size: As indicated on the Drawings.
 - c. Clearance from wall: As indicated on the Drawings.
- 2.3 FABRICATION
- A. General: Fabricate wall protection systems to comply with requirements indicated for design, dimensions, detail, finish and member sizes.
- 2.4 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

3.1 EXAMINATION

- A. Verify that rough openings, concealed blocking, and anchors are correctly sized and located.

3.2 INSTALLATION

- A. Install components in accordance with manufacturer's instructions, level and plumb, true to line and secured rigidly in position to wall without distortions. Do not use materials with chips, cracks, voids, stains, or other defects that might be visible in the finished Work.
1. Align with top of door.
 2. Cement-On installation only (no holes).
 3. Mounting Heights: Install wall protection in locations and at mounting heights indicated on Drawings.
- B. Accessories: Provide Mastic Construction Adhesive such as PL® Premium Heavy Duty Adhesive, as recommended by Manufacturer.

3.3 TOLERANCES

- A. Maximum Variation From Required Height: 1/4 inch (6 mm).
- B. Maximum Variation From Level or Plane For Visible Length: 1/4 inch (6 mm).

END OF SECTION

SECTION 102813
TOILET ACCESSORIES

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Furnish and install toilet accessories.

1.2 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract and Division 01 Specification Sections apply to this Section.
- B. Section 016000 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- C. Section 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements for construction and demolition recycling.
- D. Section 061000 - ROUGH CARPENTRY:
 - 1. Wood blocking.
 - 2. Installation of concealed anchorage devices for grab bars in toilet rooms, this Section 102813 - TOILET ACCESSORIES.
- E. Section 092900 - GYPSUM BOARD: Gypsum board partitions and metal framing.
- F. Section 093000 - TILING: Tiled walls as substrate for toilet accessories.

1.3 REFERENCE STANDARDS

- A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 014200 - REFERENCES.
- B. ANSI A 117.1 - Specifications for Making Buildings and Facilities Accessible To and Usable by Physically Handicapped People.
- C. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- D. ASTM F2285 - Standard Consumer Safety Performance Specification for Diaper Changing Tables for Commercial Use; 2004, with Editorial Revision (2016).

1.4 SUBMITTALS

- A. Submit the following under provisions of Section 013000 - ADMINISTRATIVE REQUIREMENTS:
 - 1. Literature: Manufacturer's product data sheets, for each item furnished hereunder.
 - 2. Schedule: Complete schedule, indicating types, quantity, and model numbers of accessories for each location in which the accessories will be installed.
 - 3. Selection samples: Sample color chips indicating each manufacturer's full range of colors available for selection by Architect.
 - 4. Verification samples: Complete units, as requested by Architect.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials in original packages, containers or bundles bearing brand name, identification of manufacturer or supplier and item identification number corresponding with approved schedule.
- B. Store materials inside, under cover, and in manner to keep them dry, protected from weather, surface contamination, corrosion and damage from construction traffic and other causes.

1.6 SEQUENCING AND SCHEDULING

- A. Coordinate the work of this Section with placement of internal wall reinforcement and reinforcement of toilet partitions to receive anchor attachments.
- B. Coordinate the work of this Section with placement of internal wall reinforcement.

1.7 WARRANTY

- A. Deliver to the Owner upon completion of the work of this Section, applicable manufacturer's standard warranties.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal, only products approved and accepted by the New York State Office of Mental Health (OMH) guidelines shall be considered
 1. Kingsway Group USA, www.kingswaygroupglobal.com.
 2. Behavioral Safety Products, www.besafeprod.com.
 3. Whitehall Manufacturing, www.whitehallmfg.com.
 4. Apollo Corporation, www.apollobath.com.

2.2 MATERIALS

- A. Accessories - General: Shop assembled, free of dents and scratches and packaged complete with anchors and fittings, steel anchor plates, adapters, and anchor components for installation.

2.3 TOILET ACCESSORIES

- A. The following items are Owner Furnished Contractor Installed (OFCI) as shown on the Drawings:
 1. Soap Dispensers
- B. The following items are Contractor Furnished Contractor Installed (CFCI) as shown on the Drawings:
- C. Shelf, Recessed rectangular, stainless steel.
 1. Basis of Design: Whitehall Manufacturing, Best-Care WH1820FA.
 - a. Install with tamper resistant fasteners provided by manufacturer.
 - b. Provide tamper resistant sealant at flange perimeter.
- D. Mirrors: Ligature Resistant Stainless Steel powder coated frame with quality glass mirror and #8 finish.
 1. Products:
 - a. Basis of Design: Behavioral Safety Products, product FM760.
 - b. Size: 18 inches by 24 inches.
 - c. Secure with tamper resistant stainless steel screws provided by manufacturer.
- E. Grab Bars: Anti-Ligature grab bar, painted extruded aluminum.
 1. Products:
 - a. Basis of Design: Kingsway Group USA, Grab Rail 270 Series.
 - 1) Install in strict accordance with manufacturer's instructions. Provide sealant at the full perimeter to prevent end to end looping.
- F. Heavy Duty Grab Bars: Floor supports are acceptable if necessary to achieve load rating.
 1. Push/Pull Point Load: Minimum 1000 pound-force (4448.2 N), minimum.
 2. Dimensions: 1-1/2 inch (38 mm) outside diameter, minimum 0.125 inch (3.17 mm) wall thickness, exposed flange mounting, 1-1/2 inch (38 mm) clearance between wall and inside of grab bar.
 3. Length and Configuration: As indicated on drawings.
- G. Coat Hook, anti-ligature with rubber hook mounted within a brushed stainless steel surround, releases under downward applied load.
 1. Products:
 - a. Basis of Design: Kingsway Group, product KG180.
 - 1) Install using screws provided by manufacturer.

2.4 SPLASH GUARD

- A. Attaches to the front of sink rim to provide full, frontal protection from splashback, contains synthetic copolymer material that is flexible.
 - 1. Basis of Design: Apollo Corporation, The Shield Splash Guard.
 - a. Fits all sink rims.

2.5 INSTALLATION ACCESSORIES

- A. Fasteners, screws, and bolts: Type 304 stainless, tamperproof.
- B. Expansion shields: Fiber, lead or rubber as recommended by accessory manufacturer for component and substrate.

2.6 FABRICATION

- A. Welding, AWS D10.4.
- B. Provide steel anchors and components required for secure installation.
- C. Form exposed surfaces from single sheet of stock, free of joints. Form surfaces flat without distortion, scratches or dents. Weld and grind smooth joints of fabricated components.
- D. Back paint components where contact is made with building finishes to prevent electrolysis.
- E. Shop assemble components and package complete with anchors and fittings. Hot dip galvanize exposed and painted ferrous metal and fastening devices. Provide steel anchor plates, adapters, and anchor components for installation.
- F. Hot-dip galvanized steel, except stainless steel, anchors and fastening devices.
- G. Shop assemble accessories and package with all components, anchors, fittings, fasteners and keys.
- H. Key items alike.
- I. Provide templates and rough-in measurements as required.
- J. Round and deburr edges of sheets to remove sharp edges.
- K. Provide steel anchors and components required for secure installation.

2.7 FACTORY FINISHING

- A. In accordance with NAAMM AMP 500 series.
- B. Ferrous metals: Clean and treat, spray apply one coat of baked-on rust and moisture-resistant primer, followed by two coats of baked-on synthetic enamel, in selected colors. Ensure that finish coating is uniform in color intensity and degree of gloss, throughout.
- C. Chrome/Nickel Plating: ASTM 456, Type SC2, satin finish.
- D. Stainless steel: NAAMM AMP 503, Number 4 satin finish, except as otherwise specified above under the Article entitled "Toilet Accessories".
- E. Nylon Coated Steel: Nylon coating powder formulated for a fluidized bonding process to steel to provide a hard smooth, medium gloss finish, not less than 0.3 mm (0.012-inch) thick, rated as self-extinguishing when tested in accordance with ASTM D635.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify exact location of accessories for installation.
- C. Inspect all surfaces and verify that they are in proper condition to receive the work of this Section.

3.2 PREPARATION

- A. Provide templates and rough-in measurements as required. Deliver inserts and rough-in frames to site at appropriate times for building-in by other trades
- B. Coordinate with trades responsible for providing receiving surfaces on which accessories will be installed.
- C. Exact locations of accessories within each room or area shall be as directed by the Architect.

3.3 INSTALLATION

- A. Perform installation work in accordance with the approved shop drawings and the manufacturer's installation instructions.
- B. Install toilet accessories absolutely level and in true line, securely and rigidly anchored with theft proof fasteners of the size and type most appropriate for the specific receiving surface, concealing the fasteners as far as practicable.

3.4 ADJUSTING

- A. Replace units which cannot be adjusted to operate freely and smoothly as intended for the application made.

3.5 CLEANING

- A. Remove all protective films and coverings from accessories, and clean and polish each piece. Remove all rubbish, packing materials, and debris, caused by the work of this Section.

3.6 PROTECTION

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

END OF SECTION

SECTION 104400
FIRE PROTECTION SPECIALTIES

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Fire extinguishers.
- B. Fire extinguisher cabinets.
- C. Accessories.

1.2 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract and Division 01 Specification Sections apply to this Section.
- B. Section 016000 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- C. Section 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements for construction and demolition recycling.
- D. 061000 - ROUGH CARPENTRY: Wood blocking product and execution requirements.
- E. Section 092900 - GYPSUM BOARD: Framing of openings for fire extinguisher cabinets.

1.3 REFERENCE STANDARDS

- A. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems; 2013a (Reapproved 2017).
- B. NFPA 10 - Standard for Portable Fire Extinguishers; 2017.

1.4 SUBMITTALS

- A. See Section 013000 - ADMINISTRATIVE REQUIREMENTS, for submittal procedures.
- B. Shop Drawings: Indicate cabinet physical dimensions.
- C. Product Data: Provide extinguisher operational features.
- 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.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years documented experience.
- B. Conform to NFPA 10.
- C. Provide extinguishers and cabinets classified and labeled by Underwriters Laboratories Inc. for the purpose specified and indicated.

1.6 DELIVERY, STORAGE, AND PROTECTION

- A. Deliver materials to project site in manufacturer's original, unopened undamaged containers, with identification labels intact.
- B. Store materials in original packaging, protected from exposure to harmful weather conditions, at temperature and humidity conditions recommended by the manufacturer.

1.7 FIELD CONDITIONS

- A. Coordinate the work with the placement of internal wall reinforcement to receive anchor attachments.

- B. Do not install extinguishers when ambient temperature may cause freezing of extinguisher ingredients.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Fire Extinguishers:
 - 1. JL Industries, Inc., Bloomington, MN: www.activarcpg.com.
 - 2. Larsen's Manufacturing Co., Minneapolis, MN: www.larsensmfg.com.
 - 3. Ansul, a Tyco Business; Marinette, WI: www.ansul.com.
- B. Fire Extinguisher Cabinets and Accessories:
 - 1. Ansul, a Tyco Business; Marinette, WI: www.ansul.com.
 - 2. JL Industries, Inc; Bloomington, MN: www.jlindustries.com.
 - 3. Larsen's Manufacturing Co; Minneapolis, MN: www.larsensmfg.com.
 - 4. Potter-Roemer; City of Industry, CA: www.potterroemer.com.

2.2 FIRE EXTINGUISHERS

- A. Fire Extinguishers - General: Comply with product requirements of NFPA 10 and applicable codes, whichever is more stringent.
- B. Carbon Dioxide Type Fire Extinguishers: Aluminum tank, with pressure gauge.
 - 1. Class: B:C type.
 - 2. Size: 5 pound (2.27 kg).
 - 3. Finish: Baked enamel, red color.
 - 4. Basis of Design: Larsen's Manufacturing Co; CD Series, Model 322NM.
- C. Dry Chemical Type Fire Extinguishers: Stainless steel tank, with pressure gauge.
 - 1. Class: ABC type.
 - 2. Size: 5 pound (2.27 kg).
 - 3. Finish: Baked enamel, red color.
 - 4. Basis of Design: Larsen's Manufacturing Co; MP Series.

2.3 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. Semi-recessed fire extinguisher cabinets:
 - 1. Cabinet trim style: Square trim, semi-recessed cabinet.
 - a. Protruding from wall: nominally 1-1/4 to 1-1/2 inches.
 - 2. Door: Cold-rolled steel with factory applied white thermally fused polyester coating, acceptable to receive a field applied recoating.
 - a. Style: Vertical duo design with clear tempered safety glass.
 - b. Door Handle: Door handle matching material and finish of door.
 - c. Lettering: Factory applied die-cut lettering, applied to metal portion of door.
 - 1) Pattern: Vertical reading.
 - 2) Color: Black
 - 3. Acceptable models for non-fire-resistant rated assemblies:
 - a. JL Industries "Ambassador Series", model number 1816.
 - b. Larsen "Architectural Series", model number 2409-5R.
 - c. Potter-Roemer, "Alta Series", model number 7012.
 - 4. Acceptable models for fire-resistant rated assemblies:
 - a. JL Industries "Ambassador Series", model number 1816-FX.
 - b. Larsen "Architectural Series", model number FS-2409-5R.
 - c. Potter-Roemer, "Alta Series", model number FRC-7012.
- C. Surface-mounted fire extinguisher cabinets:

1. Trim style, material and accessories shall be the same as the semi-recessed cabinets indicated above.
2. Acceptable models for surface mounted cabinets:
 - a. JL Industries "Ambassador Series", model number 1013.
 - b. Larsen "Architectural Series", model number 2409-SM.
 - c. Potter-Roemer, "Alta Series", model number 7026.

2.4 ACCESSORIES

- A. Extinguisher Brackets: Formed steel, chrome-plated.
- B. Provide bracket for all fire extinguishers not located in cabinets.
 1. Basis of Design: Larsen's Manufacturing Co.; Model 862.
- C. Cabinet Signage: 14 inches by 12 inches 90° angle projecting wall mounted sign with vertical arrows and lettering.
 1. Basis of Design: JL Industries, Inc; Model PWM108.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify rough openings for cabinet are correctly sized and located.

3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install cabinets plumb and level in wall openings, at height indicated from finished floor.
- C. Secure rigidly in place.
- D. Place extinguishers in cabinets.
- E. Install brackets at locations where fire extinguishers are not indicated to be in cabinets.
 1. Secure rigidly in place.
 2. Mount extinguishers on brackets.

END OF SECTION

SECTION 105113
METAL LOCKERS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Metal lockers, complete with all required sloped tops, closures and filler pieces.
 - 1. Lockers shall be placed above plastic laminate boot cubbies as detailed on the Drawings.

1.2 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract and Division 01 Specification Sections apply to this Section.
- B. Section 016000 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- C. Section 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements for construction and demolition recycling.
- D. Section 061000 - Rough Carpentry: Wood framed base for lockers.

1.3 SUBMITTALS

- A. Submit the following under provisions of Section 013000 - Administrative Requirements:
 - 1. Literature: Manufacturer's product data sheets, specifications, performance data, physical properties and installation instructions for each item furnished hereunder.
 - 2. Warranty: Provide sample copies of manufacturers' actual warranties, clearly defining all terms, conditions, and time periods for the coverage thereof.
 - 3. Shop drawings:
 - a. 1/4 inch scale (minimum) plans of each area with specified lockers, include layout of all lockers, closures, and filler panels and large scale details of locker construction; and details of accessory items.
 - b. Large scale details of locker construction, showing filler panels, sloping top components, attachment clips, brackets and complete installation details.
 - 4. Selection samples: Manufacturer's color chips, comprising at least 8 different colors, for selections by the Architect.

1.4 QUALITY ASSURANCE

- A. Obtain locker and benches from a single manufacturer, or from manufacturers recommended by the prime manufacturer of lockers.
- B. Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.

1.5 QUALIFICATIONS

- A. Manufacturer, with a minimum of 3 year's experience demonstrating previously successful work of the type specified herein.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Do not order or fabricate lockers, until all specified submittals have been submitted to, and approved by, the Architect.
- B. Store lockers inside, under cover, and in manner to keep them dry, protected from weather, direct sunlight, surface contamination, corrosion and damage from construction traffic and other causes.

1.7 SEQUENCING AND SCHEDULING

- A. Coordinate the work of this Section with the respective trades responsible for installing interfacing work, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.

- B. Coordinate schedule of construction, size of access and route to place of installation to prevent delay of installation due to physical impediments. Any work involving the demolition and reconstruction of partitions, walls, floors, roofing, windows, or doors to place and install the work of this Section shall be performed at no additional cost to the Owner.

1.8 EXTRA MATERIALS

- A. Upon completion of the Work of this Section, deliver to the Owner extra materials for future repairs and maintenance.
 - 1. Provide spare keyed cylinders (with keys), an amount equal to 10 percent of total lockers.
 - 2. Provide two master keys.
- B. Clearly label and package extra materials securely to prevent damage.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Metal Lockers:
 - 1. List Industries, "Superior Lockers", <http://listindustries.com>

2.2 MATERIALS

- A. Sheet Steel: Primed, mild cold-rolled and leveled steel, free from buckle, scale, and surface imperfections, stretcher leveled, to the following minimum thicknesses:
 - 1. Body and Shelf: 24 gage, 0.024 inch (0.6 mm).
 - 2. Door Outer Face: 18 gage, 0.048 inch (1.2 mm).
 - 3. Door Frame: 16 gage, 0.060 inch (1.5 mm).
 - 4. Hinges: 14 gage, 0.075 inch (1.9 mm).
 - 5. Sloping Top: 20 gage, 0.036 inch (0.9 mm).
 - 6. Trim: 20 gage, 0.036 inch (0.9 mm).
- B. Accessories For Each Locker: Three double prong wall hooks.

2.3 LOCKER UNITS

- A. Configuration: Three tier.
 - 1. Width: 12 inches.
 - 2. Depth: 18 inches.
 - 3. Height: 20 inches.
 - 4. 4 inch high base to be wrapped with wall base.
- B. Mounting: Surface mounted.
- C. Top: Sloped metal with closures.
- D. Locking method: Punch lock.
- E. Ventilation Method: Door louvers.
- F. Locker Body: Formed and flanged; with steel stiffener ribs; electric spot welded.
- G. Frames: Formed channel shape, welded and ground flush, welded to body, resilient gaskets and latching for quiet operation.
- H. Doors: Hollow channel edge construction, 1-3/16 inch (30 mm) thick; welded construction, channel reinforced top and bottom with intermediate stiffener ribs, grind and finish edges smooth.
- I. Hinges: Two for doors under 42 inches (1 050 mm) high; three for doors over 42 inches (1 050 mm) high; weld securely to locker body and door.
- J. Number Plates: Provide oval shaped brass plates. Form numbers of block font style with ADA designation, in contrasting color.
- K. Provide ventilation openings at top and bottom of each locker.
- L. Form recess for operating handle and locking device.

- M. Finish edges smooth without burrs.
- N. Fabricate sloped metal tops, ends and closure pieces.
- O. Provide end panels and filler strips.

2.4 FACTORY FINISHING

- A. Clean, degrease, and neutralize metal; prime and finish with two coats of baked enamel finish.
 - 1. Colors of locker bodies and doors as selected from manufacturer's standard range. Up to two colors may be selected for each locker type.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Inspect all surfaces and verify that they are in proper condition to receive the work of this Section. Verify that field measurements are as indicated on reviewed and approved shop drawings.
- B. Beginning of installation means acceptance of existing conditions.

3.2 PREPARATION

- A. During the operation of work of this Section, protect the work of other trades against undue soilage and damage by the exercise of reasonable care and precautions. Repair or replace any work so damaged and soiled to match original finishes.

3.3 INSTALLATION

- A. Do not commence installation of lockers until immediately adjacent surfaces have been completely installed and finished.
- B. Perform installation work in accordance with the approved shop drawings and the manufacturer's installation instructions.
- C. Furnish and install all sloped top pieces as required, refer to the Drawings for the various conditions.
- D. Furnish and install all filler pieces as required to completely fill recesses, and to align with ends of partitions. Refer to the Drawings for the various conditions.
- E. Set lockers absolutely level and in true line, with units bolted together and to the surrounding partitions, to provide a rigid and secure installation. Conceal screw heads and bolts as far as practicable, leaving exposed panels completely free from unused bolt holes.

3.4 ADJUSTING AND CLEANING

- A. Test each door and latching device, and make adjustments required to ensure a bind-free operation and proper latching.
- B. Remove all tape and other packing materials from locker surfaces, and thoroughly clean and polish all exterior and interior surfaces.
- C. Touch-up all scratches and other surface defects, using same materials and colors as shop finish.

3.5 PROTECTION

- A. Protect locker finish surfaces and hardware from damage until Owners Final Acceptance.

END OF SECTION

SECTION 105116
WOOD LOCKERS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Wood lockers.

1.2 RELATED REQUIREMENTS

- A. Section 061000 - Rough Carpentry: Wood base construction.
- B. Section 061000 - Rough Carpentry: Wood blocking and nailers.

1.3 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- B. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014, with Errata (2016).
- C. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards, U.S. Version 3.1; 2016, with Errata (2017).
- D. HPVA HP-1 - American National Standard for Hardwood and Decorative Plywood; 2016.
- E. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.

1.4 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's published data on locker construction, sizes, fittings, and accessories.
- C. Shop Drawings: Indicate locker plan layout, numbering plan, combination lock code, and key codes.
- D. Samples: Submit two samples of wood veneer panel, 12 by 12 inch (304 by 304 mm) in size illustrating wood grain, stain color, and sheen.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with at least five years of documented experience.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Wood Lockers:
 - 1. Hollman, Inc: www.hollman.com/#sle.

2.2 LOCKER APPLICATIONS

- A. Solid wood lockers:
 - 1. Width: 12 inches (305 mm).
 - 2. Depth: 18 inches (457 mm).
 - 3. Height: 72 inches (1829 mm).
 - 4. Configuration: Three tier.

2.3 WOOD LOCKERS

- A. Lockers: Factory assembled, made of hardwood plywood panels with mortise and tenon joints and hardwood plywood doors; fully finished inside and out; each locker capable of standing alone.
 - 1. Species: As selected by the Architect from the manufacturer's full range of options.
 - 2. Wood Finish: Manufacturer's standard stain and clear sealer.
 - 3. Interior Finish: Match locker exterior wood species and finish.
 - 4. Where locker ends or sides are exposed, finish the same as fronts or provide extra panels to match fronts.

5. Provide filler strips where indicated, securely attached to lockers.
- B. Component Thicknesses:
 1. Doors: 3/4 inch (19 mm) minimum thickness.
 2. Locker Body: Tops, bottoms, sides, and shelves 3/4 inch (19 mm); backs 1/2 inch (13 mm); minimum.
 3. End Panels and Filler Panels: 1/2 inch (13 mm) minimum thickness.
 4. Sloped Tops: 1/2 inch (13 mm) minimum thickness.
 5. Toe Kick Plates: 1/2 inch (13 mm) minimum thickness.
- C. Hinges: Concealed cabinet style hinge, minimum 120 degree opening, attached with tamperproof screws.
- D. Coat Hooks: Stainless steel; attached with tamperproof screws.
- E. Number Plates: Manufacturer's standard, permanently attached with adhesive; may be field installed.
- F. Locks: Locker manufacturer's standard type indicated above.
- G. Lock Strike: Stainless steel strike plate attached to locker body with throughbolts.
- H. Base cubby; Custom built, as detailed on the Drawings.

2.4 MATERIALS

- A. Wood-Based Materials:
- B. Solid Wood: Clear, dry, sound, plain sawn, selected for compatible grain and color, no defects.
- C. Hardwood Plywood: Veneer core; HPVA HP-1 grade as indicated, species as indicated, clear, compatible grain and color, no defects.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that prepared bases are in correct position and configuration.
- B. Verify bases and embedded anchors are properly sized.

3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Place and secure on prepared base.
- C. Install lockers plumb and square.
- D. Secure lockers with anchor devices to suit substrate materials.
- E. Bolt adjoining locker units together to provide rigid installation.
- F. Install end panels, filler panels, and wood trim.
- G. Touch up damaged finish to match original, using materials provided by fabricator; replace components that cannot be refinished like new.
- H. Replace components that do not operate smoothly.

3.3 CLEANING

- A. Clean locker interior and exterior surfaces.

END OF SECTION

SECTION 108200
LOUVERED ROOF TOP EQUIPMENT SCREENS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Fixed, extruded-aluminum louvered roof top equipment screens

1.2 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract and Division 01 Specification Sections apply to this Section.
- B. Section 016000 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- C. Section 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements for construction and demolition recycling.
- D. Section 051200 - STRUCTURAL METAL FRAMING: Structural framing supporting louver support members.
- E. Section 075001 - TPO ROOFING: Fully adhered single ply membrane roofing system.

1.3 PERFORMANCE REQUIREMENTS

- A. Design: Design louvers, including comprehensive engineering analysis by a qualified engineer, using structural performance requirements and design criteria indicated.
- B. Structural Performance: Louvers shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated without permanent deformation of louver components, noise or metal fatigue caused by louver blade rattle or flutter, or permanent damage to fasteners and anchors.
 - 1. Wind Loads: Determine loads based on a Nominal Wind Pressure of 30 lb./sq. ft. (1435 Pa), acting inward or outward.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For equipment screens and accessories. Include plans, elevations, sections, details, and attachments to other work. Show frame profiles and blade profiles, angles, and spacing.
- C. Samples: For each type of metal finish required.
- D. Submittal: For louvers indicated to comply with structural performance requirements and design criteria indicated.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Specified Manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Architectural Louvers, Product: "V2TH7 - 2" Deep Horizontal Tube Blade with 7" Spacing".
- B. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - 1. Basis of Design: Architectural Louvers <http://www.archlouvers.com>
 - 2. CityScapes, Hilliard, OH <https://cityscapesinc.com>.
 - 3. C/S Construction Specialties Co., Mississauga, ON <http://www.cmdgroup.com>
 - 4. The Airolite Company, LLC, Schofield, OH <http://www.airolite.com>.

2.2 MATERIALS

- A. Aluminum Extrusions: ASTM B 221M, Alloy 6063-T5.
- B. Aluminum Sheet: ASTM B 209M, Alloy 3003 with temper as required for forming.
- C. Fasteners: Use types and sizes to suit unit installation conditions.
 - 1. For fastening aluminum, use aluminum or 300 series stainless-steel fasteners.

2.3 FABRICATION, GENERAL

- A. Join concealed frame members to each other and to fixed louver blades with fillet welds concealed from view welds, threaded fasteners, or both, as standard with louver manufacturer unless otherwise indicated or size of louver assembly makes bolted connections between frame members necessary.

2.4 EXTRUDED-ALUMINUM ROOF TOP EQUIPMENT SCREEN

- A. Horizontal Blade Louvered Roof Top Equipment Screen.
 - 1. Basis-of-Design Product: Architectural Louvers; Model V2TH7 - 2" Deep Horizontal Tube Blade with 7" Spacing. Subject to compliance with requirements, provide the specified product or comparable product by one of the following:
 - a. Manufacturers of equivalent products submitted and approved in accordance with Section 0162000 - Product Substitution Procedures.
 - 2. Louver Blade Depth: 2 inches (50 mm)
 - 3. Blade Profile: Plain blade without center baffle.
 - 4. Blade Nominal Thickness: Not less than 0.081 inch (2.03 mm).
 - 5. Framing Support Nominal Thickness: Not less than 0.125 inch (3.2 mm)
 - 6. Louver Performance Requirements:
 - a. Free Area: Not less than 8.0 sq. ft. (0.74 sq. m) for 48-inch- (1220-mm-) wide by 48-inch- (1220-mm-) high louver assembly.
 - b. Horizontal Drag Coefficient: Not greater than 0.63 on a cross sectional profile, allowing for a 37% reduction in wind load imposed horizontally upon supporting structural framing.

2.5 ALUMINUM FINISHES

- A. High-Performance Organic Finish: 3-coat fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pre-treat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 1. Color and Gloss: As selected by Architect from manufacturer's full range.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Locate and place equipment screens level, plumb, and at indicated alignment with adjacent work.
- B. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weather-tight connection.
- C. Provide perimeter reveals and openings of uniform width to allow for thermal expansion, as indicated.
- D. Repair damaged finishes so no evidence remains of corrective work. Return items that cannot be refinished in the field to the factory and refinish entire unit or provide new units.

END OF SECTION

SECTION 111316
LOADING DOCK SEALS AND SHELTERS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Compression door seals.

1.2 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract and Division 01 Specification Sections apply to this Section.
- B. Section 111319.13 - DOCK LEVELERS.

1.3 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate framed wall opening, dimensions and tolerances, adjacent construction and fittings required for anchorages, and anchor points.
- C. Samples: Submit two cuts of seal covering material, 6 by 6 inch (152.4 by 152.4 mm) in size illustrating color and finish.
- D. Manufacturer's Installation Instructions: Indicate special requirements.
- E. Operation Data: Provide operating instructions and identify unit limitations.
- F. Maintenance Data: Provide unit maintenance information, lubrication cycles, and spare parts manual.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Loading Dock Seals and Shelters:
 - 1. Blue Giant Equipment Corporation; 410 Admiral Blvd, Mississauga, ON, Canada L5T 2N6; Phone (905) 457-3900; www.bluegiant.com/#sle.

2.2 COMPONENTS

- A. Door Seal: Compressible construction with adjustable head pad dock seal: Blue Giant Equipment Corporation; model BGDSA
 - 1. Cross Sectional Dimensions: 12 by 10 inch (305 by 254 mm), nominal.
 - 2. Cushion: Closed cell foam for full depth of seal; straight jambs.
 - 3. Covering Material: Vinyl impregnated waterproof nylon fabric; with supplementary high abrasion resistant wear layer, to remain flexible to minus 65 degrees F (minus 54 degrees C).
 - 4. Covering Weight: 40 oz/sq ft (12.2 g/sq m).
 - 5. Covering Color: As selected by Architect from manufacturer's full color selections.
 - a. Provide 5 inch (127 mm) wide, full height, yellow guide strip.
 - 6. Header: Movable air vented construction.
 - 7. Seams: Mechanically stitched; double ply at exposed face.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that rough-in wall opening and anchors are acceptable, correctly sized, and aligned to proper tolerances.

3.2 INSTALLATION

- A. Install seal components in accordance with manufacturer's instructions.
- B. Set plumb and level.

3.3 ADJUSTING

- A. Adjust installed unit for smooth and balanced operation.

END OF SECTION

SECTION 111319.13
DOCK LEVELERS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Prefabricated steel dock leveler.
- B. Manual operating hardware.
- C. Loading Dock Bumpers.
- D. Mechanical vehicle restraint safety lock.

1.2 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract and Division 01 Specification Sections apply to this Section.
- B. Section 033000 - Cast-in-Place Concrete: Concrete pit.
- C. Section 055000 - Metal Fabrications.
- D. Section 111316 - Loading Dock Seals and Shelters.

1.3 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide materials and finish, installation details, roughing-in measurements, and operation of unit and safety lock device.
- C. Shop Drawings: Indicate required opening dimensions and tolerances, placement dimensions of safety lock device, and perimeter conditions of construction.
- D. Manufacturer's Installation Instructions: Indicate special requirements.
- E. Certificate: Manufacturer's certificate that Products meet or exceed specified requirements.
- F. Installer's Qualification Statement.
- G. Operation Data: Provide operating instructions, and identify unit limitations.
- H. Maintenance Data: Provide unit maintenance information, lubrication cycles, and provide spare parts manual.

1.4 QUALITY ASSURANCE

- A. Dock Levelers: Conform to requirements of ANSI MH30.1.
- B. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with at least 30 years of documented experience, is ISO certified, associated with Loading Dock Equipment Manufacturers (LODEM) and whose welding procedures are compliant with AWS D1.1 specifications..
- C. Installer Qualifications: Company specializing in performing work of type specified and with at least five (5) years of documented experience.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store and handle materials and products in strict compliance with manufacturer's instructions and recommendations and industry standards. Store materials within absolute limits for temperature and humidity recommended by manufacturer. Protect from damage.
- B. Store products in manufacturer's labeled packaging until ready for installation.

1.6 WARRANTY

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.
- B. Manufacturer agrees to correct defective work within two year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Loading Dock Levelers:
 - 1. Blue Giant Equipment Corporation; 410 Admiral Blvd, Mississauga, ON, Canada L5T 2N6; Phone (905) 457-3900;; www.bluegiant.com/#sle.
 - 2. No substitutions.

2.2 COMPONENTS

- A. Loading Dock Leveler: Blue Giant Equipment Corporation; Model "M".
 - 1. Operation: Manual.
 - 2. Deck Size: As indicated in Drawings.
 - 3. Lip Size: As scheduled and indicated in Drawings.
 - 4. Operating Range: 12 inch (305 mm) above dock level, 12 inch (305 mm) below dock level.
 - 5. Automatic Lateral Compensation: Leveler shall have a deck flex up to 4 inches (102 mm) to compensate for non-level trailer beds. Rear hinge fixed and does not come up above floor level.
 - 6. Capacity: (Super class ANSI MH30.1) 26,000 lbs (11,800 kgs).
 - a. Structural Deck support to include a minimum eight (8) each high-tensile sold steel J-beam members.
 - 7. Safety Devices:
 - a. Toe Guards: Full working range metal toe guard protection.
 - b. Mechanical fall safe legs to limit free fall.
 - c. Cross traffic support; lip engaged in saddles.
- B. Vehicle Restraint: Mechanical lock, fabricated and welded steel plate construction, spring loaded to automatically latch when activated, to comply with ICC-ES (Evaluation Service) reports for semitrailer vehicle bumper requirements for dimension and placement indicated.

2.3 FINISHES

- A. Leveler Platform: Factory enameled finish.
- B. Leveler Frame: Factory enameled finish.
- C. Vehicle Restraint: Yellow painted hook, galvanized steel operating mechanism.

2.4 ACCESSORIES

- A. Night locks. Resist unauthorized entry beneath locked overhead door.
- B. Loading Dock Bumpers. Standard, two (2) model DB411 laminated bumpers 14 inches (356 mm) W x 10 inches (254 mm) H x 4.5 inches (114 mm) D.
- C. Loading Dock Seals and Shelters: Refer to Section 111316.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that rough-in openings are acceptable.

3.2 INSTALLATION

- A. Install dock leveler and vehicle restraint unit in prepared opening in accordance with manufacturer's instructions.
- B. Set square and level.

3.3 ADJUSTING

- A. Adjust installed unit and safety device for smooth and balanced operation.

END OF SECTION

SECTION 122400
WINDOW SHADES

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Manually operated, chain driven, solar sunscreen roller shades and related hardware and accessories.

1.2 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract and Division 01 Specification Sections apply to this Section.
- B. Section 016000 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- C. Section 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements for construction and demolition recycling.
- D. Section 061000 - ROUGH CARPENTRY: Blocking for window shades.
- E. Section 092900 - GYPSUM BOARD: Substrate for window shade systems.
- F. Section 095100 - ACOUSTICAL CEILINGS: Relationship of window shades to acoustical ceilings.

1.3 REFERENCE STANDARDS

- A. ASTM = B221, FEDERAL = QQ-A-2009, AMSE = SB221, AMS = 4156.
- B. NFPA 701 - Standard Methods of Fire Tests for Flame Propagation of Textiles and Films; 2015.
- C. UL 214 - Standard for Tests for Flame Propagation of Fabrics and Films.
- D. UL 325 - Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems; Current Edition, Including All Revisions.

1.4 PERFORMANCE REQUIREMENTS

- A. Fire performance characteristics; shade material tested in accordance with NFPA 701- Vertical Burn Test, rated "FR".

1.5 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets including installation instructions, detail sheets, and specifications for each type of system specified.
- C. Shop Drawings: Include shade schedule indicating size, location and keys to details.
- D. Certificates: Manufacturer's documentation that line voltage components are UL listed or UL recognized.
- E. Selection Samples: Include manufacturer's color chart or sample set.
- F. Manufacturer's Instructions: Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- G. Maintenance Data: Include data on operating hardware, cleaning instructions, and inspection procedures related to preventative maintenance.
- H. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.6 QUALITY ASSURANCE

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

- B. Installer Qualifications: Company specializing in performing work of this section approved by manufacturer.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver shades in manufacturer's unopened packaging, labeled to identify each shade for each opening.
- B. Handle and store shades in accordance with manufacturer's recommendations.

1.8 WARRANTY

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.
- B. Obtain the following record documents:
 - 1. 5 year Customer Satisfaction Guarantee and Life Time Warranty on Fabric and Hardware.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Specified Manufacturer (Basis of Design): To establish a standard of quality, design and function desired, Drawings and specifications have been based on the products and materials specified in the following Articles:
 - 1. Basis of Design: Draper: <https://www.draper.com>.

2.2 GENERAL

- A. Window shades shall be CFCI at all exterior windows located in the Waiting Room, Break Room and Nurse Manager Office.

2.3 SHADE CLOTH

- A. 3000 Net 3% Fabric, fabricated from TPO for both core yarn and jacket, single thickness, 0.018 opaque coated reinforced yarn, non-raveling 0.030 inch (0.762 mm) thick fabric.
 - 1. Openess: 3%.
 - 2. Composition: 25% Polyester, 75% PVC
 - 3. Fire Classification: FR meets NFPA 701
 - 4. Width: 98.4" (2.5m)
 - 5. Weight: 13.12 oz/yd² (445 g/m²) + 5%
 - 6. Thickness: 0.022" (0.57 mm) + 5%
 - 7. Color/style: As selected by Architect unless otherwise indicated on the Drawings.

2.4 SHADE BAND

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

2.5 SHADE FABRICATION

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

2.6 COMPONENTS

- A. Fascia:
 - 1. Material: Extruded Aluminum fascia 6063-T5.
 - 2. Fascia type: 4 by 4 inch square profile fascia.
 - 3. Finish: Clear anodized to match window frame finish.
 - 4. Physical Properties:
 - a. Tension Strength; ksi: 27.
 - b. Hardness Brinell number: 60.
 - c. Fatigue endurance limit; ksi: 10.
 - d. Average Coefficient of Thermal Expansion: 68° to 212°F per = 13.0.
 - e. Resistance to Corrosion: No known instance of failure in service or in laboratory test.
 - f. No known instance of failure in service or in laboratory test.
 - g. Stress Corrosion Cracking: No known instance of failure in service or in laboratory test.
- B. Access and Material Requirements:
 - 1. Provide shade hardware allowing for the removal of shade roller tube from brackets without removing hardware from opening and without requiring end or center supports to be removed.
 - 2. Provide shade hardware that allows for removal and re-mounting of the shade bands without having to remove the shade tube, drive or operating support brackets.
- C. Manual Operated Chain Drive Hardware and Brackets:
 - 1. Provide for universal, regular and offset drive capacity, allowing drive chain to fall at front, rear or non-offset for all shade drive end brackets. Universal offset shall be adjustable for future change.
 - 2. Provide hardware capable for installation of a removable fascia, for both regular and/or reverse roll, which shall be installed without exposed fastening devices of any kind.
 - 3. Provide shade hardware system that allows for removable regular and/or reverse roll fascias to be mounted continuously across two or more shade bands without requiring exposed fasteners of any kind.
 - 4. Provide shade hardware system that allows for operation of multiple shade bands (multi-banded shades) by a single chain operator, subject to manufacturer's design criteria. Connectors shall be offset to assure alignment from the first to the last shade band.
 - 5. Provide shade hardware system that allows multi-banded manually operated shades to be capable of smooth operation when the axis is offset a maximum of 6 degrees on each side of the plane perpendicular to the radial line of the curve, for a 12 degrees total offset.
 - 6. Provide positive mechanical engagement of drive mechanism to shade roller tube. Friction fit connectors for drive mechanism connection to shade roller tube are not acceptable.

7. Provide shade hardware constructed of minimum 1/8-inch (3.18 mm) thick plated steel or heavier as required to support 150 percent of the full weight of each shade.
8. Drive Bracket / Brake Assembly:
 - a. Drive Bracket shall be fully integrated with all shade accessories, including, but not limited to: fascia, room darkening side/sill channels, center supports and connectors for multi-banded shades.
 - b. Drive sprocket and brake assembly shall rotate and be supported on a welded 3/8 inch (9.525 mm) steel pin.
 - c. The brake shall be an over-running clutch design which disengages to 90 percent during the raising and lowering of a shade. The brake shall withstand a pull force of 50 lbs. (22 kg) in the stopped position.
 - d. The braking mechanism shall be applied to an oil-impregnated hub on to which the brake system is mounted. The oil impregnated hub design includes an articulated brake assembly, which assures a smooth, non-jerky operation in raising and lowering the shades. The assembly shall be permanently lubricated. Products that require externally applied lubrication and or not permanently lubricated are not acceptable.
 - e. The entire assembly shall be fully mounted on the steel support bracket, and fully independent of the shade tube assembly, which may be removed and reinstalled without effecting the roller shade limit adjustments.
- D. Drive Chain: #10 qualified stainless steel chain rated to 90 lb. (41 kg) minimum breaking strength. Nickel plate chain shall not be accepted.
- E. Rollers: Sized as required for installation indicated.
 1. Material: 20 gage steel.
- F. Mounting Brackets: Stamped steel, custom fabricated as required for mounting indicated.
- G. Intermediate Brackets: UHMW plastic twist-locks into carrier bracket, allowing continuous roller operation with multiple shades.
- H. Top Roller Box and End Caps: Four-sided, interlocking box and cover custom-extruded of 6063-T5 aluminum, 0.062 inch minimum wall; electrostatic finish.
 1. Size: To fit shade installation.
 2. End Caps: 16 gage steel, electrostatic finish, incorporating mounting brackets.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Inspect all surfaces and verify that they are in proper condition to receive the work of this Section. Ensure that supporting substrate is adequate.
- B. Beginning of installation means acceptance of existing project conditions.

3.2 INSTALLATION

- A. Install roller shades level, plumb, square, and true according to manufacturer's written instructions.
- B. Engage Installer to train Owner's maintenance personnel to adjust, operate and maintain roller shade systems.

3.3 TOLERANCES

- A. Maximum variation of gap at window opening perimeter: 1/4 inch.
- B. Maximum offset from level: 1/8 inch.

3.4 ADJUSTING

- A. Adjust units for smooth operation. Replace any units or components which do not operate smoothly and without hindrance.

3.5 CLEANING

- A. Clean soiled shades and exposed components as recommended by manufacturer.

- B. Upon completion of the work of this Section in any given area, remove tools, equipment and all rubbish and debris from the work area; leave area in broom-clean condition.
- C. Replace shades that cannot be cleaned to "like new" condition.

END OF SECTION

SECTION 122442
MOTORIZED WINDOW SHADE SYSTEMS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Motorized, roll-up fabric interior window shades including motor operator, controls, and mounting hardware.

1.2 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract and Division 01 Specification Sections apply to this Section.
- B. Section 061000 - ROUGH CARPENTRY: Concealed wood blocking for attachment of headrail brackets.

1.3 REFERENCE STANDARDS

- A. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2008.
- B. NFPA 701-99 - Fire Tests for Flame-Resistant Textiles and Films.
- C. NFPA 70 - National Electrical Code.

1.4 SUBMITTALS

- A. Product Data: Manufacturer's catalog data, product descriptions, installation instructions, detail sheets, and specifications for each type of system specified.
- B. Samples for Selection: Manufacturer's color chart or sample set.
- C. Shop Drawings: Prepared specifically for this project; show dimensions and interface with other products.
 - 1. Room schedule including field-verified dimensions of each opening to receive window shade systems.
 - 2. Indicate System Series, operator, fabric selection, and mounting type.
 - 3. Indicate control type.
 - 4. Wiring diagrams.
 - 5. Manufacturer's Installation Instructions: Indicate special procedures.
 - 6. Maintenance Data: Include data on operating hardware, cleaning instructions, and inspection procedures related to preventative maintenance.
 - 7. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum five years documented experience.
- B. Installer Qualifications: Company specializing in performing work of this section approved by manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to project site in manufacturer's original packaging, dry, undamaged, with seals and labels intact.
- B. Individually package and mark shades with room number and opening number.
- C. Inspect the materials upon delivery to assure that specified products have been received.
- D. Store and handle shades to prevent damage to fabrics, finishes, and operators prior to installation.

1.7 PROJECT CONDITIONS

- A. Coordinate the work with window installation and placement of concealed blocking to support blinds.
- B. Verify that field measurements are as indicated on shop drawings.

1.8 WARRANTY

- A. Hardware and Shade Fabric: Draper's standard twenty-five year limited warranty.
- B. Motors and Controls: Draper's standard five year limited warranty.

1.9 EXTRA MATERIALS

- A. Provide one additional shade of each type installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Specified Manufacturer (Basis of Design): To establish a standard of quality, design and function desired, Drawings and specifications have been based on the products and materials specified in the following Articles.
 - 1. Basis of Design: Draper, Inc., Spiceland, IN, www.draperinc.com.
 - 2. Provide all window shade systems from a single manufacturer.

2.2 MOTORIZED WINDOW SHADES

- A. Type: Motorized vertical roll-up, fabric, window shade with motors, controls, mounting brackets, and other components necessary for complete installation; Motorized FlexShade as manufactured by Draper, Inc.
 - 1. Endcaps and fascia.
- B. Shade Motor and Control System
 - 1. Standard Motor: 110 VAC, single phase, 60 HZ, instantly reversible, lifetime lubricated, and equipped with internal thermal overload protector, electric brake, and pre-set accessible limit switches. Tubular motor concealed inside each shade roller tube.
 - 2. Individual Control: Wall Switch - Toggle three position wall switch
- C. Roller: Fabricated from extruded aluminum or steel. Diameter, wall thickness, and material selected by manufacturer to accommodate shade size. Provide with roller idler assembly of molded nylon and zinc-plated steel pin. Sliding pin to allow easy installation and removal of roller. Fabric connected to the roller tube with LSE (low surface energy) double sided adhesive specifically developed to attach coated textiles to metal. Adhesive attachment to eliminate horizontal impressions in fabric.
- D. Endcaps: Stamped steel with universal design suitable for mounting to ceiling, wall, and jamb. Provide size compatible with roller size.
 - 1. Endcap covers to match fascia/headbox finish.
- E. Brackets: 1/8 inch thick stamped steel, black powder coat, idler height adjuster, field adjustable to wall or ceiling mount.
 - 1. Mounted to ceiling.
- F. Fascia: L shaped aluminum extrusion to conceal shade roller and hardware.
 - 1. Attachment: Snaps onto end caps without requiring exposed fasteners of any kind. Fascia can be mounted continuously across two or more shade bands.
 - 2. Shape: Square Fascia Panel.
 - 3. Finish: Powder coat color as selected by the Architect or as indicated on the Drawings.
- G. Headbox Ceiling Style: Aluminum fabrication with removable closure, endcaps, and back and top cover piece:
 - 1. Finish: Powder coat color as selected by the Architect or as indicated on the Drawings.
- H. Light-Filtering Fabrics:

1. SheerWeave Series SW2701: Duplex basketweave fabric-light exterior color combined with dark interior color for thermal comfort and view-through. GREENGUARD Gold. Manufacturer to supply GREENGUARD Gold certificate. Fire rating: NFPA 701. SW2701-.1 percent open.

2.3 SHADE FABRICATION

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

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. Verify that openings are ready to receive the work.
- C. Ensure structural blocking and supports are correctly placed.

3.2 PREPARATION

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

3.3 INSTALLATION

- A. Install roller shades level, plumb, square, and true according to manufacturer's written instructions.
- B. Engage Installer to train Owner's maintenance personnel to adjust, operate and maintain roller shade systems.
- C. Install the following items to conceal roller and operating mechanism. Do not use exposed fasteners.
 - D. 1. Fascias.
 - E. 2. Closure panels.
 - F. 3. Endcaps.
- G. Install headbox, side channels, and sill channel with sealant specified in Section 07 90 00 - Joint Protection.

3.4 ADJUSTING

- A. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.

3.5 CLEANING AND PROTECTION

- A. Clean roller shade surfaces after installation, according to manufacturer's written instructions.
- B. Protect installed products until completion of project.

- C. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 124813
ENTRANCE FLOOR MATS AND FRAMES

PART 1 - GENERAL

1.1 SECTION INCLUDES:

- A. Entrance matting systems, including vinyl foot grids.

1.2 REFERENCES (INDUSTRY STANDARDS):

- A. ASTM E648: Standard Test Method for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source.
- B. NFPA 253: Test Method for Critical Radiant Flux of Floor Covering Systems Using a Radiant Energy Source

1.3 SUBMITTALS

- A. Product Data: Submit product data, including manufacturer's specification sheet and installation instructions for specified products. Include methods of installation and substrate preparation for each type of substrate.
- B. Shop drawings: Submit shop drawings showing layout, profiles and product components, including anchorage, accessories, finish colors, patterns and textures.
- C. Samples: Submit samples for each type and color of exposed entrance mat, frames and accessories required. Provide samples of mat materials.
- D. Quality Assurance Submittals: (1) Certified test reports showing compliance with specified performance characteristics and physical properties, and (2) manufacturer's Installation Instructions.
- E. Closeout Submittals: (1) Cleaning & Maintenance Data (include methods for maintaining installed products and precautions against cleaning materials and methods detrimental to finishes and performance) and (2) Warranty.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Manufacturer must be capable of providing technical field service representation.
- B. Installer: Installer should be highly experienced in performing this type of work, having previously done work similar to that required for this project.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in labeled packages. Store and handle in strict compliance with manufacturer's recommendations. Protect from damage due to weather, excessive temperatures and construction operations.
- B. Deliver materials sufficiently in advance of installation to condition materials to the required temperature for 48-hours prior to installation.

1.6 PROJECT CONDITIONS

- A. Temperature: Maintain temperature where products will be installed before, during and after installation as recommended by manufacturer.
- B. Field Measurements: Where possible, verify actual measurements by field measuring before fabrication and include measurements in shop drawings. To avoid construction delays, coordinate field measurements and fabrication schedule based upon construction progress.

1.7 WARRANTY

- A. Provide manufacturer's standard limited warranty.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURER

- A. Specified Manufacturer, (**WOM-1**): To establish a standard of quality, design and function desired, Drawings and specifications have been based on J&J Flooring Group, Revere, MA, www.matsinc.com, Product: "Catwalk II". No substitution will be accepted.
- B. Specified Manufacturer, (**WOM-2**): To establish a standard of quality, design and function desired, Drawings and specifications have been based on Mats Inc, Stoughton MA, www.matsinc.com, Product: "Grate Grid". No substitution will be accepted.

2.2 ENTRANCE FLOOR MATS AND FRAME COMPONENTS

- A. Vinyl Foot Grid: Constructed from 30% post-industrial recycled polyvinyl chloride (PVC) if gray or other colors, and up to 100% post-industrial recycled PVC if black. Welded in a non-hinged, grille design with an embossed non-skid surface (non-embossed surfaces not acceptable) to sizes indicated with the following characteristics:
- B. Ultra Entry™: Extruded PVC Grid, gray color, with polyimide nylon 6.6 fiber insert in [charcoal] color. (Note to specifier: Other colors available, including custom colors. Minimums may apply.)
- C. Framing and Nosing Accessories for Vinyl Foot Grille:
- D. Recessed Application: Ultra Entry™: 3/8": use "J" frame, mill finish aluminum, or "R" frame. Optional: 3/8" "T" Section Divider.
- E. Surface Mounted Application: 3/8" grid and beveled, heavy-duty attached nosing.
- F. Note: Total thickness including the inserts is 5/8".

PART 3 - EXECUTION

3.1 GENERAL CONTRACTOR RESPONSIBILITIES

- A. A safe, climate controlled building and subfloor that meets the requirements of ASTM F710 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring or as detailed in the Mats Inc. Ultra Entry™ installation instructions is required. This includes a structurally sound concrete subfloor; new concrete slabs must conform to ASTM C33/C33M - Standard Specification for Concrete Aggregate.
- B. Chemical adhesive removers must not be used.
- C. A secure storage and installation area that is maintained permanently or temporarily at the required ambient service temperature and humidity, so the flooring contractor can acclimate the flooring materials, is required for at least 24-hours prior to and during the application of the flooring.
- D. Areas with direct prolonged exposure to sunlight must be protected with the use of Low E glass doors and windows, facades or a protective film over the glass.
- E. If required, protect the flooring from damage during construction operations using plywood or a similar product, ensuring first that the flooring surface is free of all debris. Lay panels so that the edges form a butt joint and tape the joint to prevent both movement and debris entrapment underneath them. Inspect immediately before covering and after removal for final acceptance.

3.2 FLOORING CONTRACTOR RESPONSIBILITIES

- A. Provide professional flooring installers experienced at installing commercial resilient floor coverings with sufficient professional liability insurance coverage (aka Errors and Omissions Insurance) for the project.
- B. Provide an effective installation manager to manage the project and installers and ensure that all of the required procedures are followed as detailed in the installation instructions.

END OF SECTION

UNIVERSITY OF VERMONT MEDICAL CENTER
Outpatient Surgery Center
South Burlington, VT 05403

E4H Environments for Health Architecture
Project No. 2021073
January 27, 2023

SECTION 142100
ELECTRIC TRACTION ELEVATORS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section specifies electric traction elevators.
- B. Work Required:
 - 1. The work required under this section consists of all labor, materials and services required for the complete installation (including operational verification) of all the equipment required for the elevator(s) as herein specified.
 - 2. All work shall be performed in a first class, safe and workmanlike manner.
 - 3. In all cases where a device or part of the equipment is herein referred to in the singular, it is intended that such reference shall apply to as many of such devices or parts as are required to make complete installation.

1.2 RELATED REQUIREMENTS: RELATED WORK NOT SPECIFIED HEREIN: THE FOLLOWING SECTIONS CONTAIN REQUIREMENTS THAT RELATE TO THIS SECTION AND ARE PERFORMED BY TRADES OTHER THAN THE ELEVATOR MANUFACTURER/INSTALLER.

- A. Section 01500 - CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS: protection of floor openings and personnel barriers; temporary power and lighting.
- B. Section 02200 - EARTHWORK: excavation for elevator pit.
- C. Section 03300 - CAST-IN-PLACE CONCRETE: elevator pit, and elevator machine foundation.
- D. Section 04200 - UNIT MASONRY: masonry hoistway enclosure, building-in and grouting hoistway doorframes, and grouting of sills.
- E. Section 05500 - METAL FABRICATIONS: pit ladder, divider beams, and supports for entrances, rails and hoisting beam at top of elevator hoistway.
- F. Section 07145 - CEMENTITIOUS WATERPROOFING: waterproofing of elevator pit.
- G. Section 15500 - HEATING, VENTILATING, AND AIR CONDITIONING: ventilation and temperature control of elevator equipment areas.
- H. Section 16100 - ELECTRICAL:
 - 1. Main disconnects for each elevator.
 - 2. Electrical power for elevator installation and testing.
 - 3. Disconnecting device to elevator equipment prior to activation of sprinkler system.
 - 4. The installation of dedicated GFCI receptacles in the pit and overhead.
 - 5. Lighting in controller area, machine area and pit.
 - 6. Wiring for telephone service to controller.
 - 7. Section 16610 – Emergency (Standby) Power Supply Systems: emergency generator for elevator operation.
- I. Section 16720 - FIRE ALARM SYSTEMS: The installation of fire and smoke detectors at required locations and interconnecting devices; fire alarm signal lines to contacts in the machine area.
- J. Section 16740 - TELEPHONE SYSTEMS: ADAAG-required emergency communications equipment.

1.3 REFERENCE STANDARDS: APPLICABLE CODES: COMPLY WITH APPLICABLE BUILDING AND ELEVATOR CODES AT THE PROJECT SITE, INCLUDING BUT NOT LIMITED TO THE FOLLOWING

- A. ANSI A117.1, Buildings and Facilities, Providing Accessibility and Usability for Physically Handicapped People.
- B. ADAAG, Americans with Disabilities Act Accessibility Guidelines.

- C. ANSI/NFPA 70, National Electrical Code.
- D. ANSI/NFPA 80, Fire Doors and Windows.
- E. ASME/ANSI A17.7, Safety Code for Elevators and Escalators.
- F. ANSI/UL 10B, Fire Tests of Door Assemblies.
- G. CAN/CSA C22.1, Canadian Electrical Code.
- H. CAN/CSA-B44, Safety Code for Elevators and Escalators.
- I. EN 12016 (May 1998): "EMC Product Family Standards for lifts, escalators, and passenger conveyors Part 2 – immunity"
- J. Local Building Codes
- K. All other local applicable codes.

1.4 SYSTEM DESCRIPTION (SINGLE DOOR)

- A. Equipment Description: Gen3 Edge gearless traction elevator with Machine-Roomless application.
 - 1. Single Door in the sterile and staff areas.
 - 2. Equipment Control: Elevonic® Control System. Quantity of Elevators: 3
 - 3. Elevator Stop Designations: Front Only At 1,2,3,4,5,6
 - 4. Stops : 6
 - 5. Openings: Front Only
 - 6. Travel: 64 ft 11 in 3/4
 - 7. Rated Capacity: 4500 lbs Passenger
 - 8. Rated Speed: 350 fpm
 - 9. Platform Size: 7' 9-1/2" wide x 5' 5-9/16" deep
 - 10. Clear Inside Dimensions:
 - 11. 7 ft 8 in 5/16 wide x 5 ft 5 in 0 deep
 - 12. Cab Height: 96 in
 - 13. Clear height under suspended ceiling: 7' 4 3/4"
 - 14. Entrance Type and Width: Center Opening 48" doors
 - 15. Entrance Height: 7' 0"
 - 16. Main Power Supply: 480 Volts + or - 5% of normal, three-Phase, with a separate equipment grounding conductor.
 - 17. Car Lighting Power Supply: 120 Volts, Single-phase, 15 Amp, 60 Hz.
 - 18. Machine Location: Inside the hoistway at the top
 - 19. Signal Fixtures: Manufacturer's standard.
 - 20. Controller Location: Controller(s) shall be located adjacent to the hoistway at the top landing in a remote control space.
 - 21. Performance:
 - 22. Car Speed: + 3 % of contract speed under any loading condition or direction of travel.
 - 23. Car Capacity: Safely lower, stop and hold up to 125% of rated load. (code required).
- B. Ride Quality:
 - 1. Vertical Vibration (maximum): 12 – 17 milli-g
 - 2. Horizontal Vibration (maximum): 10 - 15 milli-g
 - 3. Vertical Jerk (maximum): 4.6 ± 1.0 ft./ sec³ (1.4 ± 0.3 m/ sec³)
 - 4. Acceleration/Deceleration (maximum): 2.6 ± .33 ft./ sec² (0.8 ± .13 m/ sec²)
 - 5. In Car Noise: 50 – 55 dB(A)
 - 6. Stopping Accuracy: ± 0.2 in. (± 5 mm)
 - 7. Re-leveling Distance: ± 0.4 in. (± 10 mm)
- C. Using a microprocessor-based controller, the operation shall be automatic by means of the car and hall buttons. In the absence of system activity, one car can be made to park at the

pre-selected main landing. The other (free) cars shall park in multiple zones, changing their location with traffic demands.

D. Operating Features – Standard:

1. Full Collective Operation
2. Anti-nuisance.
3. Fan and Light Protection.
4. Load Weighing Bypass.
5. Independent Service.
6. Full Collective Operation.
7. Firefighters' Service Phase I and Phase II:
8. Top of Car Inspection.
9. MRO Manual Rescue Operation.

E. Operation Features – Optional:

1. Car to Lobby Operation.
2. Zoned Access at Bottom Landing.
3. Zoned Access at Upper Landing.
4. Provision for Card Reader in Car (Car Reader provided and Installed by others).
 - a. This operation shall return each car automatically to a designated landing when the system is initially switched to standby power. One or more cars are returned at a time. Preference is given to loaded cars over empty cars in order to reduce passenger wait times. A car must respond by beginning to move toward the designated landing within a pre-determined time. If a car does not respond, it is automatically placed in a "Not Available" mode while other cars are moved. If a car was not returned to the designated landing on the first try, a second attempt is made. If the second attempt is not successful, the car will remain in a "Not Available" mode and can only be moved by manual means. Once each car has returned to the designated landing, the doors will remain open for a predetermined amount of time.
 - b. When all cars have successfully returned to the designated landing or have attempted to move twice, automatic selection of the car(s) to run on normal operation will occur.
 - c. If for any reason a car selected for normal operation under standby power is delayed for 60 seconds, the car will be placed in a "Not Available" mode and another car will be selected for normal operation based on the priorities listed above.
 - d. Manual Override of Standby Power Operation is achieved by a manual input for each car via a strip switch. A manually selected car may be run either in a return operation to a designated landing or in normal operation under standby power. If a manually selected car has not yet returned to the designated landing, it will perform this operation first then immediately go into normal operation.
 - e. If a manually selected car is delayed, no other car can be selected in the group unless it is manually selected.
 - f. If car selection is changed by Manual Override while a car is running in return or normal operation under standby power, the newly selected car will not be permitted to run until the car that had been running has stopped, opened its doors, and gone into the Standby Power Wait state.

F. Door Control Features:

1. Door control to open doors automatically when car arrives at a landing in response to a normal hall or car call.
2. Elevator doors shall be provided with a reopening device that will stop and reopen the car door(s) and hoistway door(s) automatically should the door(s) become obstructed by an object or person.
3. Primary door protection shall consist of a two dimensional, multi-beam array projecting across the car door opening.

4. Door nudging operation to occur if doors are prevented from closing for an adjustable period of time.

G. Provide equipment according to: Seismic Zone 2

1.5 SYSTEM DESCRIPTION (DOUBLE DOOR)

A. Equipment Description: Gen3 Edge gearless traction elevator with Machine-Roomless application (Cars 5-6).

1. Location: Double door in the sterile area.
2. Equipment Control: Elevonic® Control System.
3. Quantity of Elevators: 2
4. Elevator Stop Designations: Front Only At 1,2,3,4,5,6,7
5. Stops : 7
6. Openings: Front Only
7. Travel: 78 ft 11 in 3/4
8. Rated Capacity: 4500 lbs AIA
9. Rated Speed: 350 fpm
10. Platform Size: 5' 9-1/2" wide x 9' 0-9/16" deep
11. Clear Inside Dimensions: 5 ft 8 in 5/16 wide x 9 ft 0 in 0 deep
12. Cab Height: 96 in
13. Clear height under suspended ceiling: 7' 4 3/4"
14. Entrance Type and Width: Two Speed Side Slide 48" doors
15. Entrance Height: 7' 0"
16. Main Power Supply: 480 Volts + or - 5% of normal, three-Phase, with a separate equipment grounding conductor.
17. Car Lighting Power Supply: 120 Volts, Single-phase, 15 Amp, 60 Hz.
18. Machine Location: Inside the hoistway at the top
19. Signal Fixtures: Manufacturer's standard.
20. Controller Location: Controller(s) shall be located adjacent to the hoistway at the top landing in a remote control space.
21. Performance:
 - a. Car Speed: + 3 % of contract speed under any loading condition or direction of travel.
 - b. Car Capacity: Safely lower, stop and hold up to 125% of rated load. (code required).

B. Ride Quality:

1. Vertical Vibration (maximum): 12 – 17 milli-g
2. Horizontal Vibration (maximum): 10 - 15 milli-g
3. Vertical Jerk (maximum): 4.6 ± 1.0 ft./ sec³ (1.4 ± 0.3 m/ sec³)
4. Acceleration/Deceleration (maximum): 2.6 ± .33 ft./ sec² (0.8 ± .13 m/ sec²)
5. In Car Noise: 50 – 55 dB(A)
6. Stopping Accuracy: ± 0.2 in. (± 5 mm)
7. Re-leveling Distance: ± 0.4 in. (± 10 mm)

C. Duplex Collective Operation:

1. Using a microprocessor-based controller, the operation shall be automatic by means of the car and hall buttons. In the absence of system activity, one car can be made to park at the pre-selected main landing. The other (free) car shall remain at the last landing served. Only one car shall respond to a hall call. If either car is removed from service, the other car shall immediately answer all hall calls, as well as its own car calls.

D. Operating Features – Standard:

1. Full Collective Operation
2. Anti-nuisance.
3. Fan and Light Protection.
4. Load Weighing Bypass.
5. Independent Service.

6. Full Collective Operation.
 7. Firefighters' Service Phase I and Phase II:
 8. Top of Car Inspection.
 9. Zoned Car Parking.
 10. Relative System Response Dispatching.
 11. MRO Manual Rescue Operation.
- E. Operation Features – Optional:
1. Car to Lobby Operation.
 2. Zoned Access at Bottom Landing.
 3. Zoned Access at Upper Landing.
 4. Provision for Card Reader in Car (Car Reader provided and Installed by others).
 5. Second Riser of Hall Buttons.
 6. Automatic Standby Power Operation with Manual Override.
 - a. This operation shall return each car automatically to a designated landing when the system is initially switched to standby power. One or more cars are returned at a time. Preference is given to loaded cars over empty cars in order to reduce passenger wait times. A car must respond by beginning to move toward the designated landing within a pre-determined time. If a car does not respond, it is automatically placed in a "Not Available" mode while other cars are moved. If a car was not returned to the designated landing on the first try, a second attempt is made. If the second attempt is not successful, the car will remain in a "Not Available" mode and can only be moved by manual means. Once each car has returned to the designated landing, the doors will remain open for a predetermined amount of time.
 - b. When all cars have successfully returned to the designated landing or have attempted to move twice, automatic selection of the car(s) to run on normal operation will occur.
 - c. If for any reason a car selected for normal operation under standby power is delayed for 60 seconds, the car will be placed in a "Not Available" mode and another car will be selected for normal operation based on the priorities listed above.
 - d. Manual Override of Standby Power Operation is achieved by a manual input for each car via a strip switch. A manually selected car may be run either in a return operation to a designated landing or in normal operation under standby power. If a manually selected car has not yet returned to the designated landing, it will perform this operation first then immediately go into normal operation.
 - e. If a manually selected car is delayed, no other car can be selected in the group unless it is manually selected.
 - f. If car selection is changed by Manual Override while a car is running in return or normal operation under standby power, the newly selected car will not be permitted to run until the car that had been running has stopped, opened its doors, and gone into the Standby Power Wait state.
- F. Door Control Features:
1. Door control to open doors automatically when car arrives at a landing in response to a normal hall or car call.
 2. Elevator doors shall be provided with a reopening device that will stop and reopen the car door(s) and hoistway door(s) automatically should the door(s) become obstructed by an object or person. Primary door protection shall consist of a two dimensional, multi-beam array projecting across the car door opening.
 3. Door nudging operation to occur if doors are prevented from closing for an adjustable period of time.
- G. Provide equipment according to: Seismic Zone.

1.6 SUBMITTALS

- A. Product Data: Submit manufacturer's product data for each system proposed for use. Include the following:
 - 1. Signal and operating fixtures, operating panels and indicators.
 - 2. Cab design, dimensions and layout.
 - 3. Hoistway-door and frame details.
 - 4. Electrical characteristics and connection requirements.
 - 5. Expected heat dissipation of elevator equipment in control room space and machine space (BTU).
 - 6. Color selection chart for Cab and Entrances.
- B. Shop Drawings: Submit approval layout drawings. Include the following:
 - 1. Car, guide rails, buffers and other components in hoistway.
 - 2. Maximum rail bracket spacing.
 - 3. Maximum loads imposed on guide rails requiring load transfer to building structure.
 - 4. Clearances and travel of car.
 - 5. Clear inside hoistway and pit dimensions.
 - 6. Location and sizes of access doors, hoistway entrances and frames.
- C. Operations and Maintenance Manuals: Provide manufacturer's standard operations and maintenance manual.

1.7 QUALITY ASSURANCE

- A. Manufacturer: Elevator manufacturer shall be ISO 9001 certified.
- B. Installer: Elevators shall be installed by the manufacturer.
- C. Permits, Inspections and Certificates: The Elevator Contractor shall obtain and pay for necessary Municipal or State Inspection and permit as required by the elevator inspection authority, and make such tests as are called for by the regulations or such authorities. These tests shall be made in the presence of such authorities or their authorized representatives.

1.8 DELIVERY, STORAGE AND HANDLING

- A. Should the building or the site not be prepared to receive the elevator equipment at the agreed upon date, the Construction Manager will be responsible to provide a proper and suitable storage area on or off the premises.
 - 1. Should the storage area be off-site and the equipment not yet delivered, then the elevator contractor, upon notification from the Construction Manager, will divert the elevator equipment to the storage area. If the equipment has already been delivered to the site, then the Construction Manager shall transport the elevator equipment to the storage area. The cost of elevator equipment taken to storage by either party, storage, and redeliver to the job site shall not be at the expense of the elevator contractor.

1.9 WARRANTY

- A. The elevator contractor's acceptance is conditional on the understanding that their warranty covers defective material and workmanship. The guarantee period shall not extend longer than one (1) year from the date of completion or acceptance thereof by beneficial use, whichever is earlier, of each elevator. The guarantee excludes: ordinary wear and tear, improper use, vandalism, abuse, misuse, or neglect or any other causes beyond the control of the elevator contractor and this express warranty is in lieu of all other warranties, express or implied, including any warranty of merchantability or fitness for a particular purpose.

1.10 MAINTENANCE AND SERVICE

- A. Maintenance service consisting of regular examinations and adjustments of the elevator equipment shall be provided by the elevator contractor for a period of 12 months after the elevator has been turned over for the customer's use. This service shall not be subcontracted but shall be performed by the elevator contractor. All work shall be performed by competent

employees during regular working hours of regular working days. This service shall not cover adjustments, repairs or replacement of parts due to negligence, misuse, abuse or accidents caused by persons other than the elevator contractor. Only genuine parts and supplies as used in the manufacture and installation of the original equipment shall be provided.

- B. The periodic lubrication of elevator components shall not be required, including: Sheaves, Rails, Belts, Ropes, Car and CWT guides, etc.
- C. The elevator control system must:
 - 1. Provide in the controller the necessary devices to run the elevator in inspection operation.
 - 2. Provide on top of the car the necessary devices to run the elevator in inspection operation.
 - 3. Provide in the controller an emergency stop switch. This emergency stop switch when opened disconnects power from the brake and prevents the motor from running.
 - 4. Provide in the event of a power outage, means from the controller to electrically lift and control the elevator brake to safely bring the elevator to the nearest available landing.
 - 5. Provide the means from the controller to reset the governor over speed switch and also trip the governor.
 - 6. Provide the means from the controller to reset the emergency brake when set because of an unintended car movement or ascending car over speed.
 - 7. Provide the means from the controller to reset elevator earthquake operation.
- D. Provide system capabilities to enable a remote expert to create a live, interactive connection with the elevator system to enable the following functions:
 - 1. Remotely diagnose elevator issues with a remote team of experts
 - 2. Remotely return an elevator to service
 - 3. Provide real-time status updates via email
 - 4. Remotely make changes to selected elevator functions including:
 - a. Control building traffic: Restrict floor access, remove car from group operation, shut down elevator, select up peak/down peak mode, activate independent service
 - b. Conserve energy: Activate cab light energy save mode, activate fan energy save mode, shut down car(s)
 - c. Improve passenger experience: Extend door open times, change parking floor, activate auto car full, activate anti-nuisance, advance door opening, door nudging, extend specific floor extended opening time, release trapped passengers

PART 2 - PRODUCTS

2.1 DESIGN AND SPECIFICATIONS

- A. Provide machine-roomless Gen3 Edge traction passenger elevators from Otis Elevator Company. The control system and car design based on materials and systems manufactured by Otis Elevator Company. Specifically, the system shall consist of the following components:
 - 1. Controller located entirely inside the hoistway. No extra machine room or control closet space required.
 - 2. An AC gearless machine using embedded permanent magnets mounted at the top of the hoistway.
 - 3. Polyurethane Coated-Steel Belts for elevator hoisting purposes.
 - 4. Regenerative drive that captures normally wasted energy and feeds clean power back into the building's power grid.
 - 5. LED lighting standard in ceiling lights and elevator fixtures.
 - 6. Sleep mode operation for LED ceiling lights and car fan.
- B. Approved Installer: Otis Elevator Company

2.2 EQUIPMENT: CONTROLLER COMPONENTS

- A. Controller: A microcomputer based control system shall be provided to perform all of the functions of safe elevator operation. The system shall also perform car and group operational control.

1. All high voltage (110V or above) contact points inside the controller shall be protected from accidental contact when the controller doors are open.
 2. Controller shall be separated into two distinct halves; Motor Drive side and Control side. High voltage motor power conductors shall be routed so as to be physically segregated from the rest of the controller.
 3. Field conductor terminations points shall be segregated; high voltage (>30 volts DC and 110 VAC,) and low voltage (< 30 volts DC).
 4. Controllers shall be designed and tested for Electromagnetic Interference (EMI) immunity according to the EN 12016 (May 1998): "EMC Product Family Standards for lifts, escalators, and passenger conveyors Part 2 – immunity"
- B. Drive: A Variable Voltage Variable Frequency AC drive system shall be provided. The drive shall be set up for regeneration of AC power back to the building grid.

2.3 EQUIPMENT: MACHINE AND GOVERNOR

- A. Machine: AC gearless machine, with a synchronous permanent-magnet motor, dual solenoid service and emergency disc brakes, mounted at the top of the hoistway.
- B. Governor: The governor shall be a tension type car-mounted governor.
- C. Buffers, Car and Counterweight: Oil type buffers shall be used.
- D. Hoistway Operating Devices:
 1. Emergency stop switch in the pit
 2. Terminal stopping switches.
- E. Positioning System: Consists of an encoder, reader box, and door zone vanes.
- F. Guide Rails and Attachments: Guide rails shall be Tee-section steel rails with brackets and fasteners. Side counterweight arrangements shall have a dual-purpose bracket that combines both counterweight guide rails, and one of the car guide rails to building fastening.
- G. Coated-Steel Belts: Polyurethane coated belts with high-tensile-grade, zinc-plated steel cords and a flat profile on the running surface and the backside of the belt. All driving sheaves and deflector sheaves should have a crowned profile to ensure center tracking of the belts. A continuous 24/7 monitoring system using resistance based technology has to be installed to continuously monitor the integrity of the coated steel belts and provide advanced notice of belt wear.
- H. Governor Rope: Governor rope shall be steel and shall consist of at least eight strands wound about a sisal core center.
- I. Fascia: Galvanized sheet steel shall be provided at the front, and rear, of the hoistway.
- J. Hoistway Entrances:
 1. Frames: Entrance frames shall be of bolted construction for complete one-piece unit assembly. All frames shall be securely fastened to fixing angles mounted in the hoistway and shall be of UL fire rated steel.
 2. Sills shall be extruded aluminum.
 3. Doors: Entrance doors shall be of metal construction with vertical channel reinforcements.
 4. Fire Rating: Entrance and doors shall be UL fire rated for 1-1/2 hour.
 5. Entrance Finish
 - a. Stainless Steel at Front 1,2,3,4,5,6,7
 - b. Frame Finish
 - c. Stainless Steel at Front 1,2,3,4,5,6,7
 6. Entrance marking plates: Entrance jambs shall be marked with 4" x 4" (102 mm x 102 mm) plates having raised floor markings with Braille located adjacent to the floor marking. Marking plates shall be provided on both sides of the entrance.
 7. Sight Guards: sight guards will be furnished with all doors painted to match with painted doors, painted black for stainless steel and gold stain doors.

2.4 EQUIPMENT: CAR COMPONENTS

- A. Carframe and Safety: A carframe fabricated from formed or structural steel members shall be provided with adequate bracing to support the platform and car enclosures. The car safety shall be integral to the carframe and shall be Type "B", flexible guide clamp type.
- B. Cab Options:
 - 1. Steel shell cab with stainless steel vertical removable panels
 - 2. Paints and laminate to be selected from manufacturer's catalog of choices.
 - 3. Brushed Stainless Steel finished base plate located at top and bottom.
 - 4. Black vertical trim pieces
 - 5. Premium Cab Options: Steel cab shell with raised laminate hang on panels.
- C. Car Front Finish: Satin Stainless Steel.
- D. Car Door Finish: Satin Stainless Steel.
- E. Ceiling Type: Brushed Steel Finish (BSF)
- F. Emergency Car Lighting: An emergency power unit employing a 6-volt sealed rechargeable battery and totally static circuits shall be provided to illuminate the elevator car in the event of building power failure.
- G. Fan: A two-speed 120 VAC fan will be mounted to the ceiling to facilitate in-car air circulation, meeting A17.1 code requirements. The fan shall be rubber mounted to prevent the transmission of structural vibration and will include a baffle to diffuse audible noise. A switch shall be provided in the car-operating panel to control the fan. A variable speed fan will be available when Glassback cab option is selected.
- H. Handrails: Handrails shall be provided on the Side & Rear walls of the car enclosure. Handrails shall be 1 1/2" (38.1mm) dia. Round Bar with a Brushed Steel Finish
- I. Threshold: Extruded Aluminum
- J. Emergency Exit Contact: An electrical contact shall be provided on the car-top exit.
- K. Guides: 3" (76mm) Rubber roller guides shall be mounted on the top and the bottom of the car and counterweight. Car roller guides shall be 7-7/8" (200mm) at the top of the car, and 7-7/8" (200mm) at the bottom. The counterweight roller guides shall be 3" (76mm) at the top and the bottom.
- L. Platform: The car platform shall be constructed of metal. Load weighing device shall be mounted on the belts at the top of the hoistway.
- M. Zoned Certificate frame Provide a Certificate frame with a satin stainless steel finish.
- N. The LED ceiling lights and the fan should automatically shut off when the system is not in use and be powered back up after a passenger calls the elevator and pushes the hall button.

2.5 EQUIPMENT: SIGNAL DEVICES AND FIXTURES

- A. Car Operating Panel: A car operating panel shall be provided which contains all push buttons, key switches, and message indicators for elevator operation. The car operating panel shall have a satin stainless steel finish.
 - 1. A car operating panel shall be furnished. It shall contain a bank of round stainless steel, mechanical LED illuminated buttons. Flush mounted to the panel and marked to correspond to the landings served. All buttons to have raised numerals and Braille markings with:
 - a. Flat Flush Mounted satin stainless steel button with blue or white LED illuminating halo)
 - b. Option- 1/8" (3mm) satin stainless steel projecting button with blue or white illuminating halo or gold satin button with white illuminating halo
 - c. Vandal-Resistant, Flush satin stainless steel button with blue LED illuminating center jewel

- d. Lexan 1/8" (3mm) fully illuminated button with white LED (required by some local California codes)
- 2. The car operating panel shall be equipped with the following features:
 - a. Raised markings and Braille to the left hand side of each push-button.
 - b. Car Position Indicator at the top of and integral to the car operating panel.
 - c. Door open and door close buttons.
 - d. Inspection key-switch.
 - e. Elevator Data Plate marked with elevator capacity and car number.
 - f. Help Button: The help button shall initiate two-way communication between the car and a location inside the building, switching over to another location if the call is unanswered, where personnel are available who can take the appropriate action. Visual indicators are provided for call initiation and call acknowledgement.
 - g. Landing Passing Signal: A chime bell shall sound in the car to signal that the car is either stopping at or passing a floor served by the elevator.
 - h. In car stop switch (key)
 - i. Firefighter's hat
 - j. Firefighter's Phase II Key-switch
 - k. Call Cancel Button
 - l. Firefighter's Phase II Emergency In-Car Operating Instructions: worded according to A17.1 2000, Article 2.27.7.2.
 - m. Please Exit Symbol provided in the hall.
- B. Car Position Indicator: A digital, LED car position indicator shall be integral to the car operating panel.
 - 1. Hall Fixtures: Hall fixtures shall be provided with necessary push buttons and key switches for elevator operation. Hall fixtures shall feature:
 - a. Stainless Steel Hall Position Indicators at 1,2,3,4,5,6,7
 - 2. Button Options:
 - a. Flat Flush Mounted satin stainless steel button with blue LED illuminating halo.
 - b. Vandal-Resistant, Flush satin stainless steel button with blue LED illuminating center jewel
- C. Car Lantern and Chime: A directional lantern visible from the corridor shall be provided in the car entrance. When the car stops and the doors are opening, the lantern shall indicate the direction in which the car is to travel and a chime will sound.
- D. Access key-switch at top floor in entrance jamb.
- E. Access key-switch at bottom floor in entrance jamb.
- F. Emergency (standby) Power key-switch- Manual selection of each elevator in normal operation after automatic return in standby power operation has been initiated.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Take field dimensions and examine conditions of substrates, supports, and other conditions under which this work is to be performed. Do not proceed with work until unsatisfactory conditions are corrected.

3.2 INSTALATION

- A. Installation of all elevator components except as specifically provided for elsewhere by others.

3.3 DEMONSTRATION

- A. The elevator contractor shall make a final check of each elevator operation with the Owner or Owner's representative present prior to turning each elevator over for use. The elevator contractor shall determine that control systems and operating devices are functioning properly.

END OF SECTION

UNIVERSITY OF VERMONT MEDICAL CENTER
Outpatient Surgery Center
South Burlington, VT 05403

E4H Environments for Health Architecture
Project No. 2021073
January 27, 2023



LEED v4 for BD+C: New Construction

Project Name: UVMC Outpatient Surgery Center

Y	?+	?-	N
			1

IP 1 Integrative Process

1 1 0 14 Location and Transportation

LT 1	LEED for Neighborhood Development Location				
OR Points through credits LTc2 -c8.					
LT 2	Sensitive Land Protection				1
LT 3	High Priority Site				2
LT 4	Surrounding Density and Diverse Uses				5
LT 5	Access to Quality Transit				5
LT 6	Bicycle Facilities				1
LT 7	Reduced Parking Footprint	1			
LT 8	Green Vehicles		1		

2 0 0 8 Sustainable Sites

SS p1	Construction Activity Pollution Prevention				
SS 1	Site Assessment	1			
SS 2	Site Development--Protect or Restore Habitat				2
SS 3	Open Space				1
SS 4	Rainwater Management				3
SS 5	Heat Island Reduction				2
SS 6	Light Pollution Reduction	1			

4 0 2 5 Water Efficiency

WE p1	Outdoor Water Use Reduction				
WE p2	Indoor Water Use Reduction				
WE p3	Building-Level Water Metering				
WE 1	Outdoor Water Use Reduction	2			
WE 2	Indoor Water Use Reduction				3
WE 3	Cooling Tower/Process Water Use				2
WE 4	Water Metering			1	

18 2 2 11 Energy and Atmosphere

EA p1	Fundamental Commissioning and Verification				
EA p2	Minimum Energy Performance				
EA p3	Building-Level Energy Metering				
EA p4	Fundamental Refrigerant Management				
EA 1	Enhanced Commissioning	5			1
EA 2	Optimize Energy Performance	12	2		4
EA 3	Advanced Energy Metering				1
EA 4	Demand Response/ Grid Harminization				2
EA 5	Renewable Energy Production				3
EA 6	Enhanced Refrigerant Management	1			
EA 7	Green Power and Carbon Offsets			2	

4 2 0 7 Materials and Resources

MR p1	Storage and Collection of Recyclables				
MR p2	Construction and Demolition Waste Management Planning				
MR 1	Building Life-Cycle Impact Reduction				5
MR 2	Building Products - Environmental Product Declarations	1			1
MR 3	Building Products - Sourcing of Raw Materials		1		
MR 4	Building Products - Material Ingredients	1	1		
MR 5	Construction and Demolition Waste Management	2			

8 1 0 7 Indoor Environmental Quality

EQ p1	Minimum Indoor Air Quality Performance				
EQ p2	Environmental Tobacco Smoke Control				
EQ 1	Enhanced Indoor Air Quality Strategies	2			
EQ 2	Low-Emitting Materials	3			
EQ 3	Construction Indoor Air Quality Management Plan	1			
EQ 4	Indoor Air Quality Assessment	1	1		
EQ 5	Thermal Comfort				1
EQ 6	Interior Lighting	1			1
EQ 7	Daylight				3
EQ 8	Quality Views				1
EQ 9	Acoustic Performance				1

6 0 0 0 Innovation

IN 1.1	Innovation- (Green Building Education/ Designing with Nature)	1			
IN 1.2	Exemplary Performance- 40 EPDs	1			
IN 1.3	Innovation in Design: Occupant Survey	1			
IN 1.4	Innovation: Low Mercury Lighting	1			
IN 1.5	Pilot Credit: Integrated Analysis	1			
IN 2	LEED Accredited Professional	1			

3 0 0 1 Regional Priority

RP 1.1	Regional Priority: Rainwater Management (2 pt threshold)				1
RP 1.2	Regional Priority: Bicycle Facility (1 pt threshold)				
RP 1.3	Regional Priority: Reduced Parking Footprint (1 pt threshold)	1			
RP 1.4	Regional Priority: Optimize Energy Performance (9 pt threshold)	1			
RP 1.5	Regional Priority: Surrounding Density and Diverse Uses (2 pt threshold)				
RP 1.6	Regional Priority: Site Assessment (1 pt threshold)	1			

46 6 4 54 Total










Certified 40 to 49 points Silver 50 to 59 points Gold 60 to 79 points Platinum 80 to 110

PRODUCT DATA REPORTING FORM for LEED v4 Projects

THIS FORM IS REQUIRED TO BE SUBMITTED WITH Product Data Submittals

You must include backup documentation such as SPECIFIC Product Data Sheets, Cut Sheets, Product Specific Letter from Manufacturer, etc. DO NOT INCLUDE GENERIC MARKETING MATERIAL

LEED PROJECT NAME: _____
 SUBCONTRACTOR: _____
 Specification Section: _____ Submittal Number: _____

Project Product Data			Materials and Resources LEED Credits										Low-Emitting Materials LEED Credits (See note 13)				
Product	Manufacturer	Product Costs ¹ (only exclude install labor) (\$)	Product Specific (PS) or Industry Wide (IW) Env. Product Declaration (EPD) ^{3?}	 Certified ⁴ Environmental Product Declaration (EPD)	 FSC Certified ⁷ Wood Products?	 Post-Consumer Recycled Content ⁸ (%)	 Pre-Consumer Recycled Content ⁹ (%)	 Extended Producer Responsibility ⁵ Program Name?	 Declare Label with ingredient disclosure greater than 1000 ppm?	 Fully Declared HPD to 1000 ppm Declaration ⁴ included?	 C2C version (2.1.1 or 3.0) Level of Certification	ONLY if product has FSC or recycled content, then fill Regional Data	 Extracted, Manufactured, & Purchased within ² 100 miles?	CDPH Emissions ¹⁰ testing compliant?	VOC Content ¹¹ (g/L)	Wet-Applied Products Volume Used (L)	Wood Products are low emitting ^{12?}
Ex.	ABC Product	ABC, Inc.	\$ XX,XXX	PS / IW	%	%	%	Yes / No	Yes / No	Yes / No	Yes / No		Yes / No	Yes / No	##	##	Yes / No
1																	
2																	
3																	
4																	
5																	
6																	
7																	
8																	
9																	

NOTES / DEFINITIONS:

- Furnish Costs include all expenses to deliver the material to the project site, including taxes, transport, fabrication and profit. Do not include site labor or installation.
- Within 100 miles distance is defined as travel by air to the project site, not travel distance by road. <http://www.distancefromto.net/>
- Environmental Product Declarations which conform to ISO 14025, 14040, 14044, and EN 15804 or ISO 21930 and have at least a cradle to gate scope. <http://productguide.ulenvironment.com/QuickSearch.aspx>
- The end use product has a published, complete Health Product Declaration with full disclosure of known hazards in compliance with the Health Product Declaration open Standard. [Smith Group JJR HPD Database](http://smithgroupjrr.com/HPDDatabase)
- Extended producer responsibility. Products purchased from a manufacturer (producer) that participates in an extended producer responsibility program or is directly responsible for extended producer responsibility. (e.g. Closed Loop or Take Back Program)
- Wood products must be certified by the Forest Stewardship Council (FSC) and must provide proof of vendor FSC Chain-of-Custody with this Product Data Submittal. Invoices listing COC numbers are required. <http://info.fsc.org/certificate.php>
- Post-Consumer Recycled Content: Sourced from recovered Consumer Waste and used as a raw material (e.g. plastic bottles, newspaper, etc).
- Pre-Consumer Recycled Content: Recovered Industrial Materials diverted from municipal solid waste for use in a different mfg. process, prior to use by a consumer. Note: "home scrap" from the original mfg. process that are reused / reprocessed do not qualify.
- TVOC Emissions for Building products must be tested and determined compliant in accordance with California Department of Public Health (CDPH) Standard Method v1.2-2017 <http://www.usgbc.org/resources/low-emitting-materials-third-party-certification-table>
- All paints and coatings wet-applied on site must meet applicable VOC limits of the California Air Resources Board (CARB) 2007, Suggested Control Measure (SCM) for Architectural Coatings, or the South Coast Air Quality Management District (SCAQMD) Rule 1113, effective June 3, 2011. All adhesives and sealants wet-applied on site must meet the applicable chemical content requirements of SCAQMD Rule 1168, October 6, 2017, Adhesive and Sealant Applications, as analyzed by the methods specified in Rule 1168.
- Composite Wood Evaluation as defined by the California Air Resources Board (CARB), Airborne Toxic Measure to Reduce Formaldehyde Emissions from Composite Wood Products Regulation, must be documented to have low formaldehyde emissions that meet the CARB ATCM for formaldehyde requirements for ultra-low-emitting formaldehyde (ULEF) resins or no added formaldehyde (NAUF) resins. In additional structural composite wood shall meet requirements listed in specifications.
- CDPH (California Department of Public Health (CDPH) Standard Method v1.2-2017) is required for each of the following product categories at the following thresholds: Interior Paints & Coatings (75% by volume); Interior Adhesives & Sealants (75% by volume); Flooring (90% by area); Insulation (75% by value); Ceilings (90% by area); and Composite Wood (75% by value or area.)

I, _____ a duly authorized representative of _____ hereby certify that the material information submitted here is an accurate representation of the material to be provided under our contract.

EMAIL CONTACT FOR AUTHORIZED REPRESENTATIVE: _____ Direct Phone: _____
 SIGNATURE OF AUTHORIZED REPRESENTATIVE: _____ DATE: _____

PROJECT NO	P21553.00	DATE	TBD
PROJECT NAME	UVMHC Outpatient Surgery Center	FROM	Project Team
		COMPANY	TBD

Instruction to Contractor: The following worksheet shall be completed by the end of each pay cycle. Attach updated LEED calculators to the report.

Construction Activity Pollution Prevention (Prerequisite)

1. Two date-stamped photos showing ESC measure provided? (Attach to report)

Check: Yes In Progress

Narrative description of activities this cycle:

Construction & Demolition Waste Management Planning (Prerequisite) Construction & Demolition Waste Management (2 points)

1. Construction Waste Management Plan provided?

Check: Yes In Progress

Narrative description of activities this cycle:

2. Enter total waste diversion from the CWM LEED Calculator: _____

3. Enter the number of waste streams being tracked: _____

4. Construction and Demolition Waste Management Calculator to be attached.

Date of last load included: _____

Comments:

Building Product Disclosure and Optimization (General)

1. Total Construction Cost reported in the BPDO Calculator: _____
2. Attach BPDO Calculator to report

Number of items included: _____

Building Product Disclosure and Optimization, EPDs (1 point)

1. Enter the weighted number of EPDs from the summary tab of the BPDO calculator:

(Maintain all backup documentation in a consolidated folder in the submittal management software. File names should align with Product name on BPDO calculator followed by EPD, example : "Armstrong_Optima_Tile-EPD.pdf")

Building Product Disclosure and Optimization, Material Ingredients (1 point)

1. Enter the weighted number of Material Inventories from the summary tab of the BPDO calculator:

(Maintain all backup documentation in a consolidated folder in the submittal management software. File names should align with Product name on BPDO calculator followed by HPD, example : "Shaw_Broadloom_Carpet-HPD.pdf")

Building Product Disclosure and Optimization, Sourcing of Raw Materials (1 point)

1. Enter the sustainable criteria value as a percentage of total materials cost from the summary tab of the BPDO calculator:

(Maintain all backup documentation in a consolidated folder in the submittal management software. File names should align with Product name on BPDO calculator followed by FSC or RC, example : "Columbia_Cedar_Floor_FSC.pdf")

Low-Emitting Materials (3 points)

(TT will enter categories of products tracked (ex: composite wood, paint, etc))

1. Low Emitting Materials Calculator attached to report?

Check: Yes No

Comments:

2. All product categories targeted meet thresholds? (See "Summary – Option 1" tab)

Adhesives & Sealants

% Compliant with VOC Content _____
% Compliant with General emissions evaluation _____

Paints & Coatings

% Compliant with VOC Content _____
% Compliant with General emissions evaluation _____

Flooring

% Compliant with General emissions evaluation _____

Composite Wood

% Compliant with emissions evaluation _____

Ceilings

% Compliant with emissions evaluation _____

Insulation

% Compliant with emissions evaluation _____

Construction IAQ Management Plan (1 point)

1. Construction IAQ Management Plan provided?

Check: Yes In Progress

Narrative Description of activities this cycle:

2. Two date-stamped photos showing IAQ measure provided? (Attach to report)

Check: Yes In Progress

Comments:

Thornton Tomasetti

UVMC Outpatient Surgery Center

DD Specification Review
LEED v4/v4.1

Date Issued: 7/22/2022

< Include these notes in specifications indicated with an X, N, 1 and or 2 below. Refer to the Master LEED Spec Language & Notes for specific notes.

X: Spec already includes language in both Part 1 and Part 2

N: Needs language in Part 1 and 2

1: Needs language in Part 1

2: Needs language in Part 2

Notes related to Sustainability submissions:

All LEED submissions should include LEED cover sheet.

For EPDs, HPDs, and recycled content, provide when available.

Not all products indicated will have this information available.

Provide values for recycled content and wood.

Certified Wood Invoices are required. Minimum of 50% of wood should be FSC Certified.

Provide VOC content and volume used for ALL wet applied interior products.

Provide CDPH for all ceilings, insulation, and flooring.

Provide 80% CDPH for paints, coatings, adhesives, & sealants.

For Composite wood provide documentation of CARB ULEF compliance.

Environmental Product Declaration	Health Product Declaration	Recycled Content	Certified Wood	Adhesives & Sealants	Paints & Coatings	Flooring Systems	Composite Wood	Ceilings	Wall Panels	Insulation
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DIVISION 01 GENERAL REQUIREMENTS	REVIEW NOTES										
01 10 00 Summary											
01 20 00 Price and Payment Procedures											
01 30 00 Administrative Requirements											
01 33 50 Coordination Drawings and Coordination											
01 34 00 Construction Manager Requests for Information											
01 34 00.01 Requests for Information (RFI) Form											
01 40 00 Quality Requirements											
01 42 00 References											
01 50 00 Temporary Facilities and Controls											
01 51 00 Temporary Utilities											
01 51 00 Construction Indoor Air Quality Requirements											
01 56 11 Temporary Dust, Fume and Odor Control											
01 60 00 Product Requirements											
01 62 00 Product Substitutions											
01 62 00.01 Product Substitution Request Form											
01 70 00 Execution and Closeout Requirements											
01 74 19 Construction Waste Management and Disposal											
01 77 00 Contract Closeout											
01 79 00 Demonstration and Training											
01 81 13 Sustainable Design Requirements											
01 81 19 Construction Indoor Air Quality Requirements											
01 91 13 General Commissioning Requirements											Please add a commissioning section
DIVISION 02 EXISTING CONDITIONS											
02 41 19 Selective Civil Site Demolition											
DIVISION 03 CONCRETE											
03 01 36 Resurfacing and Patching of Concrete Slabs											
Underlayment and Patching Mortar	N										
Concrete Fill Materials and Related Accessories	N										
03 05 13 Concrete Sealers											
Materials	N	N			N						
03 30 00 Cast In Place Concrete											
Concrete, General	N		N								Can fly ash be considered, and if so, what is the maximum percentage possible?
Form Facing Materials											
Steel Reinforcement	N		N								
Reinforcement Accessories	N		N								
Concrete Materials	N		N								
Waterstops											
Vapor Retarders											
Curing Materials						N					
Related Materials						N					
Concrete Mixtures for Building Elements						N					
Fabricating Reinforcement	N		N								
Concrete Mixing	N		N								
DIVISION 04 MASONRY											
04 20 00 Unit Masonry											
Brick Units	N		N								
Anchors, Ties and Reinforcement	N										
Mortar Materials for Site Mixed Mortar	N	N	N		N						
Accessories	N		N		N						
DIVISION 05 METALS											
05 12 00 Structural Steel Framing											
Structural Steel Materials	N		N								
Bolts, Connectors, and Anchors	N										
Primer	N	N				N					
Grout	N	N			N						
05 12 13 Architecturally Exposed Structural Steel Framing											
Bolts, Connectors, and Anchors	N										
Primer	N	N				N					
05 31 00 Steel Decking											
Roof Deck	N		N								
Accessories	N					N					

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Provide CDPH for all ceilings, insulation, and flooring.

Provide 80% CDPH for paints, coatings, adhesives, & sealants.

For Composite wood provide documentation of CARB ULEF compliance.

	Environmental Product Declaration	Health Product Declaration	Recycled Content	Certified Wood	Adhesives & Sealants	Paints & Coatings	Flooring Systems	Composite Wood	Ceilings	Wall Panels	Insulation	
05 54 00 Cold-Formed Metal Framing												
Materials - Steel Framing	N		N									
Exterior Non-Load Bearing Wall Framing	N		N									
Framing Accessories			N									
Anchors, Clips and Fasteners			N									
Misc. Materials	N	N			N	N						
05 45 23 Healthcare Metal Supports												
Metals, General	N		N									
Medical Support Systems			N									
05 55 00 Metal Fabrications												
Materials	N		N									
Universal Grid System			N									EQc2 required if not shop applied.
Roof Dunnage Stairs												
Fasteners			N									
Accessories	N	N			N	N						
Finishes - Hot-Dip Galvanizing												
05 51 00 Metal Stairs												
Metal Stairs - General	N		N									
Metal Stairs with Concrete Treads	N		N									
Handrails and Gaurds	N		N									
Materials	N		N									EQc2 required if not shop applied.
Accessories	N		N			N						
05 58 13 Column Covers												
Column Covers			N									
DIVISION 06 WOOD, PLASTICS & COMPOSITES												
06 10 00 Rough Carpentry												
Board and Sheet Materials	N	N	N	N				N				
Wood Treatments	N	N				N						
Accessories					N							
06 16 00 Gypsum Sheathing												
Gypsum Sheathing Board	N	N	N									Exterior applied products- exempt from LEM
Accessory Materials					N							
06 20 00 Finish Carpentry												
Finish Carpentry Items												
Interior Standing and Running Trim for Opaque Finishes	N	N										
Wood Based Components	N		N	N				N				
Board and Panel Materials			N	N				N		N		
Closet and Shelving Hardware												
Cellular PVC Wall Base				N			N	N				
Anti Ligature TV Enclosure												
Fastenings	N				N							
Accessories	N				N	N						
06 40 00 Architectural Woodwork												
Wood Materials - General Requirements	N		N	N				N		N		
Plastic Laminate Facing	N											
Backing For All Laminates	N		N	N	N			N				
Cabinet Hardware	N		N									
Slat-Wall System			N	N				N		N		
Accessories					N							
06 61 16 Solid Surfacing Fabrications												
Solid Surfacing Fabrications	N	N	N									
Accessories	N		N	N	N			N				
DIVISION 07 THERMAL & MOISTURE PROTECTION												
07 11 13 Bituminous Dampproofing												
Bituminous Dampproofing					N							
07 21 00 Thermal Insulation												
Materials - Foundation Wall and slab Insulation	N	N	N		N						N	
Accessories					N							
07 26 00 Vapor Retarders												
Vapor Barriers Within Building Assemblies	N	N	N							N		
Under Slab Vapor Barriers												
Foamed in Place Insulation					N						N	
Accessories					N							
07 27 13 Sheet Air Barriers												

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Materials - Self Adhering Sheet membrane Air Barriers NFPA Compliant Type	N	N					N				
Accessories					N						
07 42 13 Metal Composite Material Wall Panels											
Wall Panel System	N		N							N	
Materials	N		N								N
Finishes	N	N				N					
Accessories	N		N		N						
07 54 23 TPO Membrane Roofing System											
Membrane	N										
Insulation/Underlayment	N	N	N								
Adhesives and Cleaners	N				N	N					
Fasteners and Plates	N		N								
Metal Edging and Membrane Terminations	N		N								
Walkways											
Air and Vapor Barrier											
Accessories											
07 62 00 Sheet Metal Flashing and Trim											
Materials	N		N								
Accessories	N		N		N						
07 81 00 Applied Fire Proofing											
Materials		N			N	N					
07 84 43 Firestopping											
Materials		N			N					N	
Accessories					N	N					
07 92 00 Joint Sealants											
Sealant Materials					N						
Accessories	N	N			N	N					
DIVISION 08 OPENINGS											
08 11 13 Hollow Metal Doors and Frames											
Doors	N	N	N							N	
Hollow Metal Frames	N	N	N							N	
Finishes			N								
Accessories			N			N					
08 14 26 Plastic Laminate Clad Wood Doors											
Doors	N	N	N	N				N		N	
Door and Panel Cores	N	N	N	N				N		N	
Door Facings	N	N	N	N	N			N		N	
Accessories											
Door Construction											
08 31 00 Access Doors and Panels											
Access Panels for Fire Resistance Rated Construction			N								
Access Panels for Non-Rated Construction			N								
Anti Ligature Access Panels											
Accessories											
08 41 13 Aluminum-Framed Entrances and Storefronts											
Materials	N	N	N								
Storefront Framing System	N	N									
Doors	N	N	N							N	
Glazing	N	N			N						
Hardware	N		N								
Aluminum Finishes											
08 42 43 Intensive Care Unit / Critical Care Unit Entrances											

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Entrance Assemblies											
Components											
08 71 00 Door Hardware											
Scheduled Door Hardware	N	N									
Hanging Devices	N	N									
Power Transfer Devices											
Door Operating Trim											
Cylinders and Keying	N	N									
Key Control	N	N									
Mechanical Locks and Latching Devices	N	N									
Electromechanical Locking Devices											
Lock and Latch Strikes	N	N									
Conventional Exit Devices	N	N									
Electromechanical Exit Devices	N	N									
Door Closers	N	N									
Surface Mounted Closer Holders	N	N									
Architectural Trim	N	N									
Door Stops and Holders	N	N									
Architectural Seals	N	N									
Electronic Accessories											
Finishes											
08 80 00 Glazing											
Glass Products	N	N			N						
Glass - Types	N	N									
Fabrication											
Accessories					N	N					
Accessories for Wire-less Fire-rated Glazing											
08 87 00 Glazing Surface Films											
Glazing Film					N						
Accessories					N						
DIVISION 09 FINISHES											
09 05 06 Common Work Results for Flooring	N	N				N					
09 22 16 Non Structural Metal Framing											
Framing Materials	N		N								
Flexible Track Assemblies	N		N								
Deflection Track Assemblies	N		N								
Ceiling Soffit Framing Materials	N		N						N		
Accessories											
09 00 05 Resilient Floors	N	N	N		N	N					
09 00 07 Painting	N	N				N					
09 21 16 Gypsum Board											
Board Materials	N	N	N						N	N	
Accessories	N		N		N						
09 30 00 Tiling											
Tile	N	N				N					
Setting Materials	N	N			N	N					
Grouting Materials	N	N			N	N					
Accessories						N					
09 51 13 Acoustical Ceilings											
Acoustical Units	N	N							N		
Suspension Systems	N	N	N						N		
Accessories					N						
09 65 13 Resilient Base and Accessories											
Resilient Base	N	N	N			N					
Accessories	N				N						
09 65 00 Resilient Sheet Flooring											
Resilient Sheet Flooring RS-1 & RS-2	N	N	N			N					

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Accessories	N	N	N		N		N					
09 65 19 Resilient Tile Flooring												
Luxury Vinyl Tile	N	N	N		N		N					
09 65 23 Rubber Flooring												
Rubber Tile Flooring	N	N	N				N					
Rubber Stair Treads/Risers and Landings	N	N			N							
Accessories					N							
09 65 43 Linoleum Flooring												
Linoleum Flooring	N	N	N				N					
Accessories	N	N			N							
09 67 23 Resinous Flooring												
Flooring System	N	N			N		N					
Product Mixing												
Accessories	N		N				N					
09 72 13 High Impact Wall Coverings												
Wall Covering WP-1 & WP-2	N	N	N							N		
Wall Covering WP-3	N	N	N							N		
Accessories	N	N			N					N		
09 72 23 Hygienic Wall Coverings												
Hygienic Wall Covering	N	N	N							N		
Accessories	N	N			N					N		
09 81 00 Acoustical Insulation												
Interior Acoustical Wall Panels	N	N	N		N					N	N	
09 90 00 Paints and Coating												
Paint Materials, General	N	N				N						
Accessories	N	N				N						
09 91 13 Exterior Painting Schedule												
09 91 23 Interior Painting Schedule												
DIVISION 10 SPECIALTIES												
10 11 23 Marker Boards and Tack Boards												
Tack Boards	N	N	N		N							
Frameless Dry Marker Boards	N	N	N									
10 11 24 Tackable Wall Systems												
Tackable Wall Systems	N	N	N							N		
10 21 33 Cubical Curtains and Track												
Curtain Support Track	N	N	N							N		
Cubicle Curtains	N	N										
10 26 00 Wall and Door Protection												
Components												
10 28 13 Toilet Accessories												
Materials			N									
Accessories												
Splash Guard												
Installation Accessories												
10 44 00 Fire Protection Specialties												
Fire Extinguishers												
Fire Extinguisher Cabinets												
Accessories												
10 51 13 Metal Lockers												
Materials				N								
Locker Units				N								
10 82 00 Louvered Roof Top Equipment Screens												
Extruded-Aluminum Roof Top Equipment												
Aluminum Finishes												
DIVISION 12 FURNISHINGS												
12 24 00 Window Shades												
Shade Cloth	N	N								N		

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Shade Band	N	N										
Shade Fabrication Components												
12 48 13 Entrance Floor Mats and Frames												
Entrance Floor Mats and Frame Components	N	N			N		N					
DIVISION 21 FIRE SUPPRESSION												
21 00 01 Fire Protection					N							
DIVISION 22 PLUMBING												
22 00 01 Plumbing					N							All Toilets, Urinals, Showerheads, and Lavs must be Water Sense.
DIVISION 23 HEATING VENTILATING AND AIR CONDITIONING												
23 00 01 Heating, Ventilating, and Cooling					N							
23 70 00 Closed Loop Geothermal Heat Exchanger					N							
DIVISION 26 ELECTRICAL												
26 00 01 Electrical					N							
26 09 43 Network Lighting Control System					N							
26 55 61 Emergency Radio Communication System					N							
DIVISION 27 COMMUNICATIONS												
27 22 21 Communication Systems					N							
DIVISION 28 ELECTRONIC SAFETY AND SECURITY												
28 15 00 Integrated Access Control Hardware Devices					N							
DIVISION 31 Earthwork												
31 11 00 Clearing Grubbing & Stripping					N							
31 20 01 Earth Moving For Building Foundations and Slabs												
Soil Materials				N								
3123 00 Site Earthwork												
Excavated Materials												
Final Backfill for Water and Sewer Lines												
Bedding, Haunching and Initial Backfill Material												
Water												
DIVISION 32 Exterior Improvements												
32 05 00 Gravel and Aggregate Base Courses												
Geotextile Fabric for Subgrade												
Gravel Subbase												
Aggregate Surface/Leveling Course												
32 12 00 Bituminous Concrete Paving												
General	N											
Composition of Mixture			N									Specify LEED compliant SR value of at least 0.32.
Weather Limitations												
Bituminous Mixing Plant and Testing												
32 14 00 Unit Paving												
Concrete Pavers	N		N									Specify LEED compliant Initial SR value of at least 0.33
Curbs and Edge Restraints												
Aggregate Setting-Bed Materials												
32 16 00 Portland Cement Site Concrete												
Materials	N		N									Portland Cement. Specify LEED compliant SR value of at least 0.33
32 33 00 Site Furnishings												
Benches												
Tables and Chairs												
Adirondak Chairs												
Metal Screens												
Materials												
Aluminum Finishes												
Steel and Galvanized Steel Finishes												
Iron Finishes												
Stainless Steel Finishes												
32 91 13 Soil Preparation												
Materials												
Planting Soils Specified by Composition												
Inorganic Soil Amendments												
Organic Soil Amendments												
Fertilizers												
32 93 00 Planting on Grade												
Plant Material												
Water												

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Mulches												
Pesticides												
Accessories												
DIVISION 33 Utilities												
33 05 16 Utility Structures - Storm Manholes				N								
33 11 16 Water Systems												
33 31 00 Sewer Pipe												
33 41 00 Drainage System												
33 71 19 Electrical Underground Ducts and Handholes												
33 79 00 Site Grounding												

UVM Outpatient Surgery Center

LEED for New Construction v4 - BD+C

LEED Checklist - 100 DD Review

12/23/2022

Project Information	Design Team
LEED Site Area: 446,151 SF LEED Occupancy: TBD FTEs Gross Square Footage: 84,758 SF	UVMCC : Organization, Owner/Client AGE : Organization, Owner Agency E4H : E4H Architects, Architect TT : Thornton Tomasetti, Sustainability Consultant KL : Krebs and Lansing, Civil Engineer WH : Wagner Hodgson, Landscape Architect CES : CES, MEP LC : Organization, Lighting Consultant CES : CES, Plumbing EM : Organization, Energy Manager ACOU : Organization, Acoustical CxA : CxAssociates, Cx. Agent CM : Organization, Construction Manager SE : Organization, Structural Engineer
LEED Point Status	
46 'Yes' Points 6 'Opportunity' Points	

Yes ?+ ?- No	Credit Requirements	Total Points	Primary Resp.	Other Team Members	Project Status / Notes	Action Items
0 0 1 0	Integrative Process	1				
1 0 0 0	IP 1 Integrative Process	1				
	<p>v4.0 Energy Modeling: Perform simple box model before completion of SD and assess two strategies associated with a variety of building design, operation, and landscape strategies and ECMs. Water-Related Systems: Perform a preliminary water budget analysis before the completion of SD that explores how to reduce potable water loads in the building.</p> <p>v4.1 <input checked="" type="checkbox"/> Develop a project team letter at SD including sustainability goals and describe analysis of at least two of the following: Energy Systems, Water Systems, Site Selection, Social Equity, and Health & Wellbeing. The letter must be signed by all principal project team members and made available to key stakeholders including, but not limited to the owner(s), facility manager(s), tenant(s), and community members.</p>		TT	Team		TT sent over LEED v4.1 language from the team, E4H to provide confirmation that the requirements were met and that a project letter can be pulled together. This has not yet been received. On 12/20/22 meeting, E4H confirmed they would review this.
1 1 0 14	Location & Transportation	16				
	LT 1 LEED For Neighborhood Development	8 to 16				
	<p>v4.0 <input type="checkbox"/> Certified LEED-ND Location (8 pts)</p> <p>v4.0 <input type="checkbox"/> Silver LEED-ND Location (10 pts)</p> <p>v4.0 <input type="checkbox"/> Gold LEED-ND Location (12 pts)</p> <p>v4.0 <input type="checkbox"/> Platinum LEED-ND Location (15 pts)</p>	8 10 12 15				
1 0 0 0	LT 2 Sensitive Land Protection	1				
	<p>v4.0 <input type="checkbox"/> Option 1: Locate the development footprint on land that has been previously developed</p> <p>v4.0 <input checked="" type="checkbox"/> Option 2: Locate the development footprint on land that has been previously developed or that does not meet -Prime Farmland, Floodplains, Habitat, Water body & wetland - for sensitive land</p>		TT	KL	The project boundary appears to be on a wetland, this credit is not anticipated.	
2 0 0 0	LT 3 High Priority Site	1 to 2				
	<p>v4.0 <input type="checkbox"/> Option 1: Historic District (infill)- Locate the project on an infill location in a historic district</p> <p>v4.0 <input checked="" type="checkbox"/> Option 2: Priority Designation- Locate the project on a site listed by EPA National Priorities List / FEZ/ FEC/ FRC/DDA</p> <p>v4.0 <input type="checkbox"/> Option 3: Brownfield Remediation - Locate on a brownfield where soil or groundwater contamination has been identified</p> <p>v4.1 <input type="checkbox"/> Option 1, Path 1: Economically Disadvantaged Community location: Available if project is in a census tract with household income below 80% Area Median Income, 20% of population below state poverty rate, or 150% state unemployment rate.</p> <p>v4.1 <input type="checkbox"/> Option 2, Path 1: Equitable Development: Develop Equity Plan</p> <p>v4.1 <input type="checkbox"/> Option 2, Path 2: Affordable Housing in Residential or Mixed-Use Projects: Provide 10% rental units and/or 5% of sale units priced to be affordable to be households earning less than AMI.</p>	1 1 2 1 1 1	TT		Due to the site location, this credit is not achievable.	

Yes	?+	?-	No	Credit Requirements	Total Points	Primary Resp.	Other Team Members	Project Status / Notes	Action Items
			5	LT 4 Surrounding Density and Diverse Uses	1 to 5				
			v4.0	x Option 1: Surrounding Density (2-3 pts) - Locate on a site whose surrounding existing density within a 1/4 mile radius of the project boundary	2 to 3	TT		Given the project location these credits do not seem feasible.	
			v4.0	Option 2: Diversity of Uses (1-2 pts): The building's main entrance is within a 1/2-mile walking distance to seven (1 point) or eight or more (2 points) publicly available diverse uses. Use types include Food Retail, Community-Serving Retail, Services, Civic and Community Facilities and Community Anchor Uses.	1 to 2				
			v4.1	Option 3: Walkable Location: Points are awarded based on Walkscore: >90- 5 points, >80 - 4 points, >70 - 3 points, >60 - 2 points, or >50 - 1 point.	1 to 5				
			5	LT 5 Access to Quality Transit	5				
			v4.0	x Locate any functional entry of the project within a 1/4 mile walking distance of existing/planned bus, streetcar, rail or ferry, OR within 1/2 mile walking distance of existing or planned bus rapid transit stops, rail, ferry terminals.	1 to 5	TT		Tilley Drive shuttle only operates on weekdays, this credit is not anticipated. The OPR Includes language on potentially expanding local bus service to the area, the main form of transport is currently cars. City of South Burlington may expand the bus network.	
			v4.1	Locate any functional entry of the project within a 1/4 mile walking distance of existing/planned bus, streetcar, rail or ferry, OR within 1/2 mile walking distance of existing or planned bus rapid transit stops, rail, ferry terminals.	1 to 5				
			v4.1	Path 2. Access to Project-sponsored Transit Service. 30 trips for 1 point, 45 trips for 2 points. A shelter must be provided and paid transit home for emergencies and unscheduled overtime. .	1 to 2				
			1	LT 6 Bicycle Facilities	1				
			v4.0	x Short-term bike storage must be provided for at least 2.5% of all peak visitors within 100 feet of main entrance, no fewer than 4 spaces & long-term bike storage must be provided for at least 5% of all regular building occupants within 100 feet of any functional entry. At least one on-site shower with changing facility will need to be provided for the first 100 regular building occupants and one additional shower for every 150 regular building occupants thereafter (see notes for Case 2: Residential Project requirements). Additionally, bike storage must be located within 200 yards of a bike network that connects riders to at least one of the following: 1) at least 10 diverse uses 2) a school or employment center or 3) a bus rapid transit or rail station.		TT	E4H	This credit is not anticipated due to the lack of a bike network around the building.	
			v4.1	Bike storage and shower quantities per LEEDv4.0 requirements. Short-term bicycle storage must be within 200 feet (60meters) walking distance of any main entrance. Long-term bicycle storage must be within 300 feet (90 meters) walking distance of any functional entry.					
1				LT 7 Reduced Parking Footprint	1				
			v4.0	x Do not exceed the minimum local code requirements for parking capacity, and provide parking capacity that achieves a 20% Reduction from the base ratio.				There are 270 spaces planned. Medical Office base ratio is 4.5/1000 sf The base ratio for the project is 382 spots, a 20% reduction from this is 305. This credit is anticipated.	There appear to be 264 spots planned, this is below the parking reduction quantity required to earn the credit. This credit is anticipated.
			v4.1	Do not exceed the minimum local code requirements for parking capacity, and provide parking capacity that achieves a 30% reduction from the base ratios outlined in the Institute of Transportation Engineers' Transportation Planning Handbook. Projects with no off-street parking meet the requirements.					
			v4.1	Provide dedicated parking for carshare vehicles for a minimum of two years. Provide carshare vehicle parking space(s) for at least 1% of total parking spaces, rounded up. If the project has fewer than 100 parking spaces, provide one carshare vehicle parking space.					
	1			LT 8 Green Vehicles	1				
			v4.0	x Option 1: Install electrical vehicle charging station in 2% of parking spaces used by the project or at least two spaces AND designate 5% of all parking spaces used by the project as preferred parking for green vehicles. Clearly identify these spaces as reserved.		TT	E4H	CES sent Level 2 charging specification to TT that meet LEED requirements.	There are a mix of 8 Level 2 EV, 2 Level 1 EVs, and 6 Future EV stations on the plans. The v4 option can be pursued which requires 6 Level 2 EV charging stations which is already planned. The credit also requires 14 spaces with signage that call out "preferred parking for green vehicles." This is not yet called out in the drawings. KL confirmed that the signage will be incorporated by 100% CD.
			v4.0	Option 2: Liquid, gas, or battery facilities should be available and capable of refueling a number of vehicles per day equal to at least 2% of all parking spaces AND designate 5% of all parking spaces used by the project as preferred parking for green vehicles.					
			v4.1	Option 1: Install EV supply equipment in 5% of all parking spaces used by the project or at least two spaces. Clearly identify these spaces as reserved.					
			v4.1	Option 2: Make 10% of parking spaces or at least 6 spaces EV Ready. To be EV Ready, include a dedicated electrical circuit with capacity for each required space, each circuit should have conduit and wire sufficient to provide at least Level 2 charging, and should end at an electrical box/enclosure near each required space.					

Yes ?+ ?- No		Credit Requirements	Total Points	Primary Resp.	Other Team Members	Project Status / Notes	Action Items
2 0 0 8		Sustainable Sites	10				
Y		SS p1 Prereq: Construction Activity Pollution Prevention	NA				
v4.0	x	ESC measures on-site that comply with 2012 EPA CGP standard.		KL	CM	ESC Plans received in DD set	
v4.1		ESC measures on-site that comply with 2017 EPA CGP standard.					
1		SS 1 Site Assessment	1				
v4.0	x	Complete and document a site survey or assessment that includes the following information: topography, hydrology, climate, vegetation, soils, human use, and human health effects.		TT	E4H / KL / WH	Site assessment worksheet is complete.	
		SS 2 Site Development, Protect or Restore Habitat	1 to 2				
v4.0		Option 1: On-site Restoration - Using native or adapted vegetation, restore 25% of all portions of the site as previously disturbed (including building footprint). Preserve and protect from all development and construction activity 40% of the greenfield area on the site (if such area exists).	2			10/29 meeting note: The site area has not been regraded since farm land, north end of the parking lot has been untouched. TT to evaluate as landscape plan progresses. On 5/4 meeting, KL confirmed that 100% of the project site is a greenfield area, this credit was moved to "No".	
v4.0		Option 2: Financial Support - Provide at least \$0.40 per square foot for the total site area (including the building footprint) to a land trust or conservation organization within the same EPA Level III ecoregion of the project's state.	1				
v4.1	x	Option 1: On-site Restoration - Using native or adapted vegetation, restore 15% (1 pt.) or 25% (2 pt.) of all portions of the site as previously disturbed (including building footprint). Plants must include a minimum of 6 species and a 30sf pollinator garden.	1 to 2	WH			
		SS 3 Open Space	1				
v4.0	x	Designate 30% of total site area (including building footprint) as open space. A minimum of 25% of that outdoor space must be vegetated. Pedestrian-oriented paving/turf, recreation-oriented paving/turf and garden space can contribute towards compliance.		WH	E4H	Given the site boundary, this credit is not anticipated.	
		SS 4 Rainwater Management	1 to 3				
v4.0		Option 1: Percentile of Rainfall Events: Zero lot line projects - 85th Percentile (3 pts)	3			KL confirmed on 5/2 meeting that after reviewing LEED credit requirements, the gravel wetlands do not meet the intent of the credit. LEED requires 100% of the targeted percentile rain event that falls on the LEED Boundary to be reused or infiltrated on site, detention is not sufficient.	
v4.0		Option 2: Natural Land Cover Conditions (3 pts) - Manage on-site the annual increase in runoff volume from the natural land cover condition to the post developed condition.	3				
v4.1		Option 1: Percentile of Rainfall Events - Manage runoff on-site (replicating natural site hydrology processes) for a certain percentile of local rainfall events using LIDs and green infrastructure	1 to 3				
v4.1	x	Option 2: Natural Land Cover Conditions (3 pts) - Manage on-site the annual increase in runoff volume from the natural land cover condition to the post developed condition. (80th-1pt, 85th-2pt, 90th-3pt)	3	KL			
		SS 5 Heat Island Reduction	1 to 2				
v4.0	x	Option 1: Nonroof and Roof (2 pts) - Low-sloped roof to have an initial SRI value of 82 and a 3-year aged SRI value of 64. Additionally, hardscape material will need to be either shaded, installed as open-grid pavement, or specified with SR value of at least .33. Weighted calculations use- (areas of nonroof measures)/0.5 + (areas of high-reflectance roof)/.75 must be greater than or equal to the sum of total site paving area and total roof area.	2	TT	E4H / WH	The project has a lot of asphalt parking areas, this credit will be difficult to achieve. Consider specify hardscaping with an SR of .33 or higher and a roof with an SRI of 82 or greater, this credit is not anticipated.	
v4.0		Option 2: Parking Under Cover (1 pt) - Place a minimum of 75% of parking spaces under cover	1				

Yes ?+ ?- No				Credit Requirements	Total Points	Primary Resp.	Other Team Members	Project Status / Notes	Action Items
1				SS 6 Light Pollution Reduction	1				
	v4.0		x	Meet uplight and light trespass requirements using either the backlight-uplight-glare (BUG) method or calculation method. Property line is used as lighting boundary, and can be adjusted when located adjacent to public street, corridors, etc.		WH	WH / CES	WH confirmed on 5/2 meeting that fixtures that are Dark Sky compliant will be selected.	On 12/22 meeting, WL confirmed they believed this credit would be achieved. WL specified new compliant fixtures.
Yes ?+ ?- No				Water Efficiency	11				
Y				WE p1 Prereq: Outdoor Water Use Reduction, 30% Reduction	NA				
	v4.0			If irrigation is being provided, the landscape water requirement must be reduced by at least 30% from a calculated baseline. Irrigation calculations will need to be performed using the WaterSense Water Budget Tool.				WH confirmed no irrigation past the establishment period will occur on 5/2 meeting.	
	v4.0		x	Option 2: Reduced Irrigation - Reduce the project's landscape water requirement by at least 30% from the baseline for site's peak watering month		WH			
Y				WE p2 Prereq: Indoor Water Use Reduction, 20% Reduction	NA				
	v4.0		x	Reduce aggregate water consumption by 20% from a baseline for plumbing fixtures and meet efficiency requirements for appliances (dishwashers, clothes washers, ice machines, pre-rinse spray valves) and process water equipment (cooling towers, evaporative condensers). Water sense fixtures must be specified.		TT	CES / E4H / CES	<p>Most water usage is tied into process water potential ACP for Whole Building Water Use</p> <p>Fixtures:</p> <p>Lav (L1) Sloan Optima Faucet #EFB-187: 0.5 gpm Lav (L2): Sloan Optima Infrared Sensor Faucet #EBF-187 0.5gpm Urinal (U-1) Washbrook Model #6590.001: 0.125 gpf (WaterSense) WC-1 Sloan WES 111: 1.28 gpf (Not WaterSense- this required) Kitchen Sink: Elkay LKB721C: 1.5 gpm Showerhead: TBD assuming 1.5 gpm</p> <p>On 8/23 meeting, CES confirmed that S1 and S2 fixtures will only be used as surgical scrub, exam, or medication room sinks.</p>	<p>TT is in contact with GBCI about sterilizer exception, there is a possibility that GBCI does not approve the CIR and the project has to use a different sterilizer in order to pursue LEED certification.</p> <p>E4H to provide information on ice maker Ice-T12 and WSH-CCM Washer. These must be Energy Star rated. All ice machines must be energy star rated.</p> <p>There appear to be showers included in the design, please provide information in the plumbing fixture schedule.</p> <p>WC-1 is not Watersense, the plumbing fixture schedule calls out 1.28 gpf but the specified toilet only has 1.1/1.6 gpf options. Toilets must be WaterSense labeled.</p> <p>Current fixture flow rates and occupancy achieve a 23.58% water savings to meet the prerequisite.</p>
Y				WE p3 Prereq: Building Level Water Metering	NA				
	v4.0		x	Install permanent water meters and commit to sharing with USGBC for 5-year period.		TT	UVMC C	CES confirmed on 5/2 meeting that a building level water meter is present.	CES to check if utility meter meets the LEED requirements explained in the meeting minutes.
2				WE 1 Outdoor Water Use Reduction	1 to 2				
	v4.0		x	Option 1: No Irrigation (2 pts) - Show that landscape does not require permanent irrigation system beyond a two-year establishment period	2	WH		No irrigation is planned.	
	v4.0			Option 2: Reduced Irrigation (1-2 pts), 50%-100% - Reduce the project's landscape water requirement by at least 50%-100% from the baseline for site's peak watering month.	1 to 2				

Yes ?+ ?- No				Credit Requirements	Total Points	Primary Resp.	Other Team Members	Project Status / Notes	Action Items	
2	1	3		WE 2 Indoor Water Use Reduction, 25%-50%	1 to 6					
			v4.0	x 25%=1pt, 30%=2 pts, 35%=3 pts, 40%=4 pts, 45%= 5pts, 50%= 6pts. See WEp2 comments.	1 to 6	TT	CES / E4H / CES		With 107 FTES, and the following flow rates, 2 points are achieved: Consider the following flow rates: 1.28 gpf toilets 0.5 gpm lav faucets 1.0 gpm showerhead 1.0 gpm kitchenette sink 0.125 gpf urinal 31% water savings for 2 LEED points. CES confirmed on 8/23 that they will review fixture selections and check if 0.35 gpm lav faucets can be included in the design and check with UVM. This did not appear to be incorporated in the 50% CD set.	
			v4.1	Additional requirements for Schools, Retail, Hospitality, and Healthcare: use appliances that meet minimum requirements (1 point awarded for meeting all requirements in one of the tables).						
				WE 3 Cooling Tower / Process Water Use	1 to 2					
			v4.0	x Conduct a one-time potable water analysis, measuring at least five control parameters. Achieve the maximum number of water cycles without exceeding the allowed concentration levels of each parameter (up to 10 cycles) for 1 pt OR design the cooling tower to cycle more than 10 times by increasing the level of filtration (2 pts)	1 to 2	CES		No cooling tower is desired.		
			v4.1	Option 1: Conduct a one-time potable water analysis measuring at least five specified parameters. Meet the maximum number of cycles (1pt) OR increase the number of cycles by a minimum of 25% by increasing the level of treatment (2 pts)	1 to 2					
			v4.1	Option 2: Optimize water use for cooling: Designate baseline system using ASHRAE 90.1-2016 Appendix G (must include a cooling tower). Achieve increasing levels of cooling tower water efficiency with variable-speed fan cooling towers with a maximum drift of 0.002% of recirculated water volume and three cooling tower cycles	1 to 2					
			v4.1	Option 3: Process water use. Use at least 20% recycled alternative water for 1 point or 30% for 2 points to meet process water demand. Process water use must represent 10% of total building regulated water use (does not include water for cooling).	1 to 2					
				WE 4 Water Metering	1					
			v4.0	x Install permanent water meters for two of the following: irrigation, indoor plumbing fixtures and fittings, domestic hot water, boiler with aggregate projected annual water use of 100,000 gal or more, reclaimed water, or other process water.		CES	CES / WH	On 8/23 meeting, CES stated that water meters were removed as a VE item. TT was advised to move this credit to the "No" category. E4H noted that if this credit is needed it can be brought up with UVMC.		
18	2	2	11	Energy & Atmosphere						
Y				EA p1 Prereq: Fundamental Commissioning & Verification	NA					
			v4.0	x Commissioning agent to perform fundamental Cx services.		CxA		CxAssociates is on board.		
Y				EA p2 Prereq: Minimum Energy Performance	NA					
			v4.0	x Option 1 : Whole Building Energy Simulation: Demonstrate 5% improvement for NC, 3% for renovations, or 2% for CS projects in the proposed building performance rating compared with a baseline		EM		TT is running energy model		
			v4.0	Option 2: Prescriptive Compliance-ASHRAE 50% Advanced Energy Design Guide						
			v4.0	Option 3: Prescriptive Compliance-Advanced Buildings Core Performance Design Guide						
			v4.1	Comply with ANSI/ASHRAE/IESNA Standard 90.1-2016.						
Y				EA p3 Prereq: Building-Level Energy Metering	NA					
			v4.0	x Install building-level energy meters that can be aggregated to provide building-level data representing total building energy consumption, and share with USGBC for 5-year period.		TT	UVMC C	On 5/2 meeting, CES confirmed there is a whole building energy meter.		

Yes ?+ ?- No				Credit Requirements	Total Points	Primary Resp.	Other Team Members	Project Status / Notes	Action Items
Y				EA p4 Prereq: Fundamental Refrigerant Management	NA				
	v4.0			Zero use of CFC-based refrigerants in new HVAC systems.					CES to confirm zero use of CFC based refrigerants in the project.
5			1	EA 1 Enhanced Commissioning	2 to 6				
	v4.0	x		Option 1 (Path 1): Enhanced Systems Commissioning (3 pts) - commissioning process (CxP) activities for MEP and renewable energy systems and assemblies in accordance with ASHRAE Guideline 0–2005 and ASHRAE Guideline 1.1–2007 for HVAC&R systems	3	CxA		On 5/2 meeting, CxAssociates confirmed that envelope and enhanced commissioning are being pursued.	
	v4.0			Option 1 (Path 2): Enhanced and Monitoring-Based Commissioning (4 pts) - Achieve Path 1 + Develop monitoring-based procedures and identify points to be measured and evaluated to assess performance of energy- and water-consuming systems and/or	4				
	v4.0			Option 2: Envelope Commissioning (2 pts) - Fulfill the requirements in EA Prerequisite Fundamental Commissioning and Verification as they apply to the building's thermal envelope in addition to mechanical and electrical systems and assemblies	2				
	v4.1			Option 1 (Path 1): Enhanced Systems Commissioning (3 pts) - commissioning process (CxP) activities for MEP and renewable energy systems and assemblies in accordance with ASHRAE Guideline 0–2013 and ASHRAE Guideline 1.1–2007 for HVAC&R systems	3				
	v4.1			Option 2: Envelope Commissioning (2 pts) - Fulfill the requirements in EA Prerequisite Fundamental Commissioning and Verification as they apply to the building's thermal envelope in addition to mechanical and electrical systems and assemblies	2				
12	2		4	EA 2 Optimize Energy Performance	1 to 18				
	v4.0	x		Option 1: Whole-building energy simulation (1-18 pts) - Analyze efficiency measures during design and demonstrate a % improvement by following EA Prereq Min Energy Performance.	1 to 18	EM	E4H		Preliminary calculations show at least a 20% energy cost savings reduction, TT ran the EApc95 calculator and the project is achieving 12 points based on the 100% DD model.
	v4.0			Option 2: Prescriptive compliance: ASHRAE Advanced Energy Design Guide (1-6 pts) - Implement and document compliance with the applicable recommendations and standards in Chapter 4, Design Strategies and Recommendations by Climate Zone, for the appropriate ASHRAE 50% Advanced Energy Design Guide and climate zone	1 to 6				
	v4.1			Option 1: Energy Performance Compliance (1-18 points): Demonstrate a Performance Cost Index (PCI)1 below the Performance Cost Index Target (PCIT) calculated in accordance with ASHRAE Standard 90.1-2016, Appendix G, Table 4.2.1.1.	1 to 18				
	v4.1			Option 2: Prescriptive compliance: ASHRAE Advanced Energy Design Guide (1-6 pts) - Implement and document compliance with the applicable recommendations and standards in Chapter 4, Design Strategies and Recommendations by Climate Zone, for the appropriate ASHRAE 50% Advanced Energy Design Guide and climate zone	1 to 6				
	v4.1			Option 3: Systems Optimization (1 to 6 pts): Demonstrate an improvement beyond ASHRAE 90.1–2016, for Interior and Exterior Lighting; Daylight controls; Building envelope; HVAC and service water heating equipment efficiency; and Equipment and appliances.	1 to 6				
			1	EA 3 Advanced Energy Metering	1				
	v4.0	x		Install advanced energy metering for all whole-building energy sources used by the building, and any energy end use that represents 10% or more of the total annual consumption of the bldg.		CES	EM	This is not desired.	
			2	EA 4 Demand Response / Grid Harmonization	1 to 2				
	v4.0			Case 1: Demand Response Program available (2 pts) - Design a system with the capabilities of DR. Enroll in a 1-year contract with qualified DR program for at least 10% of estimated peak electricity demand. Include as part of Cx scope of work.	2			This will not be pursued because this is a medical facility.	
	v4.0			Case 2: Demand Response Program not available (1 pt) - Provide infrastructure to take advantage of future demand response programs (installation of interval recording meters with communications)	1				
	v4.1			Case 1: Demand Response Program available (2 pts) - Design a system with the capabilities of DR. Enroll in a 1-year contract with qualified DR program for at least 10% of estimated peak electricity demand. Include as part of Cx scope of work.	2				
	v4.1			Case 2: Demand Response Capable Building (1 pt) - Have infrastructure to take advantage of future demand response programs (installation of interval recording meters with communications)	1				
	v4.1			Case 3: Load Flexibility and Management Strategies (2 pts): Analyze building's annual load shape and peak load as calculated for prereq Min EP. Implement one or more load flexibility and management strategy.	1 to 2				
			3	EA 5 Renewable Energy Production	1 to 3				
	v4.0			Use RE systems to offset building energy costs from the Min EP prereq. Additionally, solar gardens or community renewable energy systems are allowed to achieve compliance. Follow up conversation with D&W will be necessary.	1 to 3			No PV Planned	
	v4.1			Use on-site renewable energy systems or procure renewable energy from offsite sources for all or a portion of the building's annual building energy use.	1 to 5				

Yes ?+ ?- No				Credit Requirements	Total Points	Primary Resp.	Other Team Members	Project Status / Notes	Action Items
1				EA 6 Enhanced Refrigerant Management	1				
	v4.0	x		Option 1: No Refrigerants or low-impact refrigerants (1pt) - Do not use refrigerants, or use only refrigerants (naturally occurring or synthetic) that have an ozone depletion potential (ODP) of zero and a global warming potential (GWP) of less than 50		CES			CES to confirm that the project is able to meet this credit with chillers. There are chillers planned based on the 100DD set. TT to send the offline calculator for CES to complete. This has not yet been received as of the 50% CD set.
	v4.0			Option 2: Calculation of refrigeration impact - Select refrigerants that are used in HVAC&R equipment to minimize or eliminate the emission of compounds that contribute to ozone depletion and climate change.					
	v4.1			Option 2: Calculation of refrigeration impact - comply with ASHRAE Standard 15-2019, implement a refrigerant management plan, and select refrigerants to minimize or eliminate ODP and GWP.					
	2			EA 7 Green Power and Carbon Offsets, 50%, 100%	1 to 2				
	v4.0	x		Engage in a contract (green power, RECs or carbon offsets) for a minimum of 5 years. The decision to pursue this credit can occur during construction. 50% = 1 point, 100% = 2 points	1 to 2	UVMCC	TT	Credits can be purchased during construction if needed.	
4	2	0	7	Materials & Resources	15				
Y				MR p1 Prereq: Storage and Collection of Recyclables	NA				
	v4.0	x		Dedicated areas for recycling collection to be provided. Space must be provided for recycling of e-waste, batteries, or mercury-containing light bulbs.		TT	E4H / UVMC C	There is a trash compactor area on the basement level. Recycling bins provided throughout, G017 is trash compactor room.	UVM to provide a narrative confirming that there will be frequent pick up of trash and recycling and that this area will be sized for the occupancy of the UVMCC OSC. Confirm the volume of waste pick up.
Y				MR p2 Prereq: Construction and Demolition Waste Management Planning	NA				
	v4.0	x		Develop and implement a CWM plan with diversion goals, and targeting at least 5 materials.		CM		CM to provide a project-specific waste management plan during construction	
	5			MR 1 Building Life-Cycle Impact Reduction	5				
	v4.0			Option 1: Historic Building Reuse (5 pts) - Maintain the existing building structure, envelope, and interior nonstructural elements of a historic building or contributing building in a historic district (building / district must be listed in local, state or national register of Historic places)	5			TT can provide an LCA for an additional fee.	
	v4.0			Option 2: Renovation of Abandoned or Blighted Building (5 pts) - Maintain at least 50%, by surface area, of the existing building structure, enclosure, and interior structural elements for buildings that meet local criteria of abandoned or are considered blight.	5				
	v4.1			Option 1: Building and Material Reuse - Path 1: Maintain Existing Structural Elements (1 to 5 points): Maintain the existing building structure and envelope.	1 to 5				
	v4.1			Option 1: Building and Material Reuse - Path 2: Maintain Interior Nonstructural Elements (1pt): Use existing interior nonstructural elements for at least 30% of the entire completed building, including additions.	1				
	v4.1	x		Option 2: Whole-Building Life-Cycle Assessment - Conduct an LCA of the structure and enclosure (1pt) that demonstrates a 5% reduction (2 pts) OR 10% reduction (3 pts) compared with a baseline in 3 of 6 impact categories (one must be GWP). One additional point for salvage/reuse.	2 to 4	TT	E4H / CM / SE		
1			1	MR 2 Building Product Disclosure & Optimization - Env Product Declarations	1 to 2				
	v4.0			Option 2: Multi-Attribute Optimization (1 pt) - Use products that comply with one of the criteria listed in LEED guide for 50%, by cost, of the total value of permanently installed products in the project	1				E4H to review TT's 100% DD spec review comments and incorporate language into the specifications.
	v4.1	x		Option 1: Environmental Product Declaration (1 pt) - Use at least 20 different permanently installed products sourced from at least 5 different manufacturers that meet the EPD requirements (industry-wide or product-specific type III LCAs)	1	CM	E4H		
	v4.1			Option 2: Embodied Carbon/LCA Optimization (1 pt) - Use at least 5 products that have a compliant embodied carbon optimization report or action plan separate from the LCA or EPD	1				
1			1	MR 3 Building Product Disclosure & Optimization - Sourcing of Raw Materials	1 to 2				
	v4.0			Option 2: Leadership Extraction Practices (1 pt) - Use products that meet at least one of the extraction criteria for at least 25% of total material cost: extended producer responsibility, bio-based materials, certified wood products, materials reuse, recycled content.					E4H to review TT's 100% DD spec review comments and incorporate language into the specifications.
	v4.1	x		Responsible Sourcing of Raw Materials (1 pt) - Use products sourced from different manufacturers that meet at least one of the responsible sourcing and extraction criteria for 15% (1pt) OR 30% (2pts) of the total value of permanently installed building products in the project.	1 to 2	CM	E4H		

Yes ?+ ?- No		Credit Requirements	Total Points	Primary Resp.	Other Team Members	Project Status / Notes	Action Items
1	1	MR 4 Building Product Disclosure & Optimization - Material Ingredients	1 to 2				
		v4.1 x Option 1: Material Ingredient Reporting (1 pt) - Use at least 20 different permanently installed products from at least 5 different manufacturers that use approved programs to demonstrate the chemical inventory of the product to at least 0.1%. This includes HPDs. AND/OR	1	CM	E4H	There is another potential point for specifying 5 products with Declare labels.	E4H to review TT's 100% DD spec review comments and incorporate language into the specifications.
		v4.1 x Option 2: Material Ingredient Optimization (1 pt) - Use products that have a compliant material ingredient optimization report or action plan. Use at least 5 permanently installed products sourced from at least three different manufacturers.	1	CM	E4H		
2		MR 5 Construction and Demolition Waste Management, 50%, 75%	1 to 2				
		v4.0 x Option 1: Diversion - Divert 50%-75% of total construction and demo materials from the landfill. Include at least 3-4 material streams.	1 to 2	CM		OPR calls out a waste diversion goal of 75%	
		v4.0 Option 2: Reduction of Total Waste Material (2 pts) - Do not generate more than 2.5 pounds of construction waste per square foot (12.2 kilograms of waste per square meter) of the building's floor area.	2				
		v4.1 Option 1: Diversion - Follow the Waste Management Plan and divert at least 50% of the total construction and demolition materials from landfills and incineration facilities.	1				
		v4.1 Option 2: Waste Prevention (1 to 2 pts): - Prevent waste through reuse and source reduction design strategies. Salvage or recycle renovation and demolition debris and utilize waste minimizing design strategies for new construction elements.	1 to 2				
8	1	0	7	Indoor Environmental Quality		16	
Y		EQ p1 Prereq: Minimum IAQ Performance	NA				
		v4.0 x Option 1: ASHRAE 62.1-2010 standard requirements. Additionally, provide direct outdoor airflow measurement devices capable of measuring minimum OA intake flow.		CES			CES to complete Minimum IAQ calculator, this will occur during CDs.
		v4.0 Option 2: CEN Standards EN 15251-2007 and EN 13779-2007					
		v4.1 Meet the requirements of ASHRAE Standard 62.1-2016 AND provide outdoor air monitors for mechanical ventilation systems with outdoor air intake flow greater than 1000 cfm.					
Y		EQ p2 Prereq: Environmental Tobacco Smoke Control	NA				
		v4.0 x Prohibit smoking inside building and prohibit smoking outside building except in designated areas located at least 25 feet from all entries, OA intake & operable windows. Also in spaces outside property line used for business purposes. Provide signage within 10 feet of all building entrances indicating the no smoking policy.		TT	E4H / UVMC C	TT received compliant no smoking policy from UVMC.	E4H to provide no smoking signage.
2		EQ 1 Enhanced IAQ Strategies	1 to 2				
		v4.0 x Option 1: Enhanced IAQ Strategies (1 pt) - Install entryway systems, sufficiently exhaust spaces with hazardous chemicals, and use MERV 13 filtration.	1	CES	E4H	Vest 1100 is 20 ft, Vest 1105 is 11 ft, Vest 1234 is 15 ft. These are all compliant with a WOM included.	E4H to provide WOM in Corridor GC06 and GC05, it is currently called out as resilient tile and not Walk off Mats are called out. Door closers and hard lid ceilings must be included at any area that may house hazardous chemicals, janitor's closets, etc. CES to provide a mechanical schedule that calls out MERV 13 filters for any systems providing outside air. CES confirmed on 12/20 meeting that filters and exhaust will be incorporated. CES to provide CO2 sensors in all densely occupied spaces. Please refer to space matrix for additional information.
		v4.0 x Option 2: Additional Enhanced Strategies (1 pt) - Select one of the following to pursue: exterior contamination prevention, increased ventilation, additional source control/monitoring, and natural ventilation room-by-room calculations.	1	CES	E4H	G034 has exhaust, Decontamination Room G010 has exhaust, HSKP G040 has exhaust, HSKP 1206, HSKP 1313	
		v4.1 Comply with 3 strategies for 1 point or 6 strategies for 2 points (Entryway systems, Interior cross-contamination prevention, Filtration of outdoor air, Filtration of recirculated air, Increased ventilation 15% or 30% ,Operable windows, Engineered natural ventilation, Carbon dioxide monitoring & Additional source control and monitoring)	1 to 2				
3		EQ 2 Low-Emitting Materials	1 to 3				
		v4.1 x Use materials on the building interior (everything within the waterproofing membrane) that meet low-emitting requirements. 1 pt for 2 product categories, 2 pts for 3, 3 pts for 4, 3 pts + exemplary performance for 5. (75% Paints and coatings, 75% Adhesives and sealants, 90% Flooring, 75% Wall panels, 90% Ceilings, 75% Insulation, 75% Furniture, 75% Composite wood)	1 to 3	CM	E4H		E4H to review TT's 100% DD spec review comments and incorporate language into the specifications.
1		EQ 3 Construction IAQ Management Plan	1				
		v4.0 x Develop and implement an IAQ Management plan for construction and preoccupancy phases. Protect absorptive materials from moisture damage and prohibit the use of tobacco products in the building and within 25' of building entrance during construction.		CM		This is anticipated.	

Yes ?+ ?- No				Credit Requirements	Total Points	Primary Resp.	Other Team Members	Project Status / Notes	Action Items
1	1			EQ 4 Indoor Air Quality Assessment	1 to 2				
		v4.0	x	Option 1: Path 1 - Before Occupancy Flush-out (1 pt) - Install new filtration media and perform a building flush-out by supplying a total air volume of 14,000 cubic feet of outdoor air per square foot	1	CM	UVMC C	1 point is available for a flush out, an additional point is available for air testing for VOCs and PM. This is a construction credit.	
		v4.0		Option 1: Path 2 - During Occupancy Flush-out (1 pt) - If occupancy is desired before the flush-out is completed, the space may be occupied only after delivery of a minimum of 3,500 cubic feet of outdoor air per square foot	1				
		v4.1		Option2: Air Testing, Path 1 - Particulate Matter and Inorganic Gases (1 pt) - Test particulate matter and demonstrate the contaminants do not exceed concentration limits.	1				
		v4.1	x	Option2: Air Testing, Path 2 - Volatile Organic Compounds (1 pt) - Perform a screening test for Total Volatile Organic Compounds.	1	CM	UVMC C		
		1		EQ 5 Thermal Comfort	1				
		v4.0	x	Option 1: ASHRAE Standard 55-2010 - Design HVAC and the building envelope to meet ASHRAE Standard 55-2010, Thermal Comfort Conditions for Human Occupancy, with errata or a local equivalent and provide thermal comfort control for each multi-occupant space & 50% of individual spaces.		CES	E4H	This is difficult in a medical facility	
		v4.0		Option 2: ISO and CEN Standards - Design HVAC systems and the building envelope to meet the requirements of the applicable standard					
1			1	EQ 6 Interior Lighting	1 to 2				
		v4.0	x	Option 1: Lighting Control (1 pt) - For at least 90% of individual occupant spaces, provide individual lighting controls with at least 3 lighting levels/scenes. All multi-occupant spaces must have multizone control systems, lighting for presentations to be separately controlled.	1	LC	E4H / CES	On 8/23 meeting, E4H confirmed that under cabinet task lights to be installed in rooms with multiple work stations and dimmable task lights in shared workstations to meet the credit intent. On 8/23 meeting, CES confirmed this could be met . E4H confirmed that under cabinet task lights can be installed in rooms with multiple work stations and dimmable task lights can be incorporated in shared workstations to meet the credit intent. E4H included narrative for how the nursing station space is used and how many people will be using those stations as more of a touch down space. They will provide task lights for each work station.	CES to provide 90% of all occupied spaces with dimming or multilevel control, task lights would need to be provided for the dictation/ computer areas and nurses stations. Please refer to space matrix for more information.
		v4.0	x	Option 2: Lighting Quality (1 pt) - Meet 4 of the 8 lighting quality options listed in the LEED Reference Guide (pg. 712). This includes light sources with a CRI of 80 or higher, rated life of at least 24,000 hours, using overhead lighting for 25% or less of total connected load, and meeting thresholds for surface reflectance (85% for ceilings, 60% for walls, and 25% for floors).	1	LC	E4H / UVMC C		
		v4.1		Meet 1 strategy for 1 point. Meet 3 strategies total for 2 points. (Glare control, Color rendering, Lighting control, Surface reflectivity)	1 to 2				
		3		EQ 7 Daylight	1 to 3				
		v4.1	x	Option 1: Simulation: Spatial Daylight Autonomy (1-3 pts) - Demonstrate through annual computer simulations that sDA _{300/50%} of at least 55% is achieved AND Demonstrate through annual computer simulations that annual sunlight exposure1000,250 (ASE1000,250) of no more than 20% is achieved OR	1 to 3		E4H	TT can perform daylight studies for an additional service.	
		v4.1		Option 2: Simulation: Illuminance Calculations (1-3 pts) - Demonstrate through computer modeling that illuminance levels will be between 300 lux and 3,000 lux for 9 a.m. and 3 p.m., both on a clear-sky day at the equinox OR	1 to 3				
		v4.1		Option 3: Measurement (1-3 pts) - Achieve illuminance levels between 300 lux and 3,000 lux for the floor area	1 to 3				
		1		EQ 8 Quality Views	1				
		v4.0		Achieve a direct line of sight to outdoors via vision glazing for 75% of all regularly occupied spaces, and meet at least 2 of the following 4 kinds of views: multiple lines of sight in different directions; views of sky, movement, flora/fauna, etc; views with distance of 3x head height of vision glazing; and views with view factor of 3 or greater.		TT	E4H	This credit is unlikely, there are many occupied areas without windows.	
		v4.1	x	Provide occupants in the building with a view to the outdoor natural or urban environment for 75% of all regularly occupied floor area. Views must include at least one of the following: nature, urban landmarks, art, or objects at least 25' from ext. glazing					
		1		EQ 9 Acoustic Performance	1				
		v4.0	x	For all occupied spaces meet requirements as applicable for HVAC background noise, sound isolation, reverberation time, and sound reinforcement and masking		ACOU	E4H / CES	This credit is not anticipated.	
		v4.1		For all occupied spaces, meet two of the following: HVAC background noise, Sound Transmission, and/or Reverberation time. Meet all three for an exemplary performance point.					
6	0	0	0	Innovation & Design	6				
1				ID 1.1 Innovation- (Green Building Education/ Designing with Nature)	1				
		v4.0	x					TT sent credit requirements for E4H to review	

Yes ?+ ?- No				Credit Requirements	Total Points	Primary Resp.	Other Team Members	Project Status / Notes	Action Items
1				ID 1.2 Exemplary Performance- 40 EPDs v4.0 <input checked="" type="checkbox"/>	1				
1				ID 1.3 Innovation in Design: Occupant Survey v4.0 <input checked="" type="checkbox"/>	1			TT sent credit requirements for UVMC to review	
1				ID 1.4 Innovation: Low Mercury Lighting v4.0 <input checked="" type="checkbox"/> Achieve one pilot credit from USGBC's LEED Pilot Credit Library	1				
1				ID 1.5 Pilot Credit: Integrated Analysis v4.0 <input checked="" type="checkbox"/>	1				
1				ID 2 LEED Accredited Professional v4.0 <input checked="" type="checkbox"/> At least one principal participant of the project team must be a LEED Accredited Professional (AP) with a specialty appropriate for the project.	1				Thornton Tomasetti meets this requirement.
3 0 0 1				Regional Priority (4 points max)	4				http://www.usgbc.org/rpc
			1	RP 1.1 Regional Priority: Rainwater Management (2 pt threshold)	1				
				RP 1.2 Regional Priority: Bicycle Facility (1 pt threshold)	1				
1				RP 1.3 Regional Priority: Reduced Parking Footprint (1 pt threshold)	1				
1				RP 1.4 Regional Priority: Optimize Energy Performance (9 pt threshold)	1				
				RP 1.5 Regional Priority: Surrounding Density and Diverse Uses (2 pt threshold)	1				
1				RP 1.6 Regional Priority: Site Assessment (1 pt threshold)	1				
46 6 5 53				Project Totals					

Certified 40-49 points Silver 50-59 points Gold 60-79 points Platinum 80-110 points