

01 11 00 SUMMARY OF WORK

- A. Scope: The Work of this Contract shall include the furnishing of all labor, materials, equipment, tools, construction equipment and machinery, water, heat utilities, transportation, insurance, taxes, superintendence, coordination and miscellaneous services required for the construction and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated into the Work. All Work shall be performed in strict accordance with the Contract Documents. In the event of conflict within the Contract Documents or within these Specifications, the provisions of the more stringent, as determined by the Owner or Architect, shall govern.

- B. Work of Other Related Sections: All other sections and documents contained herein also including the Contract Drawings.

- C. Contractor's Use of Premises:
 - 1. Contractor shall have complete and exclusive use of the premises for execution of the Work.
 - 2. On-site working rules for the Contractor, subcontractors, materials suppliers, and all employees.
 - a. Sexual harassment will not be tolerated. This shall include, but not be limited to, catcalls, whistling, hooting, physical gestures and suggestive wording or graphics on clothing.
 - b. Proper attire must be worn at all times. Unacceptable clothing shall include, but not be limited to, shorts and tank tops and tee-shirts with unacceptable wording or graphics.
 - c. Workers shall wear shirts at all times.
 - d. Unacceptable or foul language is not allowed.
 - e. Workmen shall not initiate conversation with nor shall they have contact of any kind with any of the facilities staff or employees. All conversation shall be directed to the Contractor's superintendent.
 - f. Smoking is not allowed.
 - g. Alcoholic beverages, weapons, and illegal non-prescription drugs are not allowed on the site. Persons caught introducing illegal or banned items onto the construction site will be asked to leave the site immediately and shall become eligible for dismissal.
 - 3. Assume full responsibility for the protection and safekeeping of Products under this Contract, stored on and off the site.
 - 4. Move any stored Products, under Contractor's control, which interfere with operations of the Owner or separate contractor.
 - 5. Obtain and pay for the use of additional storage or work areas needed for operations.
 - 6. Confine operations at site to areas permitted by law ordinances, permits and Contract Documents.
 - 7. Do not unreasonably encumber site with materials or equipment.
 - 8. Do not load structure with weight that will endanger structure.

- D. Site Investigation: The Contractor acknowledges that he has satisfied himself as to the nature and location of the Work, the general and local conditions, particularly those bearing upon transportation, disposal, handling and storage of materials, availability of labor, water, electric power, roads and uncertainties of weather, groundwater table or similar physical conditions at the site, the conformation and condition of the ground, the character, quality and quantity of surface and subsurface materials to be encountered, the character of equipment and facilities needed prior to and during the prosecution of the Work and all other matters which can in any way affect the Work or the cost thereof under this Contract. Any failure by the Contractor to acquaint himself with all the available information concerning these conditions will not relieve him from responsibility for estimating properly the difficulty or cost of successfully performing the Work.
- E. Hazardous Materials:
1. Do not incorporate into the Work hazardous materials or products (including, but not limited to, any mineral form of asbestos) as currently defined in the Resource Conservation and Recovery Act of 1976 (RCRA), the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), or Environmental Protection Agency (EPA) regulations, rules, or requirements, as amended, unless the Contract Documents give no other option than to provide a material or product which contains a hazardous material, component, constituent, waste, or leachate.
 2. In studying the Contract Documents and carrying out the Work, report in writing at once to the Owner or Architect the discovery of a product or material which contains hazardous materials, components, constituents, waste, or leachate.
 3. Do not incorporate in the Work a product or material which contains concentrations of a constituent, component, or material above the threshold levels which would require adherence to hazardous waste disposal regulations as currently defined, or could cause a release or threat or release of a hazardous substance at a level that would require a remedial response or removal action as currently defined by RCRA, CERCLA, or the EPA.
 4. Select materials and products meeting specified requirements which comply with EPA requirements as regards hazardous materials content. In making requests for substitutions, determine that materials and products proposed for substitution comply with RCRA, CERCLA, and EPA requirements.
- F. Partial Occupancy by The Owner Prior to Completion:
1. The Owner reserves the right of partial occupancy or use of facilities, services, and utilities, prior to Substantial Completion, without implying completion or acceptance of any part of the Project.
 2. Prior to such occupancy or use, procedures as outlined in Section 01 77 00, "Closeout Procedures" will be adhered to.
 3. The Contractor shall provide access to the building for the Owner's personnel plus provide the correct operation of the heating, ventilating, and air conditioning, and electrical system.
 4. Necessary restoration and repair of damage resulting from partial occupancy or use shall not be at the expense of the Contractor.

5. The Contractor shall also permit the Owner to place and install, or to have other Contractor's place and install, as much equipment during the progress of the Work as is possible before the final acceptance of the various parts of the Work, and shall coordinate such placing and installation of the equipment, so that it does not in any way whatever interfere with the progress of the Work or any portion of it.

G. Protection Requirements:

1. The Contractor shall protect all finished surfaces and surfaces to receive a finish material against any possible damage resulting from the conduct of Work by all Trades.
2. All finished surfaces, including factory-finished and job-finished items, shall be clean and not marred upon delivery of the building to the Owner. The Contractor shall, without extra compensation, refinish all such spaces where such surfaces prove to have been inadequately protected and are damaged.
3. Roof surfaces shall not be subjected to traffic nor shall they be used for storage of material. Where some activity must take place in order to carry out the Contract, adequate protection, subject to approval by the Owner or Architect, shall be provided.
4. The Contractor shall be responsible for the prevention of water or dust leakage into the building that is a result of the activities involved in the completion of the Project, and he shall provide the necessary devices or materials that he may deem necessary to provide such protection, all of which are subject to the approval of the Owner or Architect.
5. Tight wood sheathing shall be laid under any materials that are stored on finished cement surfaces. Reinforced non-staining Kraft building paper and plywood or planking shall be laid over all types of finished floor surfaces in traffic areas and before moving any material over these finished areas. Wheelbarrows, if used over such areas, shall have rubber-tired wheels.

H. Record Document Submittals:

1. General: As work progresses, prepare and maintain record documents as specified herein. Each record shall be certified by the Contractor. Do not use record documents for construction purposes; protect from deterioration and loss in a secure, fire-resistive location accessible to the Owner or Architect for reference during normal working hours. Upon completion, turn record documents over to the Owner or Architect.
2. Record drawings: Maintain a white-print set (blue-line or black-line) of contract drawings (including amendment and change order drawings) and shop drawings in clean, undamaged condition, with mark-up of actual installations which vary from the work as originally shown. Mark whichever drawing is most capable of showing "field" condition fully and accurately; however, a cross-reference at corresponding location on working drawings. Mark with red erasable pencil and, where feasible, use other colors to distinguish between variations in separate categories of work. Mark-up new information which is recognized to be of importance, but was for some reason not shown on either contract drawings or shop drawings. Give particular attention to concealed work, which would be difficult to measure and record at a later date. Note related change order number where applicable. Organize record drawing sheets into manageable sets, bind with durable paper cover sheets, and print suitable titles, dates and other identification on cover of each set.

3. Record specification: Maintain one copy of specifications, including amendments, change orders and similar notifications issued in printed form during construction, and mark-up variations in actual work in comparison with text of specifications and modifications as issued. Give particular attention to substitutions, selection of options, and similar information on work where it is concealed or cannot otherwise be readily discerned at a later date by direct observation. Note related record drawing information and product data, where applicable.
4. Record product data, certifications and laboratory test reports: Maintain one copy of each product data submittal, product certification, and laboratory test report and mark up significant variations in actual work in comparison with submitted information. Include both variations in product as delivered to site, and variations from manufacturer's instructions and recommendations for installation. Give particular attention to concealed products and portions of the work which cannot otherwise be readily discerned at a later date by direct observation. Note related change orders and mark-up of record drawings and specifications.

END OF SECTION – 01 11 00 SUMMARY OF WORK

01 25 00 SUBSTITUTIONS

- A. Requirements for requesting approval of proposed substitutions.
- B. Limitations on Substitutions
 - 1. General substitution requirements: The Contract is based on the materials, equipment, and methods described in the Contract Documents. Substitution or approval of alternative products may be considered by the owner only under the following conditions:
 - a. The Contractor shall place orders for specified materials and equipment promptly upon award of the Contract. No excuse for proposed substitution will be considered for materials and equipment due to unavailability unless proof is submitted that firm orders were placed with and accepted by the manufacturer within 40 days after the Notice to Proceed with the work of the Project.
 - b. The reason for the unavailability shall be taken to mean beyond the control of the Contractor. Unavailability will be construed as being due to strikes, bankruptcy, discontinuance of the manufacture of a product, or Acts of God.
 - c. Requests for such substitution shall be made in writing to the Owner or Architect after the award of a contract and within 10 days of the date on which the Contractor ascertains that he cannot obtain the material or equipment specified.
 - d. In certain instances, the manufacturer and/or the supplier of materials and services are required to receive the approval of the Owner and Architect. In other instances, approved manufacturers have been named outright. For either case, the approval by the Owner and Architect of a manufacturer or a supplier shall not relieve the manufacturer or that supplier from providing a product that fully meets the requirements of the Contract Documents.
 - 2. Availability of specified items:
 - a. Verify prior to bidding that all specified items will be available in time for installation during orderly and timely progress of the Work.
 - b. In the event specified item or items will not be so available, so notify the Owner or Architect prior to receipt of bids.
 - c. Costs of delays because of non-availability of specified items, when such delays could have been avoided by the Contractor, will be back charged as necessary and shall not be borne by the Owner.
 - 3. "Or equal":
 - a. Where the phrase "or an approved equal", "or equal as approved by the Owner or Architect" occurs in the Contract Documents, do not assume that material, equipment or methods will be approved as equal by the Owner or Architect unless the item has been specifically approved for this Work by the Owner or Architect.
 - b. The decision of the Owner or Architect shall be final.
 - 4. Substitutions will not be considered when indicated on shop drawings or product data submittals without separate formal request complying with "submittal procedures" specified in this section.
 - 5. Substitutions will not be considered unless submitted through the Contractor.

6. Additional studies, investigations, submittals, redesign and/or analysis by the Owner or Architect caused by the requested substitutions shall be paid by the Contractor at no expense to the Owner.
7. Substitute products shall not be ordered or installed without written acceptance by the owner.
8. Only one request for substitution for each product will be considered. When substitution is not accepted by the Owner or Architect, provide the specified product.
9. Owner or Architect will determine the acceptability of all substitutions.

C. Requests for Substitutions

1. Contractor's Representation

- a. Request for substitution constitutes a representation that the Contractor has investigated the proposed product and has determined that it is equal to or superior in all respects to the specified product.
- b. Request for substitution constitutes a representation that the Contractor will provide same type of warranty for substitution as for specified product. Contractor's warranty shall be in writing guaranteeing all substituted products have same or superior performance as the product specified.
- c. Request for substitution constitutes a representation that the Contractor will coordinate the installation of the accepted substitute, making such changes as may be required for the Work to be complete in all respects.
- d. Request for substitution constitutes a representation that the Contractor waives all claims for additional costs related to substitutions which consequently become apparent.
- e. Request for substitution constitutes a representation that the cost data is complete and includes all related cost under his Contract, but excludes any approved Owner or Architect's design fees required by substitution.
- f. Request for substitution constitutes a representation that the Contractor has thoroughly investigated the proposed substitute to determine if license fees and royalties are pending on the proposed substitute.

2. Requests for substitutions shall include the following information:

- a. Project title and Owner or Architect's project number.
- b. Identification of product specified including Specifications Section and Paragraph
- c. Identification of proposed substitute complete with manufacturer's name and address, trade name of product, and model or catalog number. Attach product data as specified in Section 01 33 00.
- d. List of fabricator and supplier (with address and phone number) for proposed substitute.
- e. The affect of substitution on dimensions, material thicknesses, wiring, piping, ductwork, etc. indicated in Contract Documents.
- f. The affect of substitution on other trades.
- g. The affect of substitution on construction schedule.
- h. Differences in quality and performance between specified product and proposed substitute.
- i. Comparison of manufacturer's guarantees of specified product and proposed substitute.

- j. Availability of maintenance services and replacement materials for proposed substitute.
- k. Cost data comparing proposed substitute with specified product, and amount of net change to Contract Sum.
- l. License fees and/or royalties pending on proposed substitute.

END OF SECTION – 01 25 00 SUBSTITUTIONS

01 29 00 PAYMENT PROCEDURES

- A. This Section specifies administrative and procedural requirements governing Contractor's Application for Payment.
 - 1. Coordinate the Schedule of Values and applications for Payment with the Constructor's Construction Schedule, List of Subcontracts, and Submittal Schedule.

- B. Schedule of Values:
 - 1. Coordinate preparation of Schedule of Values with preparation of the Contractor's Construction Schedule.
 - a. Correlate line items in the Schedule of Values with other required administrative schedules and forms, including:
 - 1) Contractor's construction schedule.
 - 2) Application for Payment form.
 - 3) List of subcontractors.
 - 4) List of products.
 - 5) List of principal suppliers and fabricators.
 - 6) Schedule of submittals.
 - b. Submit the Schedule of Values to the Owner at the earliest feasible date, but in no case later than 7 days before the date scheduled for submittal of the initial Application for Payment.
 - c. Sub-schedules: Where the Work is separated into phases that require separately phased payments, provide sub-schedules showing values correlated with each phase of payment.
 - 2. Format and content: use the Project manual Table of Contents as a guide to establish the format for the Schedule of Values.
 - a. Identification: Include the following Project identification on the Schedule of Values.
 - 1) Project name and location.
 - 2) Name of Architect
 - 3) Project number
 - 4) Contractor's name and address
 - 5) Date of submittal
 - b. Arrange the Schedule of Values in a tabular form with separate columns to indicate the following for each item listed:
 - 1) Generic name.
 - 2) Related Specification Section
 - 3) Name of subcontractor
 - 4) Name of manufacturer or fabricator.
 - 5) Name of Supplier.
 - 6) Change Orders (numbers) that have affected value.
 - 7) Dollar value
 - 8) Percentage of Contract Sum to the nearest one-hundredth percent, adjusted to total 100 percent.

- c. Provide a breakdown of the Contract sum in sufficient detail to facilitate continued evaluation of Applications for Payment and progress reports. Break principal subcontract amounts down into several line items.
- d. Round amounts off to the nearest whole dollar; the total shall equal the Contract Sum.
- e. For each part of the Work where an Application for Payment may include materials or equipment, purchased or fabricated and stored, but not yet installed, provide separate line items on the Schedule of Values for initial cost of the materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
- f. Margins of cost: Show line items for indirect costs, and margins on actual costs, only to the extent that such items will be listed individually in Applications for Payment. Each item in the Schedule of Values and Applications for Payment shall be complete including its total cost and proportionate share of general overhead and profit margin.

C. Applications for Payment:

1. Each Application for Payment shall be consistent with previous applications and payments as certified by the Architect and paid for by the Owner.
 - a. The initial Application for Payment at time of Substantial Completion, and the final Application for Payment involve additional requirements.
2. Payment application times: The date for each progress payment is the 15th day of each month unless indicated otherwise in the agreement. The period of construction Work covered by each application for Payment is the period ending 5 days prior to the date for each progress payment and starting the day following the end of the preceding period.
3. Payment application forms: Use AIA Document G702 and Continuation Sheets G703 as the form for Application for Payment.
4. Application preparation: Complete every entry on the form, including notarization and execution by person authorized to sign legal documents on behalf of the Owner. Incomplete applications will be returned without action.
 - a. Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revision have been made.
 - b. Include amounts of Change Orders and Construction Change Directives issued prior to the last day of the construction period covered by the application.
5. Transmittal: Submit 2 executed copies of each Application for Payment to the Owner by means ensuring receipt within 24 hours; one copy shall be complete, including waivers of lien and similar attachments, when required.
 - a. Transmit each copy with a transmittal form listing attachment, and recording appropriate information related to the application in a manner acceptable to the Owner.
6. Waivers of Mechanics lien: With each Application for Payment submit waivers of mechanics liens from subcontractors or sub-subcontractors 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 delays: Submit each Application for Payment with the Contractor's waiver of mechanics lien for the period of construction covered by the application.
 - e. Submit final Application for Payment with or preceded by final waivers from every entity involved with performance of Work covered by the application who could lawfully be entitled to a lien.
 - f. Waiver forms: Submit waivers of lien on forms, and executed in a manner, acceptable to Owner.
7. Initial application for payment:
- a. Administrative actions and submittals that must precede or coincide with submittal of the first Application for Payment include the following:
 - 1) List of subcontractors.
 - 2) List of principal suppliers and fabricators.
 - 3) Schedule of Values.
 - 4) Contractor's construction schedule (preliminary if not final).
 - 5) Schedule of principal products.
 - 6) Submittal schedule (preliminary if not final).
 - 7) List of Contractor's staff assignments.
 - 8) Copies of building permits.
 - 9) Copies of authorizations and licenses from governing authorities for performance of the Work.
 - 10) Report of pre-construction meeting.
 - 11) Certificates of insurance and insurance policies.
 - 12) Performance and payment bonds (if required).
 - 13) Data needed to acquire Owner's insurance.
 - 14) Initial settlement survey and damage report, if required.
8. 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.
 - b. Administrative actions and submittals that shall proceed or coincide with this application include:
 - 1) Occupancy permits and similar approvals.
 - 2) Warranties (guarantees) and maintenance agreements.
 - 3) Test/adjust/balance records.
 - 4) Maintenance instructions.
 - 5) Meter readings.
 - 6) Start-up performance reports.
 - 7) Change-over information related to Owner's occupancy, use, operation and maintenance.
 - 8) Final cleaning.
 - 9) Application for reduction of retainage, and consent of surety.

- 10) Advice on shifting insurance coverages.
 - 11) Final progress photographs where required.
 - 12) List of incomplete Work, recognized as exceptions to Architect's Certificate of Substantial Completion.
9. Final payment application:
- a. Administrative actions and submittals which must precede or coincide with submittal of the final payment Application for Payment include the following:
 - 1) Completion of Project closeout requirements.
 - 2) Completion of items specified for completion after Substantial Completion.
 - 3) Assurance that unsettled claims will be settled Assurance that Work not complete and accepted will be completed without undue delay.
 - 4) Transmittal of required Project construction records to Owner.
 - 5) Proof that taxes, fees and similar obligations have been paid.
 - 6) Removal of temporary facilities and services.
 - 7) Removal of surplus materials, rubbish and similar elements.
 - 8) Change of door locks to Owner's access.

END OF SECTION – 01 01 29 PAYMENT PROCEDURES

01 31 13 PROJECT COORDINATION

A. Project Coordination Scope:

1. Minimum administrative and supervisory requirements necessary for coordination of Work on the Project include, but not limited to:
 - a. Coordination and meetings.
 - b. Administrative and supervisory personnel.
 - c. Surveys and records or reports.
 - d. Limitations for use of site.
 - e. Special reports.
 - f. General installation provisions.
 - g. Cleaning and protection.
 - h. Conservation and salvage.
 - i. Work of other contractors outside the scope of this Contract but working in the immediate vicinity of this Site.
2. Contractor to also provide coordination with the Owner & the Owner's vendors, including but not limited to the following:
 - a. Furniture
 - b. Fuel
 - c. Fluids
 - d. IT
 - e. Security

B. Coordination and Meetings:

1. Prepare a written memorandum on required coordination activities. Include such items as required notices, reports and attendance at meetings. Distribute this memorandum to each entity performing work at the Project site. Prepare similar memorandum for separate contractors where interfacing of their work is required.
2. Coordination drawings: Prepare coordination drawings where work by separate entities requires fabrication off-site of products and shall indicate how work shown by separate shop drawings will interface and shall indicate sequence for installation. Comply with all requirements of the "Submittals" section.
3. Monthly coordination meetings: Hold monthly general Project coordination meetings 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. Conduct meetings in a manner which will resolve coordination problems. Record results of the meeting and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.
 - a. At Contractor's option, monthly coordination meetings can be held integrally with monthly progress meetings as specified in other sections of this specification.
 - b. All meetings can be held online with Owners prior approval.

C. Limitations on Use of The Site:

1. Limitations on-site usage as well as specific requirements that impact site utilization are indicated on the Drawings and by other Contract Documents. In addition to these limitations and requirements administer allocation of available space equitable among entities needing both access and space so as to produce the best overall efficiency in performance of the total work of the Project. Schedule deliveries so as to minimize space and time requirements for storage of materials and equipment on site.

D. Special Reports:

1. Submit special report directly to the Owner within one day of an occurrence. Submit a copy of the report to the Architect and other entities that are affected by the occurrence.
2. Reporting unusual events: When an event of an unusual and significant nature occurs at the site, prepare and submit a special report. List chain of events, persons participating, response by the Contractor's personnel, an evaluation of the results or effects and similar pertinent information. Advise the Owner in advance when such events are known or predictable.
3. Reporting accidents: Prepare and submit reports of significant accidents, at site and anywhere else work is in progress. Record and document data and actions. For this purpose, a significant accident is defined to include events where personal injury is sustained, or property loss of substance is sustained, or where the event posed a significant threat of loss or personal injury.
4. Weekly status: Submit a weekly status directly to the Owner and the Architect. This report shall be electronic in a form as approved by the Owner and shall be accompanied with photographs.

E. General Installation Provisions:

1. Pre-installation conferences: In addition to other pre-installation requirements indicated throughout the Contract Documents, hold a pre-installation meeting at the Project site well before installation of each unit of work which requires coordination with other work. Installer and representatives of the manufacturers and fabricators who are involved in or affected by that unit or work, and with its coordination or integration with other work that has preceded or will follow shall attend this meeting. Advise the Architect of scheduled meeting dates.
 - a. At each meeting review progress of other work and preparations for the particular work under consideration including specific requirements for the following:
 - 1) Contract Documents.
 - 2) Options.
 - 3) Related change orders.
 - 4) Purchases.
 - 5) Deliveries.
 - 6) Shop drawings, project data and quality control samples.
 - 7) Possible conflicts and compatibility problems.
 - 8) Time schedules.
 - 9) Weather limitations.
 - 10) Manufacturer's recommendations.
 - 11) Compatibility of materials.
 - 12) Acceptability of substrates.
 - 13) Temporary facilities.

- 14) Space and access limitations.
 - 15) Governing regulations.
 - 16) Safety.
 - 17) Inspection and testing requirements.
 - 18) Required performance results.
 - 19) Recording requirements.
 - 20) Protection.
 - 21) Other contractors performing work outside of the scope of this Contract.
- b. Record significant discussions of each conference, and record agreements and disagreements, along with the final plan of action. Distribute the record of meeting promptly to everyone concerned, including the Owner and Architect.
 - c. Do not proceed with the Work if the pre-installation conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene pre-installation conference at the earliest feasible date.
2. Installer's inspection of conditions: Require the installer of each major unit of work to inspect the substrate to receive work and conditions under which the work is to be performed. The installer shall report all unsatisfactory conditions in writing to the Contractor. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the installer.
 3. Manufacturer's instructions: Where installations include manufactured products, comply with the manufacturer's applicable instructions and recommendations for installation, to the extent that these instructions and recommendations are more explicit or more stringent than requirements indicated in the Contract Documents.
 4. Inspect each item of materials or equipment immediately prior to installation. Reject damaged and defective items.
 5. Provide attachment and connection devices and methods for securing work. Secure work true to line and level, and within recognized industry tolerances. Allow expansion and building movement. Provide uniform joint width in exposed work. Arrange joints in exposed work to obtain the best visual effect. Refer questionable visual-effect choices to the Architect for final decision.
 6. Recheck measurements and dimensions of the work, as an integral step of starting each installation.
 7. Install each unit-or-work during weather conditions and Project status which will ensure the best possible results in coordination with the entire Work. Isolate each unit of work from incompatible work as necessary to prevent deterioration.
 8. Coordinate enclosure of the Work with required inspections and tests, so as to minimize the necessity of uncovering work for that purpose.
 9. Mounting heights: Where mounting heights are not indicated, mount individual units of
 10. work at industry recognized standard mounting heights for the particular application indicated. Refer questionable mounting height choices to the Architect for final decision.

F. Cleaning and Protection:

1. During handling and installation of Work at the Project site, clean and protect Work in progress and adjoining work on the basis of continuous maintenance. Apply protective covering on installed work where it is required to ensure freedom from damage or deterioration at time of substantial completion.
 - a. Clean and perform maintenance on installed work as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
 - b. Coordinate with the requirements of Section 01 74 00.
2. Limiting exposures of Work: To the extent possible through reasonable control and protection methods, supervise performance of the Work in such a manner and by such means which will ensure that none of the Work, whether completed or in progress, will be subjected to harmful, dangerous, damaging or otherwise deleterious exposure during the progress of the Work. Such exposures include, where applicable, but not by way of limitation the following:
 - a. Excessive static or dynamic loading, and internal or external pressures.
 - b. Excessively high or low temperatures, and thermal shock.
 - c. Excessively high or low humidity.
 - d. Air contamination or pollution.
 - e. Water or ice, or excessive weathering.
 - f. Solvents and chemicals.
 - g. Light and UV exposure.
 - h. Puncture or abrasion.
 - i. Heavy traffic.
 - j. Soiling.
 - k. Insect infestation.
 - l. Combustion.
 - m. Electrical current.
 - n. High-speed operation, improper lubrication, unusual wear or other misuse.
 - o. Destructive testing.
 - p. Misalignment.
 - q. Unprotected storage.
 - r. Improper shipping or handling.
 - s. Theft or vandalism.
3. Conservation and Salvage:
 - a. It is a requirement for supervision and administration of the Work that construction operations be carried out with the maximum possible consideration given to conservation of energy, water and materials. In addition, maximum consideration shall be given to salvaging materials and equipment involved in performance of the work but not incorporated therein. Refer to other sections for required disposition of salvage materials which are the Owner's property.

END OF SECTION – 01 31 13 PROJECT COORDINATION

01 31 19 PROJECT MEETINGS

A. Scope:

1. This Section specifies administrative and procedural requirements for project meetings including, but not limited to:
 - a. Pre-construction conference.
 - b. Coordination meetings.
 - c. Progress meetings.

B. Pre-Construction Conference:

1. Schedule a pre-construction conference and organizational meeting at the Project site or other convenient location no later than 15 days after execution of the Agreement and prior to commencement of construction activities. Conduct the meeting to review responsibilities and personnel assignments. Meetings can be held online with an industry-standard recognizable software.
2. Attendees: The Owner, Architect and their consultants, the Contractor and its superintendent, major subcontractors, manufacturers, suppliers and other concerned parties shall each be represented at the conference by persons familiar with and authorized to conclude matters relating to the Work.
3. Agenda: Discuss items of significance that could affect progress including such topics as:
 - a. Tentative construction schedule.
 - b. Critical work sequencing.
 - c. Designation of responsible personnel.
 - d. Procedures for processing field decisions and Change Orders.
 - e. Procedures for processing Applications for Payment.
 - f. Distribution of Contract Documents.
 - g. Submittal of Shop Drawings, Product Data and Samples.
 - h. Preparation of record documents.
 - i. Use of the premises.
 - j. Office, Work and storage areas.
 - k. Equipment deliveries and priorities.
 - l. Safety procedures.
 - m. First aid.
 - n. Security.
 - o. Housekeeping.
 - p. Working hours.

C. Progress/Coordination Meetings:

1. Conduct progress meetings at the Project site on a schedule coordinated with Owner and Architect. Notify the Owner and Architect of scheduled meeting dates. Coordinate dates of meetings with preparation of the payment request.
2. Attendees: In addition to representatives of the Owner and Architect, each subcontractor, supplier or other entity concerned with current progress or involved in planning, coordination or performance of future activities shall be represented at these

- meetings by persons familiar with the Project and authorized to conclude matters relating to progress.
3. Agenda: Review and correct or approve minutes of the previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to the current status of the Project.
 - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine where each activity is in relation to the Contractor's Construction Schedule, whether on time or ahead or behind schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - b. Review the present and future needs of each entity present, including such items as:
 - 1) Interface requirements.
 - 2) Time.
 - 3) Sequences.
 - 4) Deliveries.
 - 5) Off-site fabrication problems.
 - 6) Access.
 - 7) Site utilization.
 - 8) Temporary facilities and services.
 - 9) Hours of work.
 - 10) Hazards and risks.
 - 11) Housekeeping.
 - 12) Quality and work standards.
 - 13) Change orders.
 - 14) Documentation of information for payment requests.
 4. Reporting: No later than 5 days after each progress meeting date, the Architect will distribute copies of minutes of the meeting to the Contractor and the Owner. Include a brief summary, in narrative form, of progress since the previous meeting and report.
 5. Schedule updating: Revise the construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue the revised schedule concurrently with the report of each meeting.

END OF SECTION – 01 31 19 PROJECT MEETINGS

01 33 00 SUBMITTALS

- A. Work included:
 - 1. Wherever possible, throughout the Contract Documents, the minimum acceptable quality of workmanship and materials has been defined either by manufacturer's name and catalog number or by reference to recognized industry standards.
 - 2. To ensure that the specified products are furnished and installed in accordance with the design intent, procedures have been established for advance submittal of design data and for its review and approval or rejection by the Architect and/or the Owner.

- B. Shop Drawings and Product Data:
 - 1. All shop drawing and product data shall be submitted electronically in a form as approved by the Owner and the Architect. Hard copies will not be accepted.
 - 2. Shop Drawings:
 - a. Unless otherwise specifically directed by the Architect, make all Shop Drawings accurately to a scale sufficiently large to show all pertinent features of the item and its method of connection to the Work.
 - b. Do not base Shop Drawings on reproductions of the Contract Documents or on standard printed data. Do not reproduce drawings or details from the original design documents and submit them for Shop Drawings.
 - c. At a minimum, provide the following information:
 - 1) Dimensions, fabrication and installation drawings, roughing-in and setting diagrams, and relationship to adjoining construction.
 - 2) Identification of products and materials.
 - 3) Wiring diagrams showing field-installed wiring.
 - 4) Notation of coordination requirements.
 - 5) Notation of dimensions established by field measurement.
 - 3. Product Data:
 - a. Information not exclusively pertinent to the Project shall be deleted so that there is no possible area of confusion as to what product, series, or model is to be examined. The Architect or Owner will not take responsibility for having examined a product that was not intended by the Contractor to be judged.
 - b. Contractor shall clearly mark each copy to show applicable choices and options to include the following:
 - 1) Data indicating compliance with specified standards and requirements.
 - 2) Notation of coordination requirements.
 - 3) For equipment, rated capacities, dimensions, weights, required clearances and furnished specialties and accessories.
 - c. All submittals must carry a submittal number.
 - d. Each piece of material will plainly show the Section number and the paragraph in the Specifications to which the submittal pertains. For example: All data and samples on sealants will bear the number 07 92 00, Para. 2.01, 2.02, etc.

C. Samples, Mockups, and Colors:

1. Unless otherwise specifically directed by the Architect, all Samples and Mockups shall be of the precise article proposed to be furnished.
2. No samples are required for items where substitutions are not allowed.
3. Samples and mockups shall faithfully represent the product or the assembly as it is proposed to be installed. This shall include, but not be limited to, materials, finishes, method of construction or assembly, relationship to adjacent construction, method of attachment to adjacent construction, plus any electrical or mechanical connection that are required for the product or assembly to function.
4. Unless the precise color and pattern is specifically described in the Contract Documents, whenever a choice of color or pattern is available in a specified product submit actual color chips to the Architect for his review and selection.
5. Samples and color charts shall be physical specimens of materials or colors proposed to be provided. Selections and approval of samples will be made by the Architect from these submitted samples and color charts, without increase in costs to the Owner or Architects. Should the Contractor desire a sample returned, he shall submit a sufficient number in order for the Architect to retain one 1 sample and return the remainder to the Contractor.
6. In order for the Architect to make a color schedule as quickly as possible and to avoid delivery and pricing problems, the Contractor shall be required to submit all items that require a color selection within 40 days of the Notice to Proceed. Delivery and pricing problems that develop because an item was not submitted within the forty (40) daytime limit, shall be the sole responsibility of the Contractor and not that of the Owner.
7. The color selection on any one item will not be made until after samples of all items that require a color selection have been submitted.

D. Maintenance and Operation Manuals:

1. Provide information for the Owner's maintenance of each system or operating equipment, including, but not limited to, lubrication, emergency control, parts replacement, spare parts inventory recommendation, listing of tools and accessories needed for maintenance and similar instructions, TAB test reports and other test reports, and including warranty and requirements indicated throughout the Specification.
2. Provide manufacturer's operating instructions for each item of mechanical equipment and supplement with additional instructions where necessary. Prepare and submit specific operating instructions for each mechanical system which involves multiple items of equipment, including instructions for charging, start-up, control or sequencing or operation, phase or seasonal variations, shut-down, safety, and similar operational instructions. Prepare in typewritten form, completely explained and easily understood.
3. Organize each maintenance manual to include an index followed by thumb tab marked sections for system operating instructions; emergency instructions including addresses and telephone numbers for service sources; regular system maintenance procedures including lubrication; spare parts listing and stocking recommendations, inspection, adjusting, re-balancing, cleaning, parts replacement, and similar maintenance instructions and recommendations. Manuals shall also include the proper use of tools

and accessories; valve schedules and control diagram for each system; manufacturer's data for each operational item in each system; manufacturer's product warranties, and warranties relating to system and equipment items as part of the Work; shop drawings relating to the system, test reports, and Project Record Documents. Bind each maintenance manual in one or more black vinyl covered, 2" thick, three-ring binder, plus pocket folder type binders for folded drawings, and mark the back spine of each binder with system identification and volume number or electronic manual (on CD).

E. Additional Requirements for Mechanical and Electrical:

1. Prior to submitting shop drawings, assure that equipment proposed for use will fit into space available, considering space for coil removal, filter service, maintenance, and other activities required to keep equipment operating in proper manner.
2. Note in "red" all deviations in electrical and/or mechanical arrangement from that indicated, including, but not limited to, such items as electrical loads, electrical connections and physical size. It is understood when submittal is received that all items that effect other trades have been coordinated with those trades.
3. Submittal data shall include, but is not limited to the following:
 - a. Arrangement drawings with complete dimensional data.
 - b. Performance data listing the following:
 - 1) Capacities, CFM, GPM, entering and leaving air and water conditions, pressure losses for air and water side and all component pressure losses.
 - 2) Horsepower, KW, and total unit electrical requirements.
 - 3) Fan curves, discharge arrangement, motor locations, sheaves and belt data.
 - 4) Power and control wiring diagrams, showing interlock requirements.
 - 5) Isolators and isolator location with selection data.
 - 6) Filter data with type, size number required and pressure drop.
 - 7) Auxiliary equipment by other manufacturers: Provide name, capacity, dimensions, wiring diagrams and power requirements.

F. The Contractor's Duties:

1. The Contractor shall review, stamp with his approval and submit, with reasonable promptness and in such sequence as to cause no delay in the Work or in the work of the Owner or any separate contractor, all submittals required by the Contract Documents. Submittals will not be examined unless it is plainly evident that the Contractor has himself reviewed and approved the material. He shall legibly mark and date each item submitted
2. indicating his approval of the submission. Under no circumstances will material be examined that comes to the Architect directly from a Subcontractor.
3. By approving and submitting submittals, the Contractor represents that he has determined and verified all materials, field measurements, and field construction criteria related thereto, or will do so, and that he has checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.
4. The Contractor shall not be relieved of responsibility for any deviation from the requirements of the Contract Documents by the Architect's approval of submittals

unless the Contractor has specifically informed the Architect in writing of such deviation at the time of submission and the Architect has given written approval to the specific deviation. The Contractor shall not be relieved from responsibility for errors or omissions in the submittals by the Architect's approval thereof.

5. Verbal discussion between the Contractor and the Owner or the Architect of a proposed deviation and any subsequent agreements thereto shall not be considered valid unless confirmed in writing by the Owner or the Architect.
6. The Contractor shall direct specific attention, in writing or on resubmitted submittals, to revisions other than those requested by the Architect on previous submittals.
7. Wherever any product is specified in accordance with the Federal Specifications, an ASTM Standard, a United States Standard Specification, or other association standard, the Contractor shall present an affidavit from the manufacturer certifying that the product complies with the particular standard specification. Where necessary and requested or specified, support test data shall be submitted to substantiate compliance.

G. Submittal Log:

1. Maintain an accurate submittal log for the duration of the construction period, showing status of all submittals of all types.
2. Make the log available to the Architect for review upon request.

H. Coordination of Submittals:

1. Prior to submittal for Architect's review, use all means necessary to fully coordinate all material, including, but not limited to, the following procedures:
 - a. Determine and verify all field dimensions and conditions, catalog numbers, and similar data.
 - b. Coordinate as required with all Trades and with all public agencies involved.
 - c. Secure all necessary approval from public agencies and others; signify by stamp or other means that all required approvals have been obtained.
 - d. Clearly indicate, in writing, all deviations from the Contract Document.
2. Mechanical and electrical coordination:
 - a. Provide coordination of ductwork, waste, vent, pipes and conduit, as necessary to provide ceiling heights required. Provide necessary information to Architect if relocation of services and/or ceiling height changes will have to be made.
 - b. Provide scaled equipment layout of mechanical room showing dimensioned equipment pads; floor drain locations; sleeve locations; and equipment location showing required code or service clearance.

I. Submittal Sequence:

1. The right is reserved by the Architect to examine submittals and samples in a proper sequence that reflects the logical sequence of erection, installations, and proper assembly. Submittals of products or materials that are the responsibility of separate Trades yet must be assembled in conjunction one with another, shall be submitted at the same time so that they may be examined all together. Should these not be submitted simultaneously, the Architect reserves the right to hold one set while awaiting the arrival of other submittals.

2. All submittals within the responsibility of one Trade must be submitted at one time together (i.e. Millwork). Numerous submittals of one product or item of construction over a period of time is not acceptable. In the event of this occurrence, the Architect will hold the submittal data arriving first until the last of the material has arrived. Then, and only then, will he make his examination.
- J. Timing of Submittals:
1. Make all submittals far enough in advance of scheduled dates for installation to provide all required time for reviews, for securing necessary approvals, for possible revision and re-submittals, and for placing orders and securing delivery.
 2. Costs of delays occasioned by tardiness of submittals may be back-charged as necessary and shall not be borne by the Owner.
- K. Examination of Submittals:
1. Architect's review shall be for general conformance with the design concept and Contract Documents. Markings or comments shall not be construed as relieving the Contractor from compliance with the Drawings and Specifications, nor departures therefrom. The Contractor remains responsible for details and accuracy, for confirming and correlating all quantities and dimensions, for selecting fabrication processes, for techniques of assembly, and for performing his work in a safe manner.
 2. When the Architect has marked the submittals, "Rejected-Resubmit", or word of similar import, the Contractor shall cause the corrections to be made to the original and shall then proceed for a new submission.
 3. The Contractor shall not under any circumstances remove any comments, notes, or drawings made by the Architect on the submittals that have been reviewed and stamped by the Architect. Should a conflict develop, the Contractor shall contact the Architect for instruction.
 4. If the Contractor finds indicated changes to cause a conflict in conjunction with present construction and/or products to be installed at a later date, he must notify the Architect and ask for verification. Should the Contractor not ask for a verification, he shall continue with the construction involving or relating to that product at his own risk.
- L. Composite Drawings:
1. In instances where submittals affect the Work of more than one Trade and/or when directed by the Architect, the Contractor shall prepare and submit composite drawings which indicate and define the Work under all affected Trades, and obtain the approval of the Architect. Upon receipt of final approval, the Contractor shall distribute print copies of the approved drawings to all affected Trades. All affected Trades shall cooperate in the preparation of the composite drawings to assure proper coordination.
- M. Delivery of Submittals:
1. The Contractor shall be responsible for the delivery and pick-up of the submittals to the office of the Architect.

END OF SECTION - 01 33 00 SUBMITTALS

01 42 00 REFERENCE STANDARDS

A. General Applicability of Standards:

1. Where reference is made to specifications, standards, or recommendations of standards producing organizations, the specific document referenced is the edition in force at the latest date hereof. Materials, methods, assemblies, or practices referenced in this manner require compliance with the requirements contained in the referenced to the same extent as if herein written out in full. Since these are generally well-known documents, they are not bound herein.
2. In addition, the standards and recommendations listed below shall be recognized as requirements in regard to materials, methods, assemblies and practices throughout these Contract Documents.
3. Copies of each of these documents, whether named in the following list or referenced in the body of the Specifications or on the Drawings, shall be made readily available by the Contractor at the job site. Obtain these copies directly from the publication source.

B. Abbreviations and Names of Organizations:

1. The following acronyms or abbreviations as referenced in these Contract Documents are defined to mean the associated names.

AAMA	Architectural Aluminum Manufacturers Association
AASHO	American Association of State Highway Officials
ACI	American Concrete Institute
ADA	Americans with Disabilities Act
AIA	American Institute of Architects
AIEE	American Institute of Electrical Engineers
AISC	American Institute of Steel Construction including Code of Standard Practice
ISI	American Iron and Steel Institute
ANSI	American National Standards Institute
APA	American Plywood Association
ARI	American Refrigeration Institute
ASHRAE	American Society of Heating, Refrigeration and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society of Testing and Materials
AWI	Architectural Woodwork Institute
AWPA	American Wood-Preservers' Association
AWPB	American Wood Preservers' Bureau
AWS	American Welding Society
AWWA	American Water Works Association
BIA	Brick Industry Association
BOCA	Building Officials and Code Administration International Basic Building Code
CDA	Copper Development Association
CMB	Certified Ballasts Manufacturing
CS	Commercial Standard, U.S. Department of Commerce
DFPA	Douglas Fir Plywood Association

EIA	Electrical Industries Association
ETL	Electrical Testing Lab
FS	Federal Specification (of the U.S. Government)
ICA	International Copper Association
IEEE	Institute of Electrical and Electronic Engineers
IES	Illuminating Engineering Society
--	Indiana Limestone Institute of America, Inc. - Indiana Limestone Handbook
--	International Masonry Industry All-Weather Council - Recommendations for Setting in Cold Weather
MSS	Manufacturer's Standardization Society of the Valve and Fitting Industry - Tennessee Boiler and Unfired Pressure Vessel Inspection Code
MIA	Masonry Institute of America
NBS	National Bureau of Standards (of the Department of Commerce of the U.S. Government) for Commercial Standards and Simplified Practice Recommendations
NCMA	National Concrete Masonry Association
NEC	National Electric Code of NBFU (National Bureau of Fire Underwriters)
NEMA	National Electric Manufacturing Association
NESC	National Electrical Safety Code
NFPA	National Fire Protection Association
NPC	National Plumbing Code
NRCA	National Roofing Contractor's Association
NTMA	National Terrazzo and Mosaic Association
NWMA	National Woodwork Manufacturer's Association
PCA	Portland Cement America
PS	Product Standard of NBS (U.S. Department of Commerce)
RIS	Redwood Inspection Service (Grading Rules)
SMACNA	Sheet Metal and Air Conditioning Contractors National Association, Inc.
SDI	Steel Deck Institute
SJI	Steel Joist Institute
SPIB	Southern Pine Inspection Bureau (Grading Rules)
SBC	Standard Building Code
SSPC	Steel Structures Painting Council
TCA	Tile Council of America
UL	Underwriter's Laboratories
WWPA	Western Wood Products Association (Grading Rules)

C. Conflict Between Standards and Contract Documents:

1. In the event of conflict between standards and the Contract Documents, the provisions of the more stringent, as determined by the Architect, shall govern.

END OF SECTION – 01 42 00 REFERENCE STANDARDS

01 45 23 TESTING LABORATORY SERVICES

A. Scope:

1. The Owner will employ and pay for the services of an independent testing laboratory to perform specified testing.
 - a. Contractor shall cooperate with laboratory to facilitate the execution of its required services.
 - b. The Contractor shall be fully responsible for seeing that all materials meet the Project requirements. Failure of the Architect or testing laboratory to detect defective work, workmanship, or materials shall in no way prevent rejection and the Contractor taking approved corrective action when such defects are discovered. The Architect shall not be obligated to make final acceptance.

B. Laboratory Duties:

1. Cooperate with Architect and Contractor; provide qualified personnel.
2. Perform specified inspections, sampling and testing of materials and methods of construction. Comply with specified standards and ascertain compliance of materials with requirements of Contract Documents.
3. Promptly notify Architect and Contractor of observed irregularities or deficiencies of the Work or products.
 - a. Promptly submit written report of each test and inspection; one copy each to the Architect, Owner, Contractor, and one copy to Record Documents file. Each report shall, at a minimum, include:
 - 1) Date issued.
 - 2) Project title and number.
 - 3) Testing laboratory name, address and telephone number.
 - 4) Name and signature of laboratory inspector.
 - 5) Date and time of sampling or inspection.
 - 6) Record of temperature and weather conditions.
 - 7) Date of test.
 - 8) Identification of product and specification section.
 - 9) Location of sample or test in the Project.
 - 10) Type of inspection or test.
 - 11) Results of tests and compliance with Contract Documents.
 - 12) Interpretations of test results.
4. Perform additional tests as required by the Architect or the Owner.

C. Limitations of Authority of Testing Laboratory:

1. Laboratory is not authorized to:
 - a. Release, revoke, alter or enlarge on requirements of the Contract Documents.
 - b. Approve or accept any portion of the Work.
 - c. Perform any duties of the Contractor.
 - d. Give instruction to the Contractor's workman in the field. All contact shall be with the Architect (or his representative) and the Contractor's Project Manager.

D. Contractor's Responsibilities:

1. Cooperate with laboratory personnel, provide access to Work, to manufacturer's operations.
2. Secure and deliver to the laboratory, adequate quantities of representational samples of materials proposed to be used and which require testing.
3. Provide to the laboratory the preliminary design mix proposed to be used for concrete, and other materials mixes which require control by the testing laboratory.
4. Furnish copies of products test reports as required.
5. Furnish incidental labor and facilities:
 - a. To provide access to Work to be tested.
 - b. To obtain and handle samples at the Project site or at the source of the project to be tested.
 - c. To facilitate inspections and tests.
 - d. For storage and curing of test samples.
6. Notify laboratory sufficiently in advance of operations to allow for laboratory assignment of personnel and scheduling of tests. When tests or inspections cannot be performed after such notice, reimburse Owner for laboratory personnel and travel expenses incurred due to Contractor's negligence.
7. The Contractor may for his own convenience, employ and pay for a separate, equally qualified independent testing laboratory to perform additional inspections, sampling and testing. This shall be done with the understanding that:
 - a. The additional testing shall be accomplished in accordance with the General Conditions;
 - b. That the finds of such additional inspections, samplings, and testing shall in no way be binding upon the Owner and the Architect;
 - c. That any such additional inspections, samplings and testing shall be performed at no additional cost to the Owner.

END OF SECTION - 01 45 23 TESTING LABORATORY SERVICES

01 52 00 TEMPORARY FACILITIES

A. Description of Requirements:

1. Specific administrative and procedural minimum actions are specified in this Section, as extensions of provisions in General Conditions and other Contract Documents. These requirements have been included for special purposes as indicated. Nothing in this Section is intended to limit types and amounts of temporary work required, and no omission from this Section will be recognized as an indication by the Architect that such temporary activity is not required for successful completion of the work and compliance with requirements of Contract Documents.

B. Quality Assurance:

1. In addition to compliance with governing regulations and rules/recommendations of franchised utility companies, comply with specific requirements indicated and with applicable local industry standards for construction work (published recommendations by local consensus "building councils").

C. Job Conditions:

1. Establish and initiate use of each temporary facility at time first reasonably required for proper performance of the Work. Terminate use and remove facilities at earliest reasonable time, when no longer needed or when permanent facilities have, with authorized use, replaced the need.
2. Install, operate, maintain and protect temporary facilities in a manner and at locations which will be safe, non-hazardous, sanitary and protective of persons and property, and free of deleterious effects.

D. Energy Costs:

1. The Contractor shall pay all costs for the temporary water, electricity, heat and ventilation used for the Work of the Project. This shall include the costs of installation and maintenance of temporary equipment. The Contractor shall remove all temporary equipment at the end of each Work phase.

E. Temporary Utility Services:

1. The types of services required include, but not by way of limitation, water, gas, electrical power and telephones. Comply with service companies' recommendations on materials and methods, or engage service companies to install services. Locate and relocate services (as necessary) to minimize interference with construction operations.

F. Temporary Construction Facilities:

1. The types of temporary construction facilities required include, but not by way of limitation, water distribution, enclosure of work, heat, ventilation, electrical power distribution, lighting, telephone, hoisting facilities, stairs, ladders, and roads. Provide facilities reasonably required to perform construction operations properly and adequately.

2. Generally, materials may be new or used, but shall be adequate for purposes intended, and shall not create unsafe conditions nor violate requirements of applicable codes.
3. Water:
 - a. Non-potable water shall be acceptable for industrial, cleaning, and firefighting purposes only.
 - b. Provide water for temporary office.
4. Enclosures:
 - a. Provide temporary enclosure where indicated and where reasonably required to ensure adequate workmanship and protection from weather and unsatisfactory ambient conditions for the work, including enclosure where temporary heat is used.
 - b. Furnish, install and maintain for the duration of construction all required scaffolds, tarpaulins, barricades, canopies, warning signs, steps, bridges, platforms, and other temporary construction necessary for proper completion of the Work in compliance with all pertinent safety and other regulations.
5. Heating:
 - a. Maintain heat to protect Work and products being installed against environmental conditions that may be detrimental to Work or products.
 - b. Provide suitable ambient temperatures and humidity levels as recommended by product manufacturers for installation and curing of products.
 - c. The use of salamanders is prohibited.
 - d. Provide heat for temporary offices and storage. Allow beneficial occupancy of Project or portion of Project prior to final completion, including air conditioning and heating.
6. Ventilation:
 - a. Prevent hazardous accumulations of dusts, fumes, mists, vapors or gases in areas occupied during construction.
 - b. Provide adequate ventilation during installation of materials, for dispersal of humidity, and ventilation of temporary sanitary facilities.
 - c. Provide ventilation for temporary offices and storage.
7. Electrical power:
 - a. Provide weatherproof, grounded, power distribution system sufficient to accommodate construction operations requiring power, use of power tools, electrical heating, lighting and start-up testing of permanent electric-powered equipment prior to its permanent connection to electrical system.
 - b. Provide appropriate enclosures for the environment in which used, in compliance with NEMA Standards.
8. Lighting:
 - a. Provide sufficient temporary lighting to ensure proper workmanship and construction needs, safe and adequate working conditions, public safety, security lighting and lighting for temporary offices and storage.

9. Access provisions:
 - a. Provide ramps, stairs, ladders and similar temporary access elements as reasonably required to perform the work and facilitate its inspection during installation. Comply with reasonable requests of governing authorities performing inspections.
 - b. When permanent stairs are available for access during construction, cover finished surfaces with sufficient protection to ensure freedom from damage and deterioration at time of Substantial Completion.
10. Roads:
 - a. Except as otherwise indicated, develop subgrade and subbase of permanent roadways at earliest possible date, and provide temporary surfacing to serve as temporary roads during construction. Surface sufficiently to provide all-weather, uninterrupted access to construction area, for every form of transportation which can be reasonably expected.
 - b. Maintain temporary roads during construction. Extend temporary roadway development and surfacing in and around construction site as reasonably required to accommodate construction activities. When no longer needed as temporary roadways, remove temporary surfacing and restore subbases to conditions required to Contract Documents for permanent development.

G. Security/Protection Provisions:

1. The types of temporary security and protection provisions required include, but no by way of limitation:
 - a. Barricades
 - b. Personnel security program (theft prevention)
 - c. Warning signs/lights
 - d. Environmental protection
 - e. Building lockup

H. Temporary Support Facilities:

1. The types of temporary support facilities required include, but not by way of limitation:
 - a. Field offices
 - b. First aid facilities
 - c. Storage sheds
 - d. Telephones
 - e. Fax machine
 - f. E-mail capability
 - g. Sanitary facilities
 - h. Thermometer
 - i. Drinking Water
 - j. Project identifications
 - k. Clean up facilities
 - l. Signs
 - m. Rodent/pest control
 - n. Waste disposal

2. Provide all general services as may be reasonably required for proficient performance of the work and accommodation of personnel at the site including Owner's and Architect's personnel. Discontinue and remove temporary support facilities, and make incidental similar use of permanent work of the Project, only when and in manner authorized by Architect; and, if not otherwise indicated, immediately before time of Substantial Completion. Locate temporary support facilities for convenience of users, and for minimum interference with construction activities.
 3. Contractor's field office:
 - a. Provide adequate office space for field office personnel plus one space workstation for incidental use by subcontractors and the Architect's representative. The space shall be suitably finished, furnished, equipped and conditioned. Provide space for meetings (with table and chairs) and an adequate space for storage of approved samples.
 4. Sanitary facilities:
 - a. Provide type acceptable to governing authorities and adequate (at all stages of construction) for use of personnel at Project site. Provide separate facilities for male and female personnel when both sexes are working (in any capacity) at Project site.
 5. Project identification sign:
 - a. Provide 1 project identification sign containing such lettered and graphic data and description relative to the construction as required by the Architect.
 - b. The sign shall be approximately 4'-0" by 8'-0", and it shall be constructed of laminated, waterproof plywood 3/4" thick, or as otherwise approved by the Architect, and shall be mounted on a rigid, substantial wood timber frame with brass wood screws, or with suitable brass bolts and washers. Provide all edges with molded wood casing. In addition, protect with top edge surface with aluminum cap flashing bent down over edges and secured with aluminum nails. Paint the sign an approved color as selected by the Architect, with contrasting colors for graphic data.
 - c. Maintain all signs in good and neat condition until such time as the Architect authorizes their removal.
- I. Removal:
1. Maintain all temporary facilities and controls as long as needed for the safe and proper completion of the Work. Remove all such temporary facilities and controls as rapidly as progress of the Work will permit.

END OF SECTION – 01 52 00 TEMPORARY FACILITIES

01 66 00 MATERIALS DELIVERY, STORAGE, AND HANDLING

- A. Delivery:
 - 1. Deliver materials and products in manufacturer's original unopened packaging with identification labels intact and legible.
 - 2. Replace damaged or contaminated containers and materials.

- B. Storage:
 - 1. Secure manufacturer's specific recommended storage requirements for products and materials to be stored.
 - 2. The following storage requirements are in addition to suppliers' recommended storage requirements:
 - a. Store materials off of ground and concrete floors. Cover and protect materials from damage due to weather and construction operations.
 - b. Maintain stored materials clean and free of dirt, grease, foreign matter and construction debris.
 - c. Store sheet materials on end.
 - d. Store roll materials on end.
 - e. Store emulsion and liquid type products in temperatures above 40 deg. F.
 - 3. The Contractor shall be responsible for compliance with storage requirements for his Work.
 - 4. Materials damaged due to improper storage shall be replaced by the Contractor at no cost to the Owner.

- C. Handling:
 - 1. Handle sheet materials, such as drywall, to avoid undue sagging.
 - 2. Handle rolled goods so as to prevent damage to edges and ends.

- D. Protection:
 - 1. Protect steel materials from corrosion.
 - 2. Protect finished surfaces from damage.
 - 3. Protect insulation from direct sunlight and moisture.
 - 4. Protect edges of sheet material from damage.

END OF SECTION – 01 66 00 MATERIALS DELIVERY, STORAGE, AND HANDLING

01 74 00 CLEANING

- A. Description:
 - 1. Maintain premises and public properties free from accumulations of waste, and rubbish, caused by operations.
 - 2. At completion of Work, remove waste materials, rubbish, tools, equipment, machinery, and surplus materials, and clean all sight-exposed surfaces; leave Project clean and ready for occupancy.
 - 3. If the Contractor fails to clean up at the completion of the Work, the Owner may do so and the cost thereof shall be charged to the Contractor.
 - 4. Hazards Control:
 - a. Store volatile wastes in covered metal containers, and remove from premises daily.
 - b. Prevent accumulation of wastes which create hazardous conditions.
 - c. Provide adequate ventilation during use of volatile or noxious substances.
 - d. Conduct cleaning and disposal operations to comply with local ordinances and anti-pollution laws.
 - e. Do not burn or bury rubbish and waste materials on Project site.
 - f. Do not dispose of volatile wastes such as mineral spirits, oil or paint thinner in storm or sanitary drains.
 - g. Do not dispose of wastes into streams or waterways.
- B. Materials: Use only cleaning materials recommended by manufacturer of surfaces to be cleaned. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.
- C. During Construction:
 - 1. Execute cleaning to ensure that building, grounds, and public properties are maintained free from accumulations of waste materials and rubbish.
 - 2. Wet down dry materials and rubbish to prevent blowing dust.
 - 3. At reasonable intervals during progress of Work, clean site and public properties, and dispose of waste materials, debris and rubbish.
 - 4. Provide on-site containers for collection of waste materials, debris and rubbish.
 - 5. Dispose of waste materials, debris and rubbish at designated dumping areas.
 - 6. Vacuum clean interior building areas when ready to receive finish painting, and continue vacuum cleaning on an as-needed basis until building is ready for Substantial Completion or occupancy.
 - 7. Handle materials in a controlled manner with as few handlings as possible; do not drop or throw materials from heights.
 - 8. Schedule cleaning operations so that dust and other contaminants resulting from cleaning process will not fall on wet, newly painted surfaces.
- D. Final Cleaning

1. Provide final cleaning of the Work, consisting of cleaning each surface or unit of work to normal "clean" condition expected for a first-class building cleaning and maintenance program. Comply with manufacturer's instructions for cleaning operations. The following are examples, but not by way of limitation, of cleaning levels required:
 - a. Remove labels which are not required as permanent labels.
 - b. Clean transparent materials, including mirrors and window/door glass, to a polished condition, removing substances which are noticeably distracting substances. Except as otherwise indicated, avoid disturbance of natural weathering of exterior surfaces. Restore reflective surfaces to original reflective condition.
 - c. Wipe surfaces of mechanical and electrical equipment clean; remove excess lubrication and other substances.
 - d. Remove debris and surface dust from limited-access spaces including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics and similar spaces.
 - e. Clean concrete floors in non-occupied spaces broom clean.
 - f. Vacuum clean carpeted surfaces and similar soft surfaces.
 - g. Clean plumbing fixtures to a sanitary condition, free of stains including those resulting from water exposure.
 - h. Clean light fixtures and lamps so as to function with full efficiency.
 - i. Clean Project site (yard and grounds), including landscape development areas, of litter and foreign substances. Sweep paved areas to a broom-clean condition; remove stains, petrochemical spills and other foreign deposits. Rake grounds which are neither planted nor paved, to a smooth, even-textured surface.
 - j. Remove grease, dust, dirt, stains, labels, fingerprints, and other foreign materials, from sight-exposed interior and exterior finished surfaces; polish surfaces so designated to shine finish.
 - k. Repair, patch and touch up marred surfaces to specified finish, to match adjacent surfaces.
 - l. Remove snow and ice from access to building.
 - m. Replace air conditioning filters if units were operated during construction.
 - n. Clean ducts, blowers and coils, if air conditioning units were operated without filters during construction.
2. Maintain cleaning until Project, or portion thereof, is occupied by Owner.

END OF SECTION – 01 74 00 CLEANING

01 77 00 PROJECT PROCEDURES

A. Scope:

1. Closeout includes general requirements near the end of the Contract Time in preparation for final acceptance, final payment, normal termination of contract, occupancy by Owner and similar actions evidencing completion of the Work. Time of closeout is directly related to "Substantial Completion", and therefore may be either a single time period for entire work or a series of time periods for individual parts of the Work which have been certified as Substantially Complete at different dates. That time variation (if any) shall be applicable to other provisions of this Section.

B. Contractor's Request for Substantial Completion:

1. When the Contractor considers the Work (or designated portion thereof) is substantially complete, he shall submit written certification to the Architect or Owner that the Project (or designated portions thereof) has reached Substantial Completion. To the written certification, attach a list of items to be completed or corrected.
2. Upon receipt of Contractor's request, Architect or Owner will either proceed with inspection or advise Contractor of prerequisites not fulfilled.

C. Should the Architect Consider The Work Substantially Complete:

1. The Architect shall notify the Contractor in writing.
2. The Contractor shall then accomplish the following:
 - a. Prepare and submit to the Architect or Owner a list of items to be completed or corrected, as determined by the Architect's or Owner's inspection.
 - b. Prepare and submit statement showing an accounting of changes to the Contract Sum.
 - c. Advise the Owner regarding pending insurance change-over requirements.
 - d. Submit releases enabling the Owner's full and unrestricted use of the Project (or designated portions thereof), access to services and utilities, including occupancy permits, operating certificates, and similar releases.
 - e. Submit specific warranties, workmanship/maintenance bonds, maintenance agreements, final certifications and similar documents.
 - f. Deliver tool, spare parts, extra stocks of materials, and similar physical items to Owner.
 - g. Make final change-over of locks and transmit keys to Owner, and advise Owner's personnel of change-over in security provisions.
 - h. Complete start-up testing of systems, and instructions to Owner's operating/maintenance personnel. Discontinue (or change-over) and remove from Project site temporary facilities and services, along with construction tools and facilities, mockups, and similar elements.
 - i. Complete final clean-up requirements (see Section 01 74 00), including touch-up painting of marred surfaces.

- j. Touch-up and otherwise repair and restore marred exposed finishes.
- 3. The Architect will prepare and issue a Certificate of Substantial Completion containing:
 - a. Date of Substantial Completion.
 - b. Contractor's list of items to be completed or corrected verified and amended by Architect or Owner.
 - c. The time within which Contractor shall complete or correct Work of listed items.
 - d. Time and date Owner will assume possession of Work or designated portion thereof.
 - e. Responsibilities of Owner and Contractor for:
 - 1) Insurance
 - 2) Utilities.
 - 3) Operation of mechanical, electrical and other systems.
 - 4) Maintenance and cleaning.
 - 5) Security.
 - f. Signatures of:
 - 1) Architect.
 - 2) Contractor.
 - 3) Owner.
- D. Owner Occupancy Of Project Or Designated Portion Thereof:
 - 1. The Contractor shall obtain a certificate of occupancy.
 - 2. The Contractor shall perform final cleaning in accordance with Section 01 74 00.
 - 3. The Owner will occupy the Project (or designated portions thereof) under the provisions stated in the Certificate of Substantial Completion.
- E. Should The Architect Or Owner Consider That The Work Is Not Substantially Complete:
 - 1. The Architect shall immediately notify the Contractor in writing.
 - 2. The Contractor shall complete the Work. He shall then submit a second written certification to the Architect or Owner that the Project (or designated portions thereof) has reached Substantial Completion. To this second certificate, attach a list of items to be completed or corrected.
 - 3. Upon receipt of Contractor's request, Architect or Owner will either proceed with inspection or advise Contractor of prerequisites not fulfilled.
- F. Contractor's Request for Final Acceptance:
 - 1. When the Contractor considers the Work (or designated portions thereof) is complete and ready for final inspection, he shall submit written certification that the Project has reached completion and is ready for final inspection. This certification shall include, but not be limited to, the following:
 - a. The Contract Documents have been reviewed.
 - b. Project has been inspected for compliance with the Contract Documents.

- c. Equipment and systems have been tested in presence of Owner's representative and are operational.
 2. Upon receipt of Contractor's request, Architect or Owner will either proceed with the final inspection or advise Contractor of prerequisites not fulfilled.
- G. Should the Architect or Owner Consider the Work Complete In Accordance With the Contract Documents:
 1. The Architect or Owner shall notify the Contractor in writing, and he shall request the Contractor to make closeout submittals.
 2. Closeout submittals:
 - a. Contractor's affidavit of payment of debts and claims.
 - b. Contractor's affidavit of releases of liens with:
 - 1) Consent of surety to final payment.
 - 2) Contractor's release or waiver of liens.
 - 3) Separate releases of waivers of liens for subcontractors, suppliers, and others with lien rights against property of Owner, together with list of those parties.
 - c. Final statement of accounting reflecting all adjustments, which shall include, but not be limited to, the following:
 - 1) Previous change orders.
 - 2) Deductions for uncorrected work.
 - d. Final statement shall also show original Contract Sum, total Contract Sum (as adjusted), previous payments, and sum remaining due.
 - e. Certified copy of Architect's or Owner's final punch list of itemized work to be completed or corrected, stating that each item has been completed or otherwise resolved for acceptance, endorsed and dated by Architect or Owner.
 - f. Final meter readings for utilities, measured record of stored fuel, and similar data as of time of Substantial Completion or when Owner took possession of and responsibility for corresponding elements of the Work.
 - g. Revise and submit evidence of final, continuing insurance coverage complying with insurance requirements.
 - h. Bonds, guarantees, and warranties.
 - i. Keys and keying schedule.
 - j. Operation and maintenance data (as described in Section 01 33 00 and throughout Specifications).
 - k. Record documents (See Section 01 11 00).
 - l. Evidence of compliance with the requirements of governing authorities.
 - 1) Certificate of Inspection:
 - a) Mechanical.
 - b) Electrical.
 - 2) Certificate of Occupancy.

- m. General operating/maintenance instructions: Arrange for each installer of work requiring continuing maintenance or operation, to meet with Owner's personnel, at project site, to provide basic instructions needed for proper operation and maintenance of entire work. Include instructions by manufacturer's representatives where installers are not expert in the required procedures. Review maintenance manuals, record documentation, tools, spare parts and materials, lubricants, fuels, identification system, control sequences, hazards, cleaning and similar procedures and facilities. For operational equipment, vibration adjustments, safety, economy/efficiency adjustments, energy effectiveness, and similar operations. Review maintenance and operations in relation with applicable warranties, agreements to maintain bonds, and similar continuing commitments.
 - 3. The Contractor shall submit final application for payment in accordance with requirements of the Contract Documents.
 - 4. The Architect will issue final certificate in accordance with provisions of the Contract Documents.
 - 5. Should final completion be materially delayed through no fault of the Contractor, the Architect or Owner may issue a semifinal certificate for payment in accordance with the provisions of the Contract Documents.
- H. Should the Architect Or Owner Consider That The Work Is Not Ready For Final Acceptance:
- 1. After final inspection, should the Architect or Owner consider that the Project is not complete or ready for final acceptance, he shall notify the Contractor in writing.
 - 2. The Contractor shall complete the Work and remedy all deficiencies. He shall then submit a second written certification to the Architect or Owner that the Project (or designated portions thereof) is complete and is again ready for final inspection.
 - 3. The Architect or Owner will re-inspect the Work. After re-inspection, the Architect or Owner will notify the Contractor as to whether he judges the Work acceptable or not. If so, he will request closeout submittals.

END OF SECTION – 01 77 00 PROJECT PROCEDURES

01 78 36 GUARANTEES AND WARRANTIES

A. General Warranties:

1. Contractor's general warranty: The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless otherwise required or permitted by the Contract Documents, that the work will be free from defects not inherent in the quality required or permitted, and that the Work will conform with the requirements of the Contract Documents. Work not conforming to these requirements, including substitutions not properly approved and authorized, may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, modifications not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear under normal usage. If required by the Architect or Owner, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.
2. Manufacturer's guarantees and warranties: Guarantees and warranties provided by manufacturers are in addition to, not in lieu of, the Contractor's general warranty.
3. Proprietary specifications and construction procedures: The Contractor shall guarantee the performance of products, construction methods and installation procedures, covered by proprietary specifications under his "GENERAL WARRANTY" and in accord with the requirements of this section.

B. Intent of the Contract Documents:

1. The intention of the Contract Documents is that the Contractor shall guarantee and warrantee satisfactory performance, as determined by the Architect or Owner, of all components of the Work provided under this Contract for a period of 1 year.
2. Some guarantees and warranties, as specified in the individual Specification Section, shall extend beyond 1 year.

C. Date of Commencement of the Contractor's General Warranty:

1. Date of Commencement of the Contractor's General Warranty shall be the date of the "CERTIFICATE OF SUBSTANTIAL COMPLETION".
2. Should "CERTIFICATE OF SUBSTANTIAL COMPLETION" not be issued, the date of commencement of all Guarantees and Warranties shall be the date the Architect or Owner certifies the "FINAL PAY REQUEST".

D. General Warranty Form:

1. The Contractor shall provide a written Guaranty/Warranty, properly executed by appropriate Subcontractor or Material Supplier, or both, countersigned and guaranteed by the Contractor, that their Work will be free from defects of materials and workmanship, and shall remain in proper operating condition for a period of 1 year.

E. Submission of Guarantees and Warranties:

1. The Contractor shall submit all Guarantees and Warranties to the Owner for approval prior to Certification of the Contractor's Final Application for Payment.

F. Correction of Defective Work:

1. Work performed under this Guarantee/Warranty shall be Guaranteed/Warranted for a period of 1 year from the date such Work is completed.

END OF SECTION – 01 78 36 GUARANTEES AND WARRANTIES

03 15 00 CONCRETE ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes specialty slab-on-grade joint load transfer systems:
 - 1. Alternating tapered plate dowel basket assemblies for saw-cut expansion joints.
 - 2. Plate dowel assemblies for cast/formed construction joints.
- B. Coordinate with structural engineering drawings and specs for approved locations and uses.
- C. Slab-on-Grade Joint Load Transfer Systems: A system that consists of flat, ASTM A36 plate that is cut into a square or rectangular shape and is embedded into a concrete slab or encased by a plastic sleeve that allows movement in lateral directions but not in vertical directions.

1.2 REFERENCES

- A. ACI Detailing Manual SP-66.
- B. ACI 302.1R Guide for Concrete Floors and Slab Construction.
- C. ACI 360R Design of Slabs-on-Ground.
- D. American Society for Testing and Materials International (ASTM):
 - 1. ASTM A36 Standard Specifications for Carbon Structural Steel.
 - 2. ASTM A108 Standard Specifications for Steel Bar, Carbon and Alloy, Cold Finished.

1.3 SUBMITTALS

- A. Product data: Manufacturer's product data with application recommendations and installation instructions for proprietary items and all accessories.
- B. Shop Drawings: Project specific plans and details, showing placement locations, spacing, dimensions, and maximum tolerances.
 - 1. Include bar sizes, lengths, material, grade, schedules, splices and laps, mechanical connections, ties, and supports for each product and condition.

1.4 QUALITY ASSURANCE

- A. Pre-installation meeting: Prior to installation, require attendance of all trades affected by slab-on-grade joint system installations, to review responsibilities, sequences, schedule, installation procedures, and coordination with other work.

PART 2 - PRODUCTS

2.1 ALTERNATING TAPERED PLATE DOWEL BASKETS

- A. Alternating tapered plate dowels: Cut flat shapes from hot rolled steel bar certified to meet ASTM A36 standards to within 3/16" of specified dowel length with a trapezoidal taper from the widest end to the narrow end.
- B. Side frame supports: Fabricated from 1/4" diameter cold drawn wire certified to meet ASTM A108.
- C. Fabrication:
 - 1. Weld plate dowels on widest end only into side frames, with welded ends alternating sides along length of assembly.
 - 2. Weld eight-gauge wires across side frames at no more than 36" o.c. to keep assembly stable during shipping and installation.
 - 3. Factory applied de-bonding agent: thinly and evenly coat plate dowels without excessive drips or thickness.
 - 4. Finished assembly shall hold alternating tapered plate dowels to within +/-1/8" of half of the slab depth.
- D. Manufacturers: Subject to compliance with requirements, manufacturers and products that may be incorporated into the Work include:
 - 1. "PD3 Basket" by PNA Construction Technologies (Basis of Design)
 - 2. Do not substitute products without Architect's full review and approval. Possible products that may be considered may include:
 - a. Double-Tapered control joint basket by Sika
 - b. Dowel Basket with sleeves by SureBuilt
 - c. Or an approved equal.
- E. Basket Dimensions: Refer to ACI 302.1R or ACI 360R for selection of plate size and spacing, and consult with structural engineer for number and size of bars.
 - 1. Basket height: Half the thickness of the slab.
 - 2. Basket width: 12 inches dowel length, unless otherwise indicated on plans.
 - 3. Dowel thickness: verify with Structural engineer, the cross sectional area of steel required at saw-cut joint.

2.2 SQUARE PLATE DOWELS

- A. Load plate dowel for construction joints: Cut flat steel shapes from hot rolled steel plate meeting ASTM A36, or cold rolled steel plate for acceptable tolerances meeting ASTM 108.
 - 1. Pocket: High-density plastic form to hold load plate in correct position, with internal voids to allow differential movement and prevent horizontal stress at concrete joints.

- B. System to include setting templates and form materials for correct placement and installation of plate dowels into concrete slabs, at correct heights and depths.
- C. Manufacturers: Subject to compliance with requirements, manufacturers and products that may be incorporated into the Work include:
 - 1. “Diamond Dowel” by PNA Construction Technologies (Basis of Design)
 - 2. Do not substitute products without Architect’s full review and approval. Possible products that may be considered may include:
 - a. Greenstreak Speed Plate by Sika
 - b. Taper Dowel by SureBuilt
 - c. Or an approved equal.
- D. Plate steel thickness and width dimensions: Refer to ACI 302.1R or ACI 360R for selection of plate dimensions and spacing, and consult with structural engineer for load requirements.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Examine substrates and conditions for compliance with requirements for form and reinforcement tolerances and other conditions affecting performance of work.
- B. Allow schedule time for inspection and acceptance of layout and placement.

3.2 INSTALLATION

- A. Install dowel systems per approved shop drawings and manufacturer’s recommendations and instructions, maintaining alignment and proper support. Measure and mark reference lines for required joint locations.
- B. Coordinate with other Division 03 Sections for forming, reinforcement, and placement of concrete.
- C. Protect dowel joint assemblies from displacement and from damage until concrete casting and curing is complete.
- D. Screed and finish concrete, using internal vibration as recommended in industry guidelines, to ensure that concrete is consolidated properly around joint system components.
- E. Where indicated, saw-cut control joints to required depths, using reference marks to align with embedded joint assemblies within slab.

END OF SECTION – 03 15 00 CONCRETE ACCESSORIES

03 35 10 CONCRETE FLOOR SEALERS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes:

1. Interior Concrete Floor Slab Densifiers: clear liquid hardener-densifier for interior cast-in-place concrete floor slabs.
2. Exterior Concrete Sealer: clear liquid film-forming sealer for exterior concrete floor and pavement slabs.

1.2 REFERENCES

A. American Society for Testing and Materials International (ASTM):

1. ASTM C-779 – Standard Test Method for Abrasion Resistance of Horizontal Concrete Surfaces.
2. ASTM C-642 – Standard Test Method for Density, Absorption, and Voids in Hardened Concrete.
3. ASTM C-309 – Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
4. ASTM C-1315 – Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete

1.3 SUBMITTALS

A. Product Data: Manufacturer's technical literature for each product indicated, specified, or required. Include manufacturer's technical data, application instructions, and recommendations.

1. Cross-reference products that are components of a complete coating system, and locations of application areas.

B. Installer Qualifications: Data for company, on-site personnel, experience, and training.

C. Maintenance Data: For inclusion in maintenance manuals.

1. Include instructions for maintenance of installed work, including methods and frequency recommended for maintaining optimum condition under anticipated use.
2. Include precautions against cleaning products and methods which may be detrimental to finishes and performance.

PART 2 -

PART 3 - PRODUCTS

3.1 GENERAL

- A. Material Compatibility: Provide materials for use within each coating system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.

3.2 CONCRETE HARDENER AND DENSIFIER

- A. Description: Water-based for interior applications, chemically reactive solution of inorganic siliceous materials to fill concrete pores to increase surface density and durability, reduce surface absorption of liquids, allow moisture vapor transmission, resist black tire marks, oil and grease, be VOC compliant, and neutralize surface alkali eliminating efflorescence.
- B. Manufacturers: Subject to compliance with requirements, provide:
 - 1. "Ashford Formula" by Curecrete Distribution, Inc. (Basis of Design)
 - 2. Do not substitute products without Architect's full review and approval. Possible products that may be considered may include:
 - a. "Liqui-Hard Ultra" by W.R. Meadows
 - b. "Scofield Formula One Lithium Densifier MP" by Sika Corporation
 - c. "Chemisil Plus" by ChemMasters
 - d. "ChemTec ONE" by Chemtec International
 - e. Or an approved equal.

3.3 CONCRETE FILM-FORMING SEALER

- A. Description: Solvent-based for exterior applications, clear, non-yellowing, high-solids barrier-sealing formula of acrylic polymers suitable for use over new and old concrete, formulated for exterior exposure. Protects concrete surfaces against salts, grease, oil, alkalies, mild acids, and detergents, and prevents dirt and stains from bonding to concrete.
- B. Manufacturers: Subject to compliance with requirements, provide:
 - 1. "Seal-Cure-25" by W.R. Meadows (Basis of Design)
 - a. Or an approved equal.

3.4 PENETRATING CONCRETE WATERPROOFING SEALER

- A. Description: Penetrating densifier that protects concrete from water penetration, proprietary blend of silicates and catalyst to seal concrete pores and improve abrasion resistance.
 - 1. Two full coats are required; product cannot be applied over other concrete sealers. Remove other concrete curing sealers and release agents prior to application.
- B. Manufacturers: Subject to compliance with requirements, provide:

1. “Vetrofluid” by Ecobeton USA.
 - a. Do not substitute product without Architect’s full review and approval.

PART 4 - EXECUTION

4.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.
 1. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 - a. Concrete: 12 percent.
 - b. Masonry (Clay and CMU): 12 percent.
 2. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
 3. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.
 4. Coating application indicates acceptance of surfaces and conditions.

4.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations.
- B. Remove plates, machined surfaces, and similar items already in place that are not to be coated. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and coating.
 1. After completing coating operations, reinstall items that were removed; use workers skilled in the trades involved.
- C. Mask and protect any glass, aluminum, or other polished surfaces in the application area. Should the concrete sealer come into contact with these materials, rinse immediately with warm water to prevent pitting or discoloration.
- D. Clean substrates of substances that could impair bond of coatings, including dirt, oil, grease, and incompatible paints and encapsulants.
 1. Remove incompatible primers as required to produce coating systems indicated.
- E. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.
- F. Fill and repair all holes, cracks, and deteriorated areas in concrete.

4.3 APPLICATION

- A. Apply concrete hardeners or sealers in accordance with manufacturer's instructions.
- B. Ensure application equipment is clean and free of previously used materials.
- C. Do not dilute concrete densifier and chemical hardener. Materials are to be premixed for use according to manufacturer's instructions. Apply undiluted concrete densifier and chemical hardener by pouring, pumping or spraying per manufacturer's instructions, using equipment recommended by manufacturer.
- D. Test Area: Contractor shall treat a small area to establish physical and visual effects of application and absorption level to establish coverage rates. Coverage will be dependent upon surface texture and porosity.
- E. On new concrete, apply undiluted concrete densifier and chemical hardener as soon as concrete is firm enough to work on after final troweling. Do not allow material to puddle on the surface.
- F. Verify with product manufacturer's recommendations for the substrate condition; two coats are usually required for adequate concrete protection.
- G. Restrict foot traffic for at least 4 hours; 12 hours is preferable.

END OF SECTION – 03 35 10 CONCRETE HARDENERS AND SEALERS

03 35 43 POLISHED CONCRETE FINISHING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Products and procedures for bonded-abrasive polished concrete floors using multi-step wet or dry mechanical processes, and accessories indicated, specified, or required to complete polishing.

1.2 DEFINITIONS

- A. Terminology: As defined by Concrete Polishing Council (CPC) glossary.
- B. Polished Concrete: The multi-step operation of mechanically grinding, honing, and polishing a concrete floor surface with bonded abrasives to cut a concrete floor surface and to refine each cut to achieve a specified level of appearance as defined by the CPC.

1.3 SUBMITTALS

- A. Product Data: Manufacturer's technical literature for each product indicated, specified, or required. Include manufacturer's technical data, application instructions, and recommendations.
 - 1. Cross-reference products that are components of a complete coating system, and locations of application areas.
 - 2. Include data for curing compounds and colored admixtures.
- B. Design Mixes: For each type, color, and finish of colored and polished concrete.
- C. Samples: not required for clear colorless finish.
- D. Installer Qualifications: Data for company, on-site personnel, experience, and training.
- E. Maintenance Data: For inclusion in maintenance manuals.
 - 1. Include instructions for maintenance of installed work, including methods and frequency recommended for maintaining optimum condition under anticipated use.
 - 2. Include precautions against cleaning products and methods which may be detrimental to finishes and performance.

1.4 QUALITY ASSURANCE

- A. Polisher Qualifications:
 - 1. Experience: Company that has successfully completed five projects similar in design, products, and extent to scope of this Project; with a record of successful in-service

- performance; and with sufficient production capability, facilities, and personnel to produce specified work.
2. Supervision: Maintain a competent supervisor who is at Project during times specified work is in progress, and is currently certified as Craftsman - Level I or higher by CPAA, CPC Craftsman, or equivalent.
 3. Manufacturer Qualification: Approved by manufacturer to apply liquid applied products.
- B. Pre-Installation of Concrete Conference: Prior to placing concrete for areas scheduled for polishing, conduct conference at Project to comply with requirements of applicable Division 01 Sections.
1. Required Attendees:
 - a. Contractor, including supervisor.
 - b. Owner's Representative.
 - c. Concrete producer.
 - d. Concrete finisher, including supervisor.
 - e. Concrete polisher, including supervisor.
 - f. Technical representative of liquid applied product manufacturers.
 2. Minimum Agenda: Polisher shall demonstrate understanding of work required by reviewing and discussing procedures for, but not limited to, following:
 - a. Tour representative areas of required work, discuss and evaluate for compliance with Contract Documents, including substrate conditions, surface preparations, sequence of procedures, and other preparatory work performed by other installers.
 - b. Review Contract Document requirements.
 - c. Review procedures, including, but not limited to:
 - 1) Applicable Division 03 Section on cast-in-place concrete.
 - 2) Specific mix designs.
 - 3) Specified curing methods/procedures.
 - 4) Protection of concrete substrate during construction and prior to polishing process.
 - 5) Project phasing and scheduling for each step of grinding, honing and polishing operations including, but not limited to:
 - a) Quality of qualified personnel committed to project.
 - b) Quality and size of grinders committed to project.
 - c) Proper disposal of concrete slurry and/or concrete dust.
 - 6) Details of each step of grinding, honing, and polishing operations.
 - a) Application of color.
 - b) Application of liquid applied products.
 - c) Protecting polished concrete floors after polishing work is complete.
 3. Reports: Record discussions, including decisions and agreements reached, and furnish copy of record to each party attending.

C. Field Mock-up: Before performing work of this Section, provide a field mock-up to verify selections made under submittals and to demonstrate aesthetic effects of polishing. Approval does not constitute approval of deviations from Contract Documents, unless the Owner and Architect specifically approve deviations in writing.

 1. Designate, with the Owner's approval, an area of the concrete slab floor for minimum 10 foot square field mock-up to demonstrate actual project polishing results.

2. Placement and finishing work shall be performed by same personnel as will place and finish the polished concrete for the remainder of the Project.
3. Mock-up shall be representative of work to be expected throughout.
4. Perform grinding, honing, and polishing work as scheduled for Project using same personnel as will perform work for Project.
5. Approval is for following aesthetic qualities:
 - a. Compliance with approved submittals.
 - b. Compliance with specified aggregate exposure class.
 - c. Compliance with specified polish appearance level.
 - d. Compliance with specified color (if applicable) or to verify clarity.
6. Obtain the Owner's written approval before starting work on Project.
7. Protect and maintain approved field mock-up area during construction in an undisturbed condition as a standard for judging completed work.

1.5 FIELD CONDITIONS

- A. **Damage and Stain Prevention:** It is the responsibility of the Contractor to prevent damage and staining of concrete surfaces to be polished.
 1. Prohibit use of markers, spray paint, and soapstone.
 2. Prohibit improper application of liquid membrane film forming curing compounds.
 3. Prohibit vehicle parking over concrete surfaces.
 4. Prohibit pipe-cutting operations over concrete surfaces.
 5. Prohibit storage of any items over concrete surfaces for not less than 28 days after concrete placement.
 6. Prohibit ferrous metals storage over concrete surfaces.
 7. Protect from petroleum, oil, hydraulic fluid, or other liquid dripping from equipment working over concrete surfaces.
 8. Protect from acids and acidic detergents contacting concrete surfaces.
 9. Protect from painting activities over concrete surfaces.
- B. **Environmental Limitations:** Comply with manufacturer's written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting liquid applied product application.
- C. **Application of polished finish system shall take place a minimum of 21 days prior to fixture and trim installation and/or substantial completion.**
- D. **Polished concrete area shall be closed to traffic during finish floor application and after application for the time as recommended by the system manufacturer.**

PART 2 - PRODUCTS

2.1 POLISHED CONCRETE, GENERAL

- A. **Liquid Concrete Densifier:** See Section 033510 for Concrete Floor Densifier products.
- B. **Field Grinding and Polishing Equipment:**

1. A multiple head, counter rotating, walk behind or ride on machine, of various size and weights, with diamond tooling affixed to the head for the purpose of grinding concrete. Excludes janitorial maintenance equipment.
 2. If dry grinding, honing, or polishing, use dust extraction equipment with flow rate suitable for dust generated, with squeegee attachments to meet OSHA requirements.
 3. If wet grinding, honing, or polishing, use slurry extraction equipment suitable for slurry removal and containment prior to proper disposal.
- C. Edge Grinding and Polishing Equipment: Hand-held or walk-behind machines which produces the same results, without noticeable differences, as field grinding and polishing equipment.
- D. Burnishing Equipment: High speed walk-behind or ride-on machines capable of generating 1000 to 2000 revolutions per minute and with sufficient head pressure of not less than 20 pounds to raise floor temperature by 20 degrees F.
- E. Diamond Tooling: Abrasive tools that contain industrial grade diamonds within a bonded matrix (such as metallic, resinous, ceramic, etc) that are attached to rotating heads to refine the concrete substrate.

2.2 POLISHED CONCRETE FINISHING SYSTEM

- A. Basis of Design: “RetroPlate” by Curecrete Distribution, Inc. (dba Advanced Floor Products; RetroPlate System).
1. Finished Color: Typically Clear, no color, as Basis of Design.
 2. Only when specifically noted on drawings:
 - a. Typically Applied, Transparent Dye: RetroPlate Concrete Dye Concentrate.
 - b. Polished Concrete Dye Color: to be selected from manufacturer’s full range.
- B. Proprietary Coloring and Polishing System Products by CureCrete: verify with manufacturer, the products recommended for the particular conditions of this project.
1. Hardener, Sealer, Densifier: RetroPlate 99, penetrating, water based, odorless liquid, VOC compliant, environmentally safe chemical, leaves no film on surface
 2. Concrete Grinding Accelerant, Concrete Clarity Enhancer: KickStart
 3. Joint Filler: CreteFill Pro 85 (Moisture Insensitive) – semi-rigid, 2-component, selfleveling, 100% solids, rapid curing, polyurea control joint and crack filler, with 85 Shore-A hardness.
 4. Oil Repellent Sealer: RetroPel
 5. Stain Protector: RetroGuard
 6. Cleaning Solution: CreteClean Plus / CreteClean Plus - Single Dose

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Acceptance of Surfaces and Conditions:
 - 1. Examine substrates to be polished for compliance with requirements and other conditions affecting performance.
 - a. Concrete finished floor flatness according to applicable Division 03 Section on cast-in-place concrete.
 - b. Concrete curing methods according to applicable Division 03 Section on cast-in-place concrete.
 - c. Concrete compressive strength according to applicable Division 03 Section on cast-in-place concrete.
- B. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents.
 - 1. Starting work within a particular area will be construed as acceptance of surface conditions.

3.2 PREPARATION

- A. Prepare and clean concrete surfaces.
- B. Provide sound concrete surfaces free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, paint splatter, and other contaminants incompatible with liquid applied products and polishing.

3.3 POLISHING CONCRETE FLOORS

- A. Perform all polishing procedures to ensure a consistent visual appearance from wall to wall.
- B. Initial Grinding:
 - 1. Use grinding equipment with metal or semi-metal bonded tooling.
 - 2. Begin grinding in one direction using sufficient size equipment and diamond tooling to meet specified aggregate exposure class.
 - 3. Make sequential passes with each pass perpendicular to previous pass using finer grit tool with each pass, up to 100 grit metal bonded tooling.
 - 4. Achieve maximum refinement with each pass before proceeding to finer grit tools.
 - 5. Clean floor thoroughly after each pass using dust extraction equipment properly fitted with squeegee attachment or walk behind auto scrubber suitable to remove all visible loose debris and dust.
 - 6. Continue grinding until aggregate surface exposure matches approved samples.
- C. Treating Surface Imperfections:
 - 1. Mix patching compound or grout material with dust created by grinding operations, manufacturer's tint, or sand to match color of adjacent concrete surfaces.
 - 2. Fill surface imperfections including, but not limited to, holes, surface damage, small and micro cracks, air holes, pop-outs, and voids with grout to eliminate micro pitting in finished work.

3. Work compound and treatment until color differences between concrete surface and filled surface imperfections are not reasonably noticeable when viewed from 20 feet away under lighting conditions that will be present after construction.
- D. Liquid Densifier Application: Apply undiluted to point of rejection, remove excess liquid, and allow curing according to manufacturer's instructions.
- E. Honing:
1. Use grinding equipment with hybrid or resin bonded tooling.
 2. Hone concrete in one direction starting with 100 grit tooling and make as many sequential passes as required to remove scratches, each pass perpendicular to previous pass, up to 400 grit tooling reaching maximum refinement with each pass before proceeding to finer grit tooling.
 3. Clean floor thoroughly after each pass using dust extraction equipment properly fitted with squeegee attachment or walk behind auto scrubber suitable to remove all visible loose debris and dust.
- F. Polishing:
1. Use polishing equipment with resin-bonded tooling.
 2. Begin polishing in one direction starting with 800 grit tooling.
 3. Make sequential passes with each pass perpendicular to previous pass using finer grit tooling with each pass until the specified level of appearance has been achieved.
 4. Achieve maximum refinement with each pass before proceeding to finer grit pads.
 5. Clean floor thoroughly after each pass using dust extraction equipment properly fitted with squeegee attachment or walk behind auto scrubber suitable to remove all visible loose debris and dust.
 6. Stain Protection: Uniformly apply and remove excessive liquid according to manufacturer's instructions. Final film thickness should be less than .05 mils after cure.
 7. Final Polish: Using burnishing equipment and finest grit abrasive pads, burnish to uniform reflective sheen matching approved field mock-up.

3.4 POLISHED CONCRETE FLOOR FINISH APPEARANCE

- A. Aggregate Exposure Class B – Fine Aggregate: Surface exposure of 85 to 95% fine aggregate and 5 to 15% blend of cement fines and coarse aggregates.
- B. Appearance Level 3 – Polished:
1. Procedure: Recommended not less than 4 steps with full refinement of each diamond tool with one application of densifier.
 2. Measurement: Determine the Image Clarity Value,%, and the Haze Index:
 - a. Image Clarity Value, %: An average value of 40 to 69 measured in accordance with ASTM D5767 prior to the application of sealers.
 - b. Haze Index: An average value less than 10 measured in accordance with ASTM D4039 prior to the application of sealers.

- c. The minimum number of tests distributed across the polished surface should be three, for areas up to 1000 ft² and one additional test for each 1000 ft² or fraction thereof. This applies to both the Image Clarity Value and Haze Index.

END OF SECTION 03 35 43 – POLISHED CONCRETE FINISHING

03 45 00 PRECAST ARCHITECTURAL CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. The Old Dominion Freight Line Logo cast into an architectural concrete wall panel, including:
 - a. Design of precast units, including final engineering for reinforcing, support, and anchorage.
 - b. Manufacturing, finishing, shipping, unloading, and erection of precast units
2. Precast concrete splash blocks.

B. Products supplied with and installed under this Section: Anchor bolts and bearing plates for installation and connection to structure or other concrete construction.

C. Include all labor, materials, reinforcing design, supervision, tools and equipment required for the fabrication, delivery and installation of the Architectural Precast Concrete as shown on drawings.

1.2 PERFORMANCE REQUIREMENTS

A. Structural Performance: Design, fabricate and install wall-mounted precast units to withstand specified performance requirements indicated by structural engineer in addition to handling loads and erection stresses.

1. Design loads: See Structural Drawings for loading information. Design, fabricate and install units to withstand the indicated loads plus a design factor of safety.
2. Thermal movement: Withstand expansion and contraction forces resulting from ambient air temperature expansion and contraction due to heat and cold.
3. Concrete compressive strength of 5,000 psi minimum at 28 days when tested in accordance with ASTM C-39. Provide test results and other required data in accordance with ACI 301 and ACI 318.

1.3 SUBMITTALS

A. Product Data: For each type of product and material to be used.

B. Design Mixtures: For each precast concrete mixture. Include compressive strength and water-absorption tests.

C. Shop Drawings: Detail fabrication and installation of architectural precast concrete units.

1. Show project-specific layout plans, elevations, dimensions, and cross sections of each unit.

2. Indicate joints, reveals, and extent and location of each surface finish.
3. Detail attachment to adjacent structures, and treatment of joints.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Support units during shipment on non-staining shock-absorbing material.
- B. Store units with adequate dunnage and bracing and protect units to prevent contact with soil, to prevent staining, and to prevent cracking, distortion, warping or other physical damage.
- C. Handle and transport units in a position consistent with their shape and design in order to avoid excessive stresses which would cause cracking or damage.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. See Structural drawings and specifications for cast concrete components, reinforcement, and grout materials.
- B. Accessories:
 1. Molds and forms should be coated with a release agent before casting.
 2. Provide clips, hangers, plastic or steel shims, and other accessories required to install architectural precast concrete units.
 3. Bond Breaker: Closed cell polyethylene foam, 1/8 inch to 1/4 inch (3 mm to 6 mm) thick.
 4. Sealants: Low modulus polyurethane.
- C. Exposed Finish: Panel faces shall be free of joint marks, grain, and other obvious defects. Corners, including false joints shall be uniform, straight and sharp. Finish exposed face surfaces to match approved sample panels, first production panel and/or mock-ups, whichever is required and approved by the Architect.
 1. Beveled or exposed top, bottom, and side faces of units to match the main face surface finish.

2.2 OLD DOMINION FREIGHT LINE LOGO

- A. See Architectural Drawings for details.
 1. Logo dimension: 5'-6" diameter.
 2. Logo to be set in 3/4" relief.
- B. Logo design file will be provided by Owner.
- C. Paint logo with designated colors as shown on Architectural drawings.

2.3 CONCRETE SPLASH BLOCKS

- A. Sloped, precast concrete shapes with raised edges, designed to direct water away from the building at the bottom of downspouts.
 - 1. Size: approx. 12" wide x 24" long minimum. (30" long is acceptable.)
 - 2. Weight: minimum 30 pounds each.
 - 3. Color: standard gray, no special color.
- B. Submittals required showing shape, dimensions, and thicknesses of product proposed to be provided.

PART 3 - EXECUTION**3.1 EXAMINATION**

- A. Examine supporting structural frame or foundation and conditions for compliance with requirements for installation tolerances, true and level bearing surfaces, and other conditions affecting performance.
- B. Deliver anchorage devices that are embedded in or attached to the building structural frame or foundation before start of such work. Provide locations and anchor layouts showing the proper installation of each anchorage device.
- C. Do not install precast concrete units until supporting cast-in-place building structural framing has attained minimum allowable design compressive strength or supporting steel or other structure is complete.

3.2 REPAIR

- A. Precast units may be rejected due to any one of following:
 - 1. Non-conformance with allowable tolerances
 - 2. Damage to surfaces, finish, corners, or edges exposed to view after erection
 - 3. Broken, chipped, spalled, cracked, or otherwise damaged units
 - 4. Defects listed in PCI MNL-117
- B. Acceptance of repaired units by Architect shall be contingent upon:
 - 1. Repairs being done skillfully so as to be sound, permanent, and flush with adjacent surfaces
 - 2. Color and texture of repaired areas matching adjoining surfaces and showing no apparent line of demarcation between repaired and original work.
- C. Replacement of patching shall be necessary if patch is unacceptable to Architect.
 - 1. Architect's decision will be final with respect to acceptance or rejection of patched units.
 - 2. Remove and replace units that are rejected, including units with unacceptable patching, at no additional cost to Owner.

3.3 FINISHING AND PROTECTION

- A. Prime and paint logo per Division 09 requirements for exterior painting. Consult paint system manufacturer for coating recommendations for specific substrate, job conditions, and environmental factors.
- B. Protect precast architectural concrete elements from damage until final acceptance at project completion.

END OF SECTION 03 45 00 – PRECAST ARCHITECTURAL CONCRETE

04 21 13 BRICK MASONRY

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes masonry veneer assemblies consisting of face brick and building (common) brick.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For the following:
 - 1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
 - 2. Trim Units: Show sizes, profiles, and locations.
 - 3. Anchors and Ties: types, locations, spacings, and attachments.
 - 4. Fabricated Flashing: Detail corner units, end-dam units, and other special applications.
- C. Samples: Not required if providing the exact products and colors indicated on drawings.
- D. For substitution requests, if alternative brick products are proposed in lieu of basis-of-design products, Architect and/or Owner must review and approve physical samples of a sufficient number of units to satisfactorily demonstrate the color and range of texture and color variations to be expected among an entire lot.

PART 2 - PRODUCTS

2.1 BRICK

- A. General: Provide shapes indicated and as follows:
 - 1. For ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces, provide units without cores or frogs and with exposed surfaces finished.
 - 2. Provide special shapes for applications where stretcher units cannot accommodate special conditions, including those at corners, movement joints, bond beams, sashes, and lintels.
 - 3. Provide special shapes for applications requiring brick of size, form, color, and texture on exposed surfaces that cannot be produced by sawing.
 - a. Provide special shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view.
- B. Face Brick: ASTM C-216, Grade SW.
 - 1. Type FBS unless otherwise indicated on drawings.

2. Type FBX or FBA where designated by Architect for aesthetic effects.
 3. Efflorescence: Provide brick that has been tested according to ASTM C-67 and is rated "not effloresced."
 4. Size:
 - a. Nominal face dimensions of 4"x2-2/3"x8" unless otherwise indicated.
 - b. Other sizes only where indicated on drawings
 - c. Manufactured to dimensions 3/8 inch less than nominal dimensions.
- C. Exposed Faces: Provide color and texture matching the Architect's selection or sample.
- D. Building (Common) Brick: ASTM C-62, Grade SW.
1. Size: Match size of face brick.
 2. Application: Use where brick is indicated for concealed locations. Face brick complying with requirements for grade, compressive strength, and size indicated for building brick may be substituted for building brick.

2.2 TIES AND ANCHORS

- A. Materials: Provide ties and anchors specified in subsequent paragraphs that are made from materials that comply with eight subparagraphs below, unless otherwise indicated.
1. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A-82; with ASTM A-153, Class B-2 coating.
- B. Wire Ties, General: Unless otherwise indicated, size wire ties to extend at least halfway through veneer but with at least 5/8-inch cover on outside face. Outer ends of wires are bent 90 degrees and extend 2 inches parallel to face of veneer.
- C. Where wythes do not align or are of different materials, use adjustable ties with pintle-and-eye connections having a maximum adjustment of 1-1/4 inches.
- D. Adjustable Anchors for Connecting to Structure: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.
- E. Adjustable Masonry-Veneer Anchors
1. General: Provide anchors that allow vertical adjustment but resist tension and compression forces perpendicular to plane of wall, for attachment over sheathing to wood or metal studs, and as follows:
 - a. Structural Performance Characteristics: Capable of withstanding a 100-lbf load in both tension and compression without deforming or developing play in excess of 0.05 inch.
 - b. Adjustable anchors with two pintles, span of the adjustable portion 2 inches.
 2. Where continuous insulation is provided on the outside of exterior wall sheathing, provide ties and anchors that are specially designed to accommodate the insulation thickness.

- F. Masonry Veneer Anchors at metal studs: Provide barrel-type anchor for screws, with polymer washers to seal the face of the envelope air/vapor barrier, and provide thermal break through the exterior applied insulation layer.
- G. Partition Top anchors: Specially designed to provide lateral shear resistance at the upper limit of masonry walls, permitting vertical deflection of the cover above, without transferring compressive loads to the masonry below.

2.3 EMBEDDED FLASHING

- A. Metal Flashing: Provide metal flashing complying with SMACNA's "Architectural Sheet Metal Manual" and as follows:
 - 1. Stainless Steel: ASTM A-240, Type 304, 0.016 inch (0.4 mm) thick.
 - 2. Fabricate through-wall metal flashing embedded in masonry from stainless steel with ribs at 3-inch intervals along length of flashing to provide an integral mortar bond.
 - a. Available Products:
 - 1) Cheney Flashing Company; Cheney Flashing (Dovetail) or Cheney 3-Way Flashing (Sawtooth).
 - 2) Keystone Flashing Company, Inc.; Keystone 3-Way Interlocking Thruwall Flashing.
 - 3) Or approved equal.
 - 3. Fabricate through-wall flashing with snaplock receiver on exterior face where indicated to receive counterflashing.
 - 4. Fabricate through-wall flashing with drip edge where indicated. Fabricate by extending flashing 1/2 inch out from wall, with outer edge bent down 30 degrees and hemmed.
 - 5. Fabricate through-wall flashing with sealant stop unless otherwise indicated. Fabricate by bending metal back on itself 3/4 inch at exterior face of wall and down into joint 3/8 inch to form a stop for retaining sealant backer rod.
- B. Flexible Flashing: For flashing not exposed to the exterior, use one of the following, unless otherwise indicated:
 - 1. Monolithic Sheet: Elastomeric thermoplastic flashing, 0.040 inch (1.0 mm) thick.
 - 2. Self-Adhesive Sheet: Elastomeric thermoplastic flashing, 0.025 inch (0.6 mm) thick, with a 0.015-inch- (0.4-mm-) thick coating of rubberized-asphalt adhesive.
 - 3. Self-Adhesive Sheet with Drip Edge: Elastomeric thermoplastic flashing, 0.025 inch (0.6 mm) thick, with a 0.015-inch- (0.4-mm-) thick coating of rubberized-asphalt adhesive. Where flashing extends to face of masonry, rubberized-asphalt coating is held back approximately 1-1/2 inches from edge.
 - 4. Accessories: Provide preformed corners, end dams, other special shapes, and seaming materials produced by flashing manufacturer.
- C. Adhesives, Primers, and Accessories for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

2.4 MISCELLANEOUS MASONRY ACCESSORIES

- A. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D-2000, Designation M2AA-805 or PVC, complying with ASTM D-2287, Type PVC-65406 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.
- B. Bond-Breaker Strips: Use to prevent 3-point adhesion in shallow caulk joints or joints where backer rod cannot be used, to ensure the correct and uniform sealant depth.
 - 1. Asphalt-saturated, organic roofing felt complying with ASTM D-226, Type I (No. 15 asphalt felt).
 - 2. Polyethylene or Polypropylene tape designed for use in concrete and masonry joints.
- C. Weep/Vent Products: Use one of the following, unless otherwise indicated:
 - 1. Cellular Plastic Weep/Vent: One-piece, flexible extrusion made from UV-resistant polypropylene copolymer, full height and width of head joint and depth 1/8 inch less than depth of outer wythe, in color selected from manufacturer's standard.
 - 2. Mesh Weep/Vent: Free-draining mesh; made from polyethylene strands, full height and width of head joint and depth 1/8 inch less than depth of outer wythe; in color selected from manufacturer's standard.
 - 3. Vinyl Weep Hole/Vent: One-piece, offset, T-shaped units made from flexible, injection-molded PVC, designed to fit into a head joint and consisting of a louvered vertical leg, flexible wings to seal against ends of masonry units, and a top flap to keep mortar out of the head joint; in color approved by Architect to match that of mortar.
- D. Cavity Drainage Material: Free-draining mesh strips, made from polymer strands that will not degrade within the wall cavity, to suspend mortar droppings at unequal heights allowing moisture to drain from the cavity and maintain airflow within the cavity wall.
 - 1. Height: approx. 10 inches, with dovetail or trapezoid shaped notches 7 inches deep
 - 2. Depth / Thickness: 2 inches minimum, or more to match and fill airspace cavity width.
 - 3. Subject to compliance with requirements, available manufacturers and products that may be incorporated into the Work include, but are not limited to, the following:
 - a. "MortarNet with Insect Barrier" by Mortar Net Solutions
 - b. "Mortar Trap" by Hohmann & Barnard, Inc
 - c. "Cavity Net DT" by Wire-Bond
 - d. Or an approved equal.

PART 3 - EXECUTION**3.1 INSTALLATION**

- A. Before installation, examine rough-ins, substrates, and built-in construction. Coordinate openings, recesses, and chases.

- B. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.
- C. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures. Combine units from several pallets or cubes as they are placed.
- D. Comply with construction tolerances in ACI 530.1/ASCE 6/TMS 602.
- E. Bond Pattern for Exposed Masonry: As indicated on drawings; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.

3.2 ANCHORING MASONRY VENEERS

- A. Anchor masonry veneers to wall framing or concrete and masonry backup with seismic masonry-veneer anchors to comply with the following requirements:
 - 1. Fasten screw-attached and seismic anchors through sheathing to wall framing or to concrete and masonry backup with metal fasteners of type indicated. Use two fasteners unless anchor design only uses one fastener.
 - 2. Insert slip-in anchors in metal studs as sheathing is installed. Provide one anchor at each stud in each horizontal joint between sheathing boards.
 - 3. Embed tie sections in masonry joints.
 - 4. Provide not less than 2 inch of air space between back of masonry veneer and face of sheathing.
 - 5. Locate anchor sections to allow maximum vertical differential movement of ties up and down.
 - 6. Space anchors as indicated, but not more than 16 inches o.c. vertically and 16 or 24 inches o.c. horizontally with not less than 1 anchor for each 3.5 sq. ft. of wall area. Install additional anchors within 12 inches of openings and at intervals, not exceeding 32 inches, around perimeter.

3.3 CONTROL AND EXPANSION JOINTS

- A. General: Install control and expansion joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.
 - 1. Extend movement joints through thickness of entire veneer assembly, for full length or height of veneer, including into parapets.
- B. Vertical Expansion Joints in Brick Veneer:
 - 1. For brickwork without openings, space no more than 24 feet apart.
 - 2. For brickwork with multiple openings, consider symmetrical placement of expansion joints and reduced spacing of no more than 18 feet apart.
 - 3. Place additional vertical expansion joints as follows:

- a. within 4 feet of corners
 - b. at offsets and setbacks
 - c. at wall intersections
 - d. at changes in wall height
 - e. where wall backing system changes
 - f. where support of brick veneer changes
 - g. where wall function or climatic exposure changes
- C. Provide horizontal, pressure-relieving joints beneath shelf angles supporting masonry, by either leaving an air space or inserting a compressible filler of width required for installing sealant and backer rod specified in Division 07 Section "Joint Sealants," but not less than 3/8 inch.
- D. Bond Breaks: Use building paper or flashing to separate brickwork from dissimilar materials, foundations and slabs.
- E. Expansion Joint Sealants: Comply with ASTM C-920, Class 50 (movement), Type S (single component), Grade NS (nonsag), Use M (for mortar). Consult sealant manufacturer's literature for guidance regarding use of primer and backing materials.

3.4 FLASHING, WEEP HOLES, CAVITY DRAINAGE, AND VENTS

- A. General: Install embedded flashing and weep materials in masonry at shelf angles, lintels, ledges, other obstructions to the downward flow of water within the wall cavity, and where indicated. Install vents at shelf angles, ledges, and other obstructions to allow upward flow of air in cavities.
- B. Install flashing as follows, unless otherwise indicated:
- 1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar.
 - 2. At masonry-veneer walls, extend flashing through veneer, across air space behind veneer, and up face of sheathing at least 12 inches; with upper edge tucked under building wrap, lapping at least 4 inches.
 - 3. At lintels and shelf angles, extend flashing a minimum of 6 inches into masonry at each end. At heads and sills, extend flashing 6 inches at ends, and turn up not less than 2 inches to form end dams.
- C. Install weep products to form moisture and air weep vents as follows:
- 1. Install weeps in joints of the first course of masonry immediately above each level of embedded horizontal flashing.
 - 2. Install weeps above flashing under brick sills and masonry trims.
 - 3. Space weep holes 24 inches o.c., horizontally unless otherwise indicated.
 - 4. Install weeps within 48" of the tops of masonry veneer walls to promote air circulation.
 - 5. Trim wicking material flush with outside face of wall after mortar has set.

END OF SECTION – 04 21 13 BRICK MASONRY

04 22 00 BLOCK MASONRY

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes structural concrete masonry assemblies, including, but not limited to Concrete Masonry Units, mortar and grout, masonry joint reinforcement, and miscellaneous masonry accessories.

1.2 SUBMITTALS

- A. Product Data: For each different masonry unit, accessory, and other manufactured product specified.
- B. Shop Drawings: Detail bending and placement of unit masonry reinforcing bars, and show elevations and sections of reinforced walls.
- C. Material Test Reports: From a qualified testing agency indicating and interpreting test results of the following for compliance with requirements indicated:
 - 1. Each type of masonry unit required.
 - a. Include size-variation data, verifying that actual range of sizes falls within specified tolerances.
 - b. Include test results, measurements, and calculations establishing net-area compressive strength of masonry units.
 - 2. Mortar mix designs complying with property requirements of ASTM C-270.
 - 3. Grout mix designs complying with compressive strength requirements of ASTM C-476. Include description of type and proportions of grout ingredients.

1.3 QUALITY ASSURANCE

- A. See Structural Drawings notes for inspection and testing requirements.
- B. Fire-Resistance Ratings: Where indicated or required, provide materials and construction identical to those of tested assemblies with fire-resistance ratings determined per ASTM E-119 by a testing and inspecting agency, by equivalent concrete masonry thickness, or by another means, as acceptable to authorities having jurisdiction.
- C. Qualifications of workmen:
 - 1. For the actual cutting and placing of concrete masonry units, use only skilled journeyman masons who are thoroughly experienced with the materials and methods specified and thoroughly familiar with the design requirements.
 - 2. In acceptance or rejection of installed concrete masonry units, no allowance will be made for lack of skill on the part of workmen.

3. Provide at least one skilled journeyman mason who shall be present at all times during execution of the work of this Section and who shall personally direct the execution of this portion of the Work.

1.4 JOB CONDITIONS

- A. During erection, cover top of walls with heavy waterproof sheeting at end of each day's work. Cover partially completed structures when work is not in progress. Extend cover a minimum of 24" down both sides and hold cover securely in place.
- B. Do not apply uniform floor or roof loading for at least 12 hours after building masonry walls or columns.
- C. Do not apply concentrated loads for at least 3 days after building masonry walls or columns.
- D. Staining: Prevent grout or mortar from staining the face of masonry to be left exposed or painted. Remove immediately grout or mortar in contact with such masonry.
- E. Protect sills, ledges and projections from droppings of mortar.

PART 2 - PRODUCTS

2.1 CONCRETE MASONRY UNITS (CMU)

- A. ASTM C90 units with standard nominal face dimensions of 16" x 8" (See drawings for other sizes). Provide special shapes where required for lintels, corners, jambs, sash, control joints, headers, bonding and other special conditions.
 1. Normal weight: Conform to ASTM C33. Dry net unit weight shall be not less than 125 lbs./cu.ft. Typical unless otherwise noted.
 2. Light weight: Conform to ASTM C33. Dry net unit weight shall not exceed 105 lbs./cu.ft. Only where specifically indicated
 3. Materials in exposed surfaces shall be free of chips, cracks or other imperfections.
- B. Architectural Units: Integrally colored pre-finished architectural concrete block meeting the requirements of ASTM C90, with indicated sizes and face textures selected by Architect.
 1. Exposed Face Appearance:
 - a. Split face: units that are split after curing to expose a rough texture and reveals the aggregates used in the block.
 - b. Smooth or Ground face: tightly-mixed aggregate formed to a smooth colored finish.
 - c. Shotblasted: surface blasted to make a "weathered" exposed aggregate finish.
 - d. High-density: prefinished with fine aggregates to simulate smooth natural stone.

2.2 MORTAR AND GROUT

- A. Materials:

1. Portland cement: ASTM C150, type 1.
2. Masonry cement: ASTM C91, packaged cement.
3. Sand: Natural siliceous sand conforming to ASTM C144.
4. Aggregate: per ASTM C404.
5. Water: Potable.

B. Load-bearing walls: Type M mortar.

1. Use Type N for interior non-loading bearing walls.
2. Use Type S for foundations below grade.

C. Unless specifically noted otherwise, accelerating admixtures will not be permitted.

D. Retempering will be allowed only as necessary to maintain flow.

E. Use no mortar more than two hours old.

F. Grout for Bond Beams, Core Filling, and Reinforced Masonry: Shall meet or exceed ASTM C476. Aggregate for grout shall conform to ASTM C404.

G. Pigment: Where indicated for colored mortar, use pigments that are natural and/or synthetic, milled blended iron oxides.

1. Inert, stable to atmospheric conditions, sunfast, weather resistant, alkali resistant, water insoluble, lime proof, and nonbleeding, designed to produce uniform and consistent color.

2.3 REINFORCING AND ACCESSORIES

A. Provide welded wire units prefabricated in straight lengths of not less than 10', with matching corner and tee units. Fabricate from cold-drawn steel wire complying with ASTM A82, with deformed continuous side rods and plain cross-rods, and a unit width of 1-1/2" to 2" less than thickness of wall or partition.

1. Ladder type fabricated with single pair of 9 ga. side rods and 9 ga. perpendicular cross-rods spaced not more than 16" o.c.
2. Hot-dip galvanized after fabrication with 1.5 oz. zinc coating, ASTM A153, Class B2 if exposed to moisture and/or weather; .80 oz. zinc coating, ASTM A641, Class 3 if completely embedded in mortar or grout.

B. Reinforcing Bars: Deformed steel, ASTM A615, Grade 60.

1. Intersecting Wall Anchor: Z-type rigid steel bar 1/4" x 1" x 24" with 3" i.d. bends. Hot-dip galvanized after fabrication. Install in alternate courses with horizontal wall reinforcing. Install in alternate courses with horizontal wall reinforcing. Block cores into which the ties are placed shall be filled with grout.

C. Premolded Control Joint Strips: Solid rubber strips with a Shore A durometer hardness of 60 to 80, designed to fit standard sash block and maintain lateral stability in masonry wall, size and configuration as indicated.

PART 3 - EXECUTION**3.1 GENERAL EXECUTION**

- A. Thickness: Build masonry construction to the full thickness shown, except, build singlewythe walls (if any) to the actual thickness of the masonry units, using units of nominal thickness shown or specified.
- B. Build chases and recesses as shown and as required for the work of other trades. Provide not less than 8" of masonry between chase or recess and jamb of openings, and between adjacent chases and recesses.
- C. Cut masonry units to produce clean, sharp, unchipped edges. Cut units as required to provide pattern shown and to fit adjoining work neatly. Use full units without cutting wherever possible.
- D. Do not wet concrete masonry units.
- E. Frozen materials and work: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen work. Remove and replace masonry work damaged by frost or freezing.
- F. Layout walls in advance for accurate spacing of surface bond patterns, with uniform joint widths and to properly locate openings, movement-type joints, returns and offsets. Avoid the use of less-than-half size units at corners, jambs and wherever possible at other locations.
- G. Lay-up walls plumb and true and with courses level, accurately spaced and coordinated with other work.
- H. Coursing: One concrete masonry unit plus one joint shall equal 8". All joints shall be 3/8", unless indicated otherwise. Pattern to be running bond.

3.2 LAYING MASONRY – GENERAL

- A. Lay masonry plumb, true, and level. Lay masonry with full head and bed joints on surfaces joined, unless indicated otherwise.
 - 1. Where vertical cells are filled with grout and reinforced, cells shall be aligned to provide clear openings. Cross webs adjacent to vertical cores which are to be filled with grout shall be fully bedded in mortar to prevent leakage of grout. Cut off face of blocks wherever splices occur to provide cleanout and inspection ports. When reinforcing bars have been installed, mortar in the new faces on cut block to match other block.
 - 2. Where thickness of concrete block diminishes, (e.g.: 8" block is set on 12" block) use solid top FHA blocks in top course of thicker portion of wall.
 - 3. Realignment of masonry shall not be permitted after a higher or following course has been laid. Any masonry which is disturbed after the mortar has stiffened shall be removed and re-laid with fresh mortar.

4. When work has been stopped and about to resume again, rack back 1/2-masonry unit length in each course. Do not tooth. Clean exposed surfaces of set masonry and remove loose masonry units and mortar prior to laying fresh masonry.
5. Do not lay masonry when air temperature is below 40 degrees F, or forecasted to go below 40 degrees F within 24 hours, or when it is raining.
6. Built-In Work: As the work progresses, build-in items specified under this and other sections of these Specifications. Fill in solidly with masonry around built-in items. Fill space between hollow metal frames and masonry solidly with mortar. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath in the joint below and rod mortar or grout into core.
7. Intersecting Load-Bearing Walls: If carried up separately, block vertical joint with 8" maximum offsets and provide rigid steel anchors spaced not more than 4'-0" o.c. vertically, or omit blocking and provide rigid steel anchors at not more than 2'-0" o.c. vertically. If used with hollow masonry units, embed ends in mortar filled cores.
8. Non-Bearing Interior Partition Walls: Build full height of story to underside of solid structure above, unless otherwise indicated.

B. Mortar Bedding and Jointing:

1. Mix in accordance with ASTM C270. Measure and batch materials either by volume or weight, such that the required proportions for mortar can be accurately controlled and maintained. Measurement of sand exclusively by shovel will not be permitted.
2. Mixing: Mix mortars with the maximum amount of water consistent with workability to provide maximum tensile bond strength within the capacity of the mortar. Use water clean and free of deleterious materials which would impair the work. Do not use mortar which has begun to set, or if more than 2 hours has elapsed since initial mixing. Keep mortar tempered on the board. Retempering in mixer or in mortar box shall not be allowed.
3. Laying masonry units: With completely filled bed, head and collar joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not slush head joints. Lay hollow concrete masonry units with full mortar coverage on horizontal and vertical face shells; also bed webs in mortar in starting course on footings and foundation walls and in all courses of piers, columns and pilasters, and where adjacent to cells or cavities to be reinforced or to be filled with concrete or grout.
4. Joints: Maintain joint widths except for minor variations required to maintain bond alignment. If not otherwise indicated, lay walls with 3/8" joints. Cut joints flush for masonry walls which are to be concealed or to be covered by other materials. Tool exposed joints slightly concave. Rake out mortar in preparation for application of caulking or sealants where shown.
5. Remove masonry units disturbed above laying; clean and relay in fresh mortar. Do not pound corners at jambs to fit stretcher units which have been set in position. If adjustments are required, remove units, clean off mortar, and reset in fresh mortar.

C. Continuous Horizontal Joint Reinforcing:

1. Provide continuous horizontal joint reinforcing. Fully embed longitudinal side rods in mortar for their entire length with a minimum cover of 5/8" on exterior side of walls and 1/2" at other locations. Lap reinforcements a minimum of 6" at ends of units. Do not

bridge control and expansion joints with reinforcing, unless otherwise indicated. Provide continuity at corners and wall intersections by use of prefabricated "L" and "T" sections. Cut and bend units as directed by manufacturer for continuity at returns, offsets, column fireproofing, pipe enclosures and other special conditions.

2. Space continuous horizontal reinforcing at 16" o.c. vertically unless, otherwise indicated.
3. Reinforce masonry openings greater than 1'-0" wide, with horizontal joint reinforcing placed in 2 horizontal joints approximately 8" apart, both immediately above the lintel and below the sill. Extend reinforcing a minimum of 2'-0" beyond jambs of the opening, bridging control joints where provided.

D. Lintels

1. Install loose lintels of steel and other materials where shown.
 - a. Steel Lintels shall be factory primed, ready for field painting.
2. Provide masonry lintels where shown and wherever openings of more than 1'-0" are shown without structural steel or other supporting lintels. Provide precast or formed-in-place masonry lintels. Thoroughly cure precast lintels before handling and installation. Temporarily support formed-in-place lintels.
3. For hollow concrete masonry unit walls, use specially formed "U"-shaped lintel units with reinforcing bars placed as shown and filled with grout.
4. Provide minimum bearing at each jamb of 8".
5. Openings in 6" through 12" thick wall: Erect adequate work to support masonry over openings. Keep in place until grout in bond beam lintels has set sufficiently to support the load. Set concrete masonry units in mortar. Lay so that all concrete lintels may be poured in one operation.
6. Lay regular course of masonry overhead and reinforce next joint with joint reinforcing specified above.

E. Control and Expansion Joints:

1. Provide vertical expansion, control and isolation joints in masonry where shown and / or as required. Build-in related masonry accessory items as the masonry work progresses.
2. See Division 7 for sealants.
3. Control joints:
 - a. Provide vertical control joints in all masonry walls that exceed 40'-0" in length and/or exceed a ratio of panel length to height (L/H) of 3. These joints shall be placed at the following locations:
 - 1) Changes in wall height or thickness.
 - 2) At construction joints in foundation, in roof, and in floors.
 - 3) At chases and recesses for piping, columns, fixtures, etc.
 - 4) At abutment of wall and columns.
 - 5) At return angles in "L", "T", and "U" shaped structures.
 - 6) At other locations designated on the Drawings.
 - b. All joint locations must be verified and approved by the Architect.

- c. Create control joints with the use of the control joint gasket, backer rod and sealant. The gasket shall run continuous throughout the full height of the wall.
- F. Repair and Cleaning - General: Remove and replace masonry units which are loose, chipped, broken, stained or otherwise damaged, or if units do not match adjoining units as intended.
- G. Provide new units to match adjoining units and install in fresh mortar or grout, pointed to eliminate evidence of replacement. Clean exposed CMU masonry at the end of each day's work and after final pointing to remove mortar spots and droppings.
- H. Tolerances for construction:
 - 1. Variation from the plumb in the lines and surfaces of columns, walls and arises shall not exceed 1/8" in 10'-0" and 1/4" in a story height or 20'-0" maximum. Variation from plumb for external corners, expansion joints and other conspicuous lines, shall not exceed 1/4" in any story or 20'-0" maximum.
 - 2. Variation from the level of the grades indicated on the Drawings for exposed lintels, sills, parapets, horizontal grooves, and other conspicuous lines shall not exceed 1/4" in any bay or module or 20'-0", (whichever dimension is the least) nor 1/2" in 40'-0" or more.
 - 3. Variation of the linear building line from an established position in plan and related portion of columns, walls and partitions shall not exceed 1/4" in any bay or module or 20'-0", (whichever dimension is the least) nor 1/2" in 40'-0" or more.
 - 4. Variation in cross-sectional dimensions of columns and thickness of walls shall not exceed minus 1/4", nor plus 1/2" from the dimensions indicated on the Drawings.

END OF SECTION – 04 22 00 BLOCK MASONRY

05 05 13 SHOP-APPLIED COATINGS FOR METAL

PART 1 - GENERAL

1.1 EXPOSED COLOR OF METAL DECK AND MISC. STEEL

- A. Steel Deck shall be galvanized with indicated zinc coating; cleaned, pretreated, and primed with manufacturer's baked-on, lead- and chromate-free rust-inhibitive primer, interior exposed deck primer color shall be white.
- B. All miscellaneous exposed steel shall be galvanized and primed with shop-applied or field-applied lead- and chromate-free rust-inhibitive primer, primer color shall be gray.

END OF SECTION – 05 05 13 SHOP-APPLIED COATINGS FOR METAL

05 40 00 COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes exterior and interior load-bearing cold-formed steel framing, including, but not limited to, punched channel studs and C-shaped steel joists.

1.2 PERFORMANCE REQUIREMENTS

- A. Delegated Component Design: Include comprehensive engineering analysis by a qualified professional engineer, to verify that products, supports, connections and fasteners will withstand dynamic loads applicable to the project without detrimental effects or excessive deflection, including the effects of thermal differentials and fastener pullout resistance.
 - 1. Delegated Design includes the selection of non-structural metal framing components, including partition wall studs, girts, braces, hangers, and ceiling joists, based on engineering analysis by the cold-formed metal framing supplier to select metal sizes and thicknesses with appropriate material properties for the application intended.
 - 2. Compute structural properties of studs and joists in accordance with AISC "Specification for Design of Cold-Formed Steel Structural Members", and as verified by the Delegated Design engineer.
- B. Fire-rated assemblies: Where framing units are components of assemblies indicated for a fire-resistance rating, including materials identical to those in tested, approved assemblies, and provide units which have been approved by governing authorities having jurisdiction.
- C. AISI Specifications and Standards: Comply with:
 - 1. AISI S100 North American Specification for the Design of Cold-Formed Steel Structural Members.
 - 2. AISI S200 North American Standard for Cold-Formed Steel Framing - General Provisions.
 - 3. AISI S201 North American Standard for Cold-Formed Steel Framing - Product Standard.
 - 4. AISI S211 North American Standard for Cold-Formed Steel Framing - Wall Stud Design.
 - 5. AISI S212 North American Standard for Cold-Formed Steel Framing - Header Design.
 - 6. AISI S213 North American Standard for Cold-Formed Steel Framing - Lateral Design.
 - 7. AISI Code of Standard Practice for Cold-Formed Steel Structural Framing.

1.3 SUBMITTALS

- A. Product data: Manufacturer's Data for each type of cold-formed metal framing product and accessory used.

- B. Shop Drawings: Show layout, spacings, sizes, thicknesses, and types of cold-formed metal framing; fabrication; and fastening and anchorage details, including mechanical fasteners. Show reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.
 - 1. For cold-formed metal framing indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

- C. Product Test Reports: From a qualified testing agency indicating that each of the following complies with requirements, based on comprehensive testing of current products:
 - 1. Expansion anchors.
 - 2. Power-actuated anchors.
 - 3. Mechanical fasteners.
 - 4. Vertical deflection clips.
 - 5. Miscellaneous structural clips and accessories.

- D. Research/Evaluation Reports: Evidence of cold-formed metal framing's compliance with building codes in effect for Project.
 - 1. Provide ICC-ES Evaluation Reports for shaft wall framing systems.

PART 2 - PRODUCTS

2.1 METAL FRAMING

- A. System components: With each type of metal framing required, provide manufacturer's standard steel runner (tracks), blocking, lintels, clip angles, shoes, reinforcements, fasteners, and accessories as recommended by manufacturer for applications indicated, as needed to provide a complete metal framing system.

- B. Available Manufacturers: Subject to compliance with requirements, manufacturers offering cold-formed metal framing that may be incorporated into the Work include, but are not limited to, the following:
 - 1. ClarkDietrich Building Systems.
 - 2. Consolidated Systems, Inc.
 - 3. United Metal Products, Inc.
 - 4. Marion\Ware by Ware Industries, Inc.
 - 5. Or an approved equal.

- C. Materials and Finishes:
 - 1. 16 ga. and heavier units: Fabricate metal framing components of structural quality steel sheet with a minimum yield point of 40,000 psi.
 - 2. 18 ga. and lighter units: Fabricate metal framing components of commercial quality steel sheet with a minimum yield point of 33,000 psi.
 - 3. Reference structural drawings and notes for additional structural and materials property requirements.

4. Provide galvanized finish to metal framing components complying with ASTM A653 for minimum G60 coating.
 - a. At exterior framing, and framing in wet or humid locations: G90 or better.
- D. Studs: Manufacturer's standard C-shaped load-bearing steel studs of size, shape, and gauge indicated, with min. 1.625" flange and flange return lip, complying with ASTM C-955.
- E. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with straight flanges, flange width 1-1/4 inches minimum.
- F. Steel Single- or Double-L Headers: Manufacturer's standard L-shapes used to form header beams, of web depths required, and with minimum base metal thickness, flange width and section properties required to meet design requirements.
- G. Steel Joists for Floors, Ceilings, and Rafters: Manufacturer's standard C-shaped steel joists, of web depths indicated, punched, with enlarged service holes, with stiffened flanges, and with minimum base metal thickness, flange width and section properties required to meet design requirements.
- H. Provide accessories as required, including but not limited to:
 1. Supplementary framing.
 2. Bracing, bridging, and solid blocking.
 3. Web stiffeners.
 4. Anchor clips.
 5. End clips.
 6. Gusset plates.
 7. Stud kickers, knee braces, and girts.
 8. Joist hangers and end closures.
 9. Hole reinforcing plates.
 10. Backer plates.

2.2 ANCHORS, CLIPS, AND FASTENERS

- A. Steel Shapes and Clips: ASTM A-36, zinc coated by hot-dip process according to ASTM A-123.
- B. Vertical Deflection and Drift Clips: Manufacturer's standard bypass or head clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web and structure.
- C. Anchor Bolts: ASTM F-1554, threaded carbon-steel hex-headed bolts and carbon-steel nuts; and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A-153, Class C
- D. Expansion Anchors: Fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 5 times design load, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.
- E. Power-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 design load, as determined by testing per ASTM E-1190 conducted by a qualified independent testing agency.

- F. Mechanical Fasteners: ASTM C-1513, corrosion-resistant-coated, self-drilling, self-tapping steel drill screws.
 - 1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.
- G. Welding Electrodes: Comply with AWS standards.

2.3 FABRICATION

- A. Framing components may be prefabricated into panels prior to erection. Fabricate panels plumb, square, true to line and braced against racking with joints welded. Perform lifting of prefabricated panels in a manner to prevent damage or distortion.
- B. Fastenings: Attach similar components by welding. Attach dissimilar components by welding, bolting, or screw fasteners, as standard with fabricator.
- C. Wire tying of framing components is not permitted.
- D. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies to prevent damage or permanent distortion.
- E. Fabrication Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:
 - 1. Spacing: Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
 - 2. Squareness: Fabricate each cold-formed metal framing assembly to a maximum out-of-square tolerance of 1/8 inch.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Examine supporting substrates and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Ensure full contact of bearing flanges or track webs on supporting concrete or masonry construction, and grout bearing surfaces uniform and level where required.

3.2 INSTALLATION

- A. Install cold-formed metal framing according to AISI's "Standard for Cold-Formed Steel Framing - General Provisions" and to manufacturer's written instructions unless more stringent requirements are indicated.

- B. Do not bridge building expansion and control joints with cold-formed metal framing. Independently frame both sides of joints.
- C. Install supplementary framing, blocking, and bracing in stud framing indicated to support fixtures, equipment, services, casework, heavy trim, furnishings, and similar work requiring attachment to framing.
- D. Install miscellaneous framing and connections, including supplementary framing, diagonal bracing straps, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.
- E. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed metal framing with galvanized repair paint according to ASTM A-780 and manufacturer's written instructions.

END OF SECTION – 05 40 00 COLD-FORMED METAL FRAMING

05 50 00 METAL FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes miscellaneous metal framing, supports, sheet metal, and fabrications. All items of miscellaneous metal work and related parts are not necessarily described. Provide all work as indicated on the Drawings and/or necessary to complete the Contract, except for items which may be specifically excluded.

1.2 SUBMITTALS

- A. Product Data showing steel properties and dimensions, including:
 - 1. Nonslip aggregates and nonslip-aggregate surface finishes.
 - 2. Metal-pan stair treads
 - 3. Metal sheet and plate components
 - 4. Paint products.
 - 5. Grout.
- B. Shop Drawings: Show fabrication and installation details for metal fabrications.
 - 1. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.
 - 2. Show dimensions and types of bends, welds, fasteners, and finishes.
 - 3. Provide templates for anchors and bolts specified for installation under other Sections.
 - 4. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- C. Certification that each welder has satisfactorily passed AWS qualification tests for welding processes involved and has undergone recertification as required.

1.3 QUALITY ASSURANCE

- A. In addition to complying with all applicable codes and regulations, comply with industry standards and guidelines, including but not limited to those published by the following:
 - 1. AISC – American Institute of Steel Construction
 - 2. AWS – American Welding Society
 - 3. AA – The Aluminum Association
- B. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded, minimum tensile strength 70 ksi. Refer to Structural drawings for other welding requirements.

PART 2 - PRODUCTS**2.1 METAL MATERIALS**

- A. Steel Plates, Shapes, and Bars: ASTM A-36.
- B. Stainless-Steel Sheet, Strip, Plate, and Flat Bars: ASTM A-666, Type 304.
- C. Stainless-Steel Bars and Shapes: ASTM A-276, Type 304.
- D. Rolled-Steel Floor Plate: ASTM A-786, rolled from plate complying with ASTM A-36 or ASTM A-283, Grade C or D.
- E. Rolled-Stainless-Steel Floor Plate: ASTM A-793.
- F. Abrasive-Surface Floor Plate: Steel plate with abrasive granules rolled into surface or [with abrasive material metallurgically bonded to steel by a proprietary process.
- G. Steel Tubing: ASTM A-500, cold-formed steel tubing.
- H. Steel Pipe: ASTM A-53, standard weight (Schedule 40), unless another weight is indicated or required by structural loads.
- I. Cast Iron: ASTM A-48, Class 30, unless another class is indicated or required by structural loads.
- J. Aluminum Plate and Sheet: ASTM B-209, Alloy 6061-T6.
- K. Aluminum Extrusions: ASTM B-221, Alloy 6063-T6.
- L. Aluminum-Alloy Rolled Tread Plate: ASTM B-632, Alloy 6061-T6.
- M. Aluminum Castings: ASTM B-26, Alloy 443.0-F.

2.2 FASTENERS

- A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exposed exterior use, and zinc-plated fasteners with coating complying with ASTM B-633, Class Fe/Zn 5 for concealed applications in exterior walls. Provide stainless-steel fasteners for fastening aluminum. Select fasteners for type, grade, and class required.
- B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A-307, Grade A; with hex nuts, ASTM A-563; and, where indicated, flat washers.
- C. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts, nuts and, where indicated, flat washers; ASTM F-593 for bolts and ASTM F-594 for nuts, Alloy Group 1 (A1).
- D. Anchor Bolts: ASTM F-1554, Grade 36.

1. Provide hot-dip or mechanically deposited, zinc-coated anchor bolts where item being fastened is indicated to be galvanized.

E. Eyebolts: ASTM A-489.

F. Machine Screws: ASME B18.6.3.

G. Lag Bolts: ASME B18.2.1.

H. Wood Screws: Flat head, ASME B18.6.1.

I. Plain Washers: Round, ASME B18.22.1.

J. Lock Washers: Helical, spring type, ASME B18.21.1.

K. Expansion Anchors: Anchor bolt and sleeve assembly with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E-488, conducted by a qualified independent testing agency.

1. Material for Anchors in Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B-633, Class Fe/Zn 5.

2. Material for Anchors in Exterior Locations: Alloy Group 1 (A1) stainless-steel bolts complying with ASTM F-593 and nuts complying with ASTM F-594.

L. Toggle bolts: FS FF-B-588, tumble-wing type, class and style as required.

M. Concrete anchors: Simpson Set Epoxy Anchors with A307 rods.

2.3 GROUT

A. Nonshrink, Metallic Grout: Factory-packaged, ferrous-aggregate grout complying with ASTM C-1107, specifically recommended by manufacturer for heavy-duty loading applications.

B. Nonshrink, Non-metallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C-1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

2.4 MISCELLANEOUS METAL FABRICATIONS

A. Manufactured items of types normally carried in stock inventories, as distinguished from items fabricated especially for this Project, shall be fabricated from materials customarily used by the manufacturer, irrespective of the requirements of this Specification, unless in particular instances, special materials are necessary. With respect to shop prime coatings on such stocked items, manufacturer's standard finish will be accepted unless specified otherwise.

B. Continuous Bent Plates: Provide continuous single angles in long lengths where indicated or necessitated. Drill ½" holes for wood attachment at 24" o.c. where required.

- C. Miscellaneous Clip Angles and Bent Plates: Provide as indicated or necessitated. Drill ½" holes for wood attachment at 24" o.c. where required.
- D. Angles at Roof Deck Openings: Provide angles in single lengths where indicated. Drill ½" holes for attachment of wood, with a minimum of two attachment points and a maximum spacing of 24" o.c.
- E. Loose Lintels: Loose lintels to be Hot-dip galvanized and shall be long enough to provide 8" of bearing on each end. Provide loose lintels to the masonry trade for installation.
- F. Welding Plates: Fabricate plates of sizes indicated. Fabricate to have a minimum of two Nelson Studs on bottom side of plates. Use stud sizes indicated.
- G. Miscellaneous Steel Trim: Unless otherwise indicated, fabricate units from structural steel shapes, plates, and bars of profiles shown with continuously welded joints, and smooth exposed edges. Miter corners and use concealed field splices wherever possible. Provide cutouts, fittings, and anchorages as required to coordinate assembly and installation with other work.
- H. Rough Hardware: Furnish bent, or otherwise custom-fabricated, bolts, plates, anchors, hangers, dowels, and other miscellaneous steel and iron shapes as required. Fabricate items to sizes, shapes, and dimensions required. Furnish malleable-iron washers for heads and nuts that bear on wood structural connections, and furnish steel washers elsewhere.
- I. Miscellaneous Framing and Supports:
 - 1. Provide steel framing and supports for applications indicated that are not a part of structural steel framework as required to complete the Work.
 - 2. Fabricate units to sizes, shapes, and profiles indicated and required to receive other adjacent construction retained by framing and supports. Fabricate from structural steel shapes, plates, and steel bars of welded construction using mitered joints for field connection. Cut, drill, and tap units to receive hardware, hangers, and similar items.
 - 3. Equip units with integrally welded anchors for casting into concrete or building into masonry. Furnish inserts if units must be installed after concrete is placed.

2.5 PIPE BOLLARDS

- A. Fabricate from Schedule 80 steel pipe. Prime painted Gray unless noted otherwise to be Hot-dip galvanized. Meet the requirements set forth in ASTM A 446 and ASTM A 525
- B. Heights: 48" above finished grade, 7'-0" Total height.
- C. Install footing prior to application of pavement materials.
- D. Anchor bollards in concrete with pipe sleeves preset and anchored into concrete. After bollards have been inserted into sleeves, fill annular space between bollard and sleeve solidly with non-shrink, non-metallic grout, mixed and placed to comply with grout manufacturer's recommendations.
- E. Fill bollards solidly with concrete, mounding top surface.

2.6 FABRICATION

- A. Form metal fabrications from materials of size, thickness, and shapes indicated but not less than that needed to comply with performance requirements indicated. Work to dimensions indicated or accepted on shop drawings, using proven details of fabrication and support. Use type of materials indicated or specified for various components of each metal fabrication.
- B. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edge.
- C. Exterior work: Allow for thermal movement resulting from change in ambient temperature in the design, fabrication, and installation of installed metal assemblies to prevent buckling, opening up of joints, and overstressing of welds and fasteners. Base design calculations on actual surface temperatures of metals due to both solar heat gain and nighttime sky heat loss.
- D. Shear and punch metals cleanly and accurately. Remove burrs.
- E. Ease exposed edges to a radius of approximately 1/32", unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- F. Remove sharp or rough areas on exposed traffic surfaces.
- G. Weld corners and seams continuously to comply with the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing, and contour of welded surface matches those adjacent.
 - 5. Refer to Structural drawings and notes for additional welding requirements.
- H. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of type indicated or, if not indicated, Phillips flat-head (countersunk) screws or bolts. Locate joints where least conspicuous.
- I. Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.
- J. Shop assembly: Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

- K. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
- L. Fabricate joints that will be exposed to weather in a manner to exclude water, or provide weep holes where water may accumulate.

2.7 COATINGS, PRIMERS AND FINISHES

- A. Galvanizing: Any steel I that has any surface or edge exposed to the weather shall be hot-dip galvanized after fabrication (unless noted otherwise). All galvanized shall meet the requirements set forth in ASTM A 446 and ASTM A 525.
- B. Before steel leaves the shop, remove loose mill scale, rust and foreign matter, and apply one coat of primer. Do not paint surfaces at places to be welded.
- C. Shop Coating:
 - 1. Prepare uncoated ferrous metal surfaces to comply with minimum requirements indicated below for SSPC surface preparation specifications and environmental exposure conditions of installed metal fabrications:
 - a. Exteriors: SSPC-SP 6 "Commercial Blast Cleaning".
 - b. Interiors: SSPC-SP 3 "Power Tool Cleaning".
 - 2. Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finishes or to be embedded in concrete, sprayed-on fireproofing, or masonry, unless otherwise indicated. Comply with requirements of SSPC-PA 1 "Paint Application Specification No. 1" for shop painting. Use only top quality, rust-inhibiting primer.
 - a. Ensure that primer is compatible with finish, field paint. See Division 09 Sections for Painting.
- D. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
 - 1. Finish metal fabrications after assembly and welding to ensure complete coating coverage.
- E. Finishes: Metal fabrications may be shop-powder-coated with color or field painted as indicated on drawings.
- F. Stainless Steel Finishes: Mill finish, matte finish, or brushed finish as indicated on drawings or in other Sections.
- G. Aluminum Finishes:
 - 1. As-Fabricated Finish: AA-M10, mechanical Finish, as fabricated.
 - 2. Mechanical Finish: AA-M32, medium satin directionally textured.
 - 3. Anodized Finish: AAMA 611, Architectural Class I, 0.010 mm or thicker.
 - a. Clear anodized AA-A41
 - b. Color Anodized AA-A44, color as indicated on drawings.

4. Baked-Enamel or Powder-Coat Finish (typical at interior locations): AAMA 2603 except with a minimum dry film thickness of 1.5 mils (0.04 mm). Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
5. High-Performance Organic Finish (typical at exterior locations): 2-coat fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

PART 3 - EXECUTION**3.1 ADJUSTING AND CLEANING**

- A. Clean-Up: Immediately after erection, clean field welds, bolted connections, and abraded areas. Clean up spatter and debris resulting from welding. Where welding is rough and may interfere with smooth laying of metal deck, grind welds.
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A-780.
- C. Touch-Up Painting: Touch-up welds, scarred and abraded places on bent plates, structural steel and bar joists with rust-inhibiting paint. Ensure compatibility with finish and field paints. Coordinate with Division 09 Sections.

END OF SECTION – 05 50 00 METAL FABRICATIONS

05 51 00 METAL STAIRS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes fabricated steel stairs.

1.2 REFERENCES

- A. ASTM International:

1. ASTM A36 - Standard Specification for Carbon Structural Steel.
2. ASTM A53 - Standard Specification for Pipe, Steel, Black and Hot-dipped, Zinc-Coated, Welded and Seamless.
3. ASTM A366 - Standard Specification for Commercial Steel (CS) Sheet, Carbon (0.15 maximum Percent) Cold-Rolled.
4. ASTM A500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
5. ASTM A513 - Standard Specification for Electric-Resistance-Welded Carbon and Alloy Steel Mechanical Tubing.
6. ASTM A570 - Standard Specification for Steel, Sheet and Strip, Carbon, Hot-Rolled.
7. ASTM A569 - Standard Specification for Commercial Steel (CS), Sheet and Strip, Carbon (0.16 Maximum to 0.25 Maximum to 0.25 Maximum Percent), Hot-Rolled.

- B. AWS D1.1 - Structural Welding Code - Steel.

- C. AWS D1.3 - Structural Welding Code - Sheet Steel.

- D. ADAAG - Americans with Disabilities Act.

- E. SSPC - Steel Structures Painting Council.

1.3 PERFORMANCE REQUIREMENTS

- A. Comply with requirements of Metal Stairs Manual published by the National Association of Architectural Metal Manufacturers for Service Class stairs.

- B. Steel stairs: Engineer, fabricate, and install steel stairs to withstand the following structural loads without exceeding the allowable design working stress of the materials involved, including anchors and connections. Apply each load to produce the maximum stress in each component of steel stairs.

1. Treads: Capable of withstanding a uniform load of 100 lbf per square foot or a concentrated load of 300 lbf on an area of 4 square inches located in the center of the tread, whichever produces the greater stress.
2. Platforms: Capable of withstanding a uniform load of 100 lbf per square foot.
3. Framing: Capable of withstanding stresses resulting from loads specified above as well as stresses resulting from railing system loads.
4. Limit deflection of treads, platforms and framing members to L/240 or 1/4", whichever is less.

C. Handrails and railings systems: See Section 05 52 13.

1.4 SUBMITTALS

A. Product Data showing steel properties and dimensions, including:

1. Metal-pan stair treads, stringers, plate components, and fasteners.
2. Paint and primer products.
3. Grout.

B. Shop Drawings: Show fabrication and installation details for metal stairs.

1. Include plans, elevations, sections, and details of metal stairs and their connections. Show anchorage and accessory items.
2. Show dimensions and types of bends, welds, fasteners, and finishes.
3. Provide templates for anchors and bolts required for installation or embedment under other Sections.
4. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 QUALITY ASSURANCE

A. Manufacturer shall have not less than 10 continuous years of successful production/ installation of custom fabricated steel stairs. All components shall meet or exceed ADA, OSHA and appropriate building code requirements.

PART 2 - PRODUCTS

2.1 STEEL STAIRS

A. Treads, Risers and Landings:

1. Type:
 - a. Exterior: Open risers with Type GCM-1 close mesh press locked grating treads and landings.
 - 1) Hot dip galvanized steel. (4" C.B.; 7/16" c/c B.B.)
 - 2) Provide abrasive, anti-slip nosings, full width, at each tread.

- b. Interior: Closed risers with pans for poured-in-place concrete treads and landings.
- 2. Materials:
 - a. Steel: ASTM A-36.
 - b. Bolts, nuts and washers: ASTM A-325 bolts of sizes recommended by the stair manufacturer for the application.
 - c. Welding materials: AWS D1.1, type required for materials being welded.
- B. Fabrication:
 - 1. Verify dimensions on site prior to shop fabrication.
 - 2. Provide support beams appropriate for the application as recommended by the stair manufacturer.
 - 3. Grind exposed welds flush and smooth with adjacent finished surfaces. Ease exposed edges to small uniform radius.
 - 4. Priming: Clean surfaces of rust, scale, grease, and foreign matter prior to finishing. Apply one coat of primer. Do not prime surfaces in direct contact bond with concrete or where field welding is required.

PART 3 - EXECUTION**3.1 INSTALLATION**

- A. Set metal stairs accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- B. Provide anchorage devices and fasteners where metal stairs are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag bolts, wood screws, and other connectors.

END OF SECTION – 05 51 00 METAL STAIRS

05 51 33 METAL LADDERS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes fabricated vertical steel ladders.

1.2 REFERENCES

- A. Conform to the following standards:
 - 1. ANSI A14.3 American National Standard for Ladders - Fixed - Safety Requirements.
 - 2. OSHA 29 CFT Standard 1910.27 - Fixed ladders; Occupational Safety and Health Standards.
 - 3. For elevator pit ladders, comply with ASME A17.1.

1.3 SUBMITTALS

- A. Product Data showing steel properties and dimensions, including:
 - 1. Steel components and fasteners.
 - 2. Paint and primer products.
- B. Shop Drawings: Show fabrication and installation details for metal ladders.
 - 1. Include plans, elevations, sections, and details of metal stairs and their connections. Show anchorage and accessory items.
 - 2. Show dimensions and types of bends, welds, and fasteners.
 - 3. Provide templates for anchors and bolts required for installation or embedment under other Sections.
 - 4. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 QUALITY ASSURANCE

- A. Perform welding in accordance with requirements of the American Welding Society Structural Welding Code.
- B. Employ welders and tackers qualified in accordance with AWS D1.0 to perform the type of work required.
- C. Installer Qualifications: A company with a minimum of five years experience in installing ladders, including selecting fasteners, to attain the required operational and structural performance.

PART 2 - PRODUCTS

2.1 VERTICAL LADDERS

- A. General: See Drawings for size and configuration.
 - 1. Comply with OSHA Standards.
- B. Materials:
 - 1. Mill grade, cold-rolled, hot dip galvanized.
 - 2. Concrete anchors: Phillips Red Head self-drilling anchors with machine bolts.
 - 3. Welding electrodes: Series E-70, recommended for the application.
 - 4. Rungs: 1-1/4" steel at 12" o.c. (unless otherwise noted). Non-slip per OSHA standards.
 - 5. Platform:
 - a. Bar grating: 1" x 1/8 bearing bars, welded 1-3/16" centers with cross bars on 4" centers.
 - b. Provide with non-slip surface.
- C. Accessories: Safety post extender. Basis of design model is J.L. Industries LP-4

2.2 FABRICATION

- A. Shop fabricate to the greatest extent possible. Make "stand-off" legs long enough to give clearance between walls and ladder rungs.
- B. Apply one smooth shop coat of rust-inhibiting paint to steel items after fabricating is complete.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Examine supporting structure for ladders anchorage requirements.
- B. Install as indicated. Installation must comply with applicable local, state and national code authorities having jurisdiction.
- C. Anchor to masonry walls, floors, and concrete with machine bolts and masonry anchors; and anchor to steel angle at top by welding.
- D. After items are installed, touch up scratched, scarred, and welded places with products matching shop coat materials.

END OF SECTION – 05 51 33 METAL LADDERS

05 52 00 METAL RAILINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes metal railing systems fabricated with solid bar stock, pipes and tubes, and including all brackets, fasteners, and hardware.

1.2 REFERENCES

- A. ASTM International:
 - 1. ASTM E-894 - Standard Test Method for Anchorage of Permanent Metal Railing Systems and Rails for Buildings
 - 2. ASTM E-935 - Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings

1.3 PERFORMANCE REQUIREMENTS

- A. Handrails and railings systems: Engineer, fabricate, and install to withstand required structural loads without exceeding the allowable design working stress of the materials involved, including anchors and connections.
- B. Structural Performance: Provide railings capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
 - 1. Handrails:
 - a. Uniform load of 50 lbf/ ft. applied in any direction.
 - b. Concentrated load of 200 lbf applied in any direction.
 - c. Uniform and concentrated loads need not be assumed to act concurrently.
 - 2. Top Rails of Guards:
 - a. Uniform load of 50 lbf/ ft. applied in any direction.
 - b. Concentrated load of 200 lbf applied in any direction.
 - c. Uniform and concentrated loads need not be assumed to act concurrently.
 - 3. Infill of Guards:
 - a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft..
 - b. Uniform load of 25 lbf/sq. ft. applied horizontally.
 - c. Infill load and other loads need not be assumed to act concurrently.
- C. Thermal Movements: Provide exterior railings that allow for thermal movements resulting from changes in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss typical for the location of installation.

- D. Conflicting requirements: In the event of conflict between applicable codes and regulations and the requirements of the referenced standards of these Specifications, the provisions of the more stringent shall govern.

1.4 SUBMITTALS

- A. Product Data: For mechanically connected railings, materials, finishes, accessories, grout, anchoring cement, and paint products.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
 - 1. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, according to ASTM E-894 and ASTM E-935.
- D. Mill Certificates: Signed by manufacturers of each type of metal product certifying that products furnished comply with requirements.
- E. Qualifications Data:
 - 1. For Fabricator, including welding certifications.
 - 2. For Installer, including welding certifications.
 - 3. For Professional Engineer, for loading design.

PART 2 - PRODUCTS

2.1 STEEL RAILINGS

- A. Steel pipe and ferrules:
 - 1. Steel pipe and ferrules:
 - a. 1-1/4" i.d. (1-1/2" O.D.), ASTM A 53, Type S or E, Grade B, Schedule 40.
 - b. Exterior units shall be hot-dipped galvanized unless noted otherwise.
 - 2. Steel tubes, bars and shapes:
 - a. Carbon steel C1010 with edges eased over.
 - b. Exterior units shall be hot-dipped galvanized unless noted otherwise.
 - 3. Wall brackets: No. 386 as manufactured by Julius Blum, or equal.
 - 4. Pipe plug: No. 608 as manufactured by Julius Blum, or equal.
- B. Fasteners: Select fasteners of type, grade, and class required to produce connections that are suitable for anchoring railing to other types of construction indicated and capable of withstanding design loadings.

2.2 FABRICATION**A. Welding:**

1. Use only qualified welders.
2. Weld corners and seams continuously to comply the following:
 - a. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - b. Obtain fusion without undercut or overlap.
 - c. Remove welding flux immediately.
 - d. At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing and welded surface matches contours of adjoining surfaces.

B. Shop fabricate steel pipe railing in single sections.**C. Where pipes and other elements intersect, cope butting ends to closely fit to pipe joint and weld.****D. Provide steel pipe ferrules (large enough to allow balusters of pipe rail to slip inside) to be set in concrete.****E. Clean fabricated sections of railings and apply an even, full coat of a high-grade rust resistant primer, except for portions of balusters to be fitted inside of ferrules. Primers shall be compatible with finish paint coatings. Coordinate with Division 09 Sections.****PART 3 - EXECUTION****3.1 INSTALLATION****A. Installing Railing at Wall:**

1. Attach handrails to wall with wall brackets and end fittings. Provide bracket and end fittings. Provide bracket with 2-1/4" clearance from inside face of handrail to finished wall surface.
2. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads. In any case, verify locations with the Architect.
3. Secure wall brackets and wall return fittings to building construction as follows:
 - a. Use type of bracket with flange tapped for concealed anchorage to threaded hanger bolt.
 - b. Use type of bracket with predrilled hole for exposed bolt anchorage.
 - c. For concrete and solid masonry anchorage, use drilled-in expansion shield and either concealed hanger bolt or exposed lag bolt, as applicable.
 - d. For hollow masonry anchorage, use toggle bolts with square heads.

- e. For wood stud partitions, use lag bolts set into wood backing between studs. Coordinate with stud installation to accurately locate backing members.
 - f. For steel-framed gypsum board assemblies, fasten brackets directly to steel framing or concealed anchors using self-tapping screws of size and type required to support structural loads.
- B. Installing Pipe Rails in Concrete: Anchor posts in concrete by welding posts to embedded weld plates.
- C. Immediately after erection, clean field welds, bolted connections, and abraded areas of shop primer, and paint exposed areas with the same material as used for shop priming.
- 1. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A-780.

END OF SECTION – 05 52 00 METAL RAILINGS

06 10 00 ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes framing with dimension lumber and engineered wood products.

1.2 REFERENCES

- A. Lumber grading agencies, and the abbreviations used to reference them, include the following:
1. NeLMA: Northeastern Lumber Manufacturers' Association.
 2. APA: The Engineered Wood Association (formerly American Plywood Association).
 3. ALSC: American Lumber Standard Committee, Inc.
 4. NHLA: National Hardwood Lumber Association.
 5. NLGA: National Lumber Grades Authority.
 6. SPIB: The Southern Pine Inspection Bureau.
 7. WCLIB: West Coast Lumber Inspection Bureau.
 8. WWPAA: Western Wood Products Association.
- B. ASTM International:
1. ASTM D-3201 - Standard Test Method for Hygroscopic Properties of Fire-Retardant Wood and Wood-Based Products
 2. ASTM D-3737 - Standard Practice for Establishing Allowable Properties for Structural Glued Laminated Timber (Glulam)
 3. ASTM D-5055 - Standard Specification for Establishing and Monitoring Structural Capacities of Prefabricated Wood I-Joists
 4. ASTM D-5456 - Standard Specification for Evaluation of Structural Composite Lumber Products
 5. ASTM D-5664 - Standard Test Method for Evaluating the Effects of Fire-Retardant Treatments and Elevated Temperatures on Strength Properties of Fire-Retardant Treated Lumber
 6. ASTM D-6841 - Standard Practice for Calculating Design Value Treatment Adjustment Factors for Fire-Retardant-Treated Lumber
 7. ASTM D-7672 - Standard Specification for Evaluating Structural Capacities of Rim Board Products and Assemblies
 8. ASTM E-84 - Standard Test Method for Surface Burning Characteristics of Building Materials
 9. ASTM E-119 - Standard Test Methods for Fire Tests of Building Construction and Materials
- C. UL-723 - Test for Surface Burning Characteristics of Building Materials
- D. Department of Commerce (DOC) National Institute of Standards and Technology (NIST):
1. Voluntary Product Standard PS-20, American Softwood Lumber Standard

2. Voluntary Product Standard PS-1, Structural Plywood
3. Voluntary Product Standard PS-2, Performance Standard for Wood Structural Panels

E. American National Standards Institute (ANSI)

1. ANSI 117 - Standard Specification for Structural Glued Laminated Timber of Softwood Species
2. ANSI 405 - Standard for Adhesives for Use in Structural Glued Laminated Timber
3. ANSI A190.1 - Product Standard for Structural Glued Laminated Timber
4. AHA/ANSI A135.4 - Basic Hardboard
5. ANSI A208.1 – Particleboard
6. ANSI A208.2 – Medium Density Fiberboard
7. ANSI/APA PRG 320 - Standard for Performance Rated Cross-Laminated Timber
8. APA PRR 401 – Performance Standard for APA Rim Boards
9. ANSI/APA PRR 410 - Standard for Performance Rated Engineered Wood Rim Boards

F. American Wood Protection Association (AWPA)

1. AWPA U1 – Specifications for Treated Wood
2. AWPA C20 - Structural Lumber Fire Retardant Treatment by Pressure Process
3. AWPA C27 - Plywood Fire-Retardant Treatment by Pressure Process

1.3 SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
3. For fire-retardant treatments specified to be High-Temperature (HT) type include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D-5664.
4. Include statement that moisture content of treated materials was reduced to levels required before shipment to Project site.
5. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Stack lumber flat, off the ground, with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings, and provide protection from excessive moisture, direct sun, termites, and other agents of decay.

- B. Lumber may be rejected by the Architect, Owner, or Engineer, whether or not it has been installed, for excessive warp, twist, bow, crook, mildew, fungus, or mold, as well as for improper cutting and fitting.

PART 2 - PRODUCTS

2.1 DIMENSION LUMBER

- A. General: Conform to standards established by the American Lumber Standards Committee.
- B. Sawn Lumber used for load-supporting purposes, including end-jointed or edge-glued lumber, machine stress-rated or machine-evaluated lumber, shall be identified by the grade mark of a lumber grading or inspection agency that has been approved by an accreditation body that complies with PS-20 or equivalent.
 - 1. Factory mark each piece of lumber with grade stamp of grading agency.
- C. Provide dressed lumber, S4S, unless otherwise indicated.
- D. Maximum Moisture Content: 19% maximum at the time of permanent closing in of the structure.
- E. Structural Lumber: No. 1 Grade
 - 1. Douglas Fir-Larch and Hem-Fir: Western Wood Products Association (WWPA).
 - 2. Southern Pine: Southern Pine Inspection Bureau (SPIB).
 - 3. Spruce-Pine-Fir: Northeastern Lumber Manufacturers Association (NLMA).
- F. Non-Load-Bearing Interior Partitions: Construction, Stud, or No. 2 grade of the following species:
 - 1. Mixed southern pine; SPIB.
 - 2. Eastern softwoods; NELMA.
- G. Other Concealed Framing: Construction or No. 2 grade.
 - 1. Any species of machine stress-rated dimension lumber with a grade of not less than 2400f-2.0E.

2.2 PLYWOOD

- A. See Structural drawings for wall and roof sheathing requirements.
 - 1. Exterior, Structural 1 or Exposure 1 sheathing as indicated.
- B. Identify each panel with the appropriate APA grade mark and meet the requirements of the latest edition of U.S. Product Standards or APA's Performance Standards. Panel thickness, grade, and Group or Identification Index shall be at least equal to that shown on the Drawings. Installation shall be in accordance with the APA recommendations.

2.3 MISCELLANEOUS LUMBER

- A. Miscellaneous lumber: Provide wood for support or attachment of other work including, but not limited to, cant strips, bucks, nailers, plates, blocking, bracing, furring, grounds, stripping and similar members.
- B. 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.
- C. For blocking not used for attachment of other construction Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.
- D. Telephone and Electrical Equipment Backing Panels: DOC PS 1, Exposure 1, C-D Plugged, fire-retardant treated, in thickness indicated or, if not indicated, not less than 3/4-inch nominal thickness.
- E. Wood nailers at roof perimeter for elastomeric sheet roofing shall be No. 2 or better lumber, treated for fire and rot resistance. Creosote and asphaltic preservatives are not acceptable. Surface height of nailers shall be coordinated with the thickness of the exterior insulation.
 - 1. Install wood nailers at the roof perimeter for the installation of elastomeric roofing, flashing, and gutter. Anchor firmly to deck at 3'-0" o.c. to resist a force of 175 lbs. per lineal foot in any direction. Where the deck consists of material with limited holding capability, the anchoring shall be accomplished by fastening to the supporting steel or with toggle bolts penetrating to the underside of the deck or such means as may be approved in writing the roof manufacturer. 1/2" vent spaces shall be provided between adjacent lengths of nailers.

2.4 FIRE-RETARDANT TREATED WOOD

- A. General: Where fire-retardant-treated materials are indicated, use materials that are acceptable to authorities having jurisdiction, complying with the fire-test-response characteristics specified.
 - 1. Identify fire-retardant-treated materials with appropriate classification marking of UL, U.S. Testing, Timber Products Inspection, or another testing and inspecting agency acceptable to authorities having jurisdiction.
 - 2. Use fire-retardant-treatment formulations that do not bleed through or otherwise adversely affect finishes. Do not use colorants to distinguish treated materials from untreated materials.
- B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame spread index of 25 or less when tested according to ASTM E-84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes. Use the following treatment type:
 - 1. Exterior Type: Designed for use at exterior locations and locations exposed to humidity or intermittent moisture. Treated materials shall comply with requirements specified for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D-2898.

2. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D-3201 when tested at 92% relative humidity. Use at dry locations not exposed to moisture.
 3. Design Value Adjustment Factors: Treated lumber shall be tested according ASTM D-5664, and design value adjustment factors shall be calculated according to ASTM D-6841.
 4. Mill lumber after treatment within limits set for wood removal that do not affect listed fire-test-response characteristics, using a woodworking plant certified by testing and inspecting agency.
 5. Mill lumber before treatment and implement special procedures during treatment and drying processes that prevent lumber from warping and developing discolorations from drying sticks or other causes, marring, and other defects affecting appearance of treated woodwork.
 6. Kiln-dry materials after treatment to maximum moisture content of 19 percent.
- C. Corrosivity: Provide fire retardant treated lumber and plywood evaluated in accordance with AWPA E12 for use with fastening materials specified.
- D. Each piece of fire-retardant-treated lumber and wood panels shall be labeled. The label shall contain the following:
1. The identification mark of an approved agency.
 2. Identification of the treating manufacturer.
 3. The name of the fire retardant treatment.
 4. The species of wood treated.
 5. The flame-spread and smoke-developed index.
 6. The method of drying after treatment.
 7. For fire-retardant-treated wood exposed to weather, damp, or wet locations, it shall be identified as "Exterior". Include the words "No increase in the listed classification when subjected to Standard Rain Test per ASTM D-2898."
- E. Treat wood items indicated on the drawings, and generally as follows:
1. Framing for load bearing exterior and interior walls in construction required to be non-combustible.
 2. Framing for non-load-bearing partitions where indicated as required for fire resistance.
 3. Framing for non-load-bearing exterior walls where allowable for non-combustible construction.
 4. Roof and floor assemblies where allowable for non-combustible construction.
 5. Concealed blocking in non-combustible construction.
 6. Plywood backing panels.
- F. Fire-retardant OSB sheathing (where specifically allowed by Architect and Structural Engineer):
1. Certified to meet building code requirements for fire resistant construction and provide designs values greater than or equal to fire-retardant-treated (FRT) plywood of the same thickness.
 2. Meets Structural 1 and Exposure 1 requirements.

3. Basis of Design: “LP FlameBlock” by LP Building Products.
 - a. Coating on one side or both sides, as required by the fire-resistant construction assembly type.

2.5 WOOD-PRESERVATIVE-TREATED MATERIALS

- A. Preservative Treatment by Pressure Process shall comply with AWWA Standards.
 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
 2. For exposed items or items indicated to receive a stained or natural finish, use chemical formulations that do not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.
- B. Provide AWWA standardized “Use Category” preservative systems and required retentions for specific products and end-uses.
- C. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.
- D. Application: Treat items indicated on Drawings, and the following:
 1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
 2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
 3. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
 4. Wood framing members that are less than 18 inches above the ground in crawl spaces or unexcavated areas.
 5. Wood floor plates that are installed over concrete slabs-on-grade.
- E. Complete fabrication of treated items prior to treatment, where possible. If cut after treatment, coat cut surfaces with heavy brush coat of same chemical used for treatment. Inspect each piece of lumber or plywood after drying and discard damaged or defective pieces.

2.6 FASTENERS

- A. Provide size, type, material and finish as indicated and as recommended by applicable standards, complying with Federal Specifications for nails, staples, screws, bolts, nuts, washers and anchoring devices. Provide metal hangers and framing anchors of the size and type recommended by the manufacturer for each use including recommending nails.
 1. Where carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A-153, or of Type 304 stainless steel.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Framing Standard: Comply with AF&PA's "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- B. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.
- C. Apply field treatment complying with AWWPA M4 to cut surfaces of preservative-treated lumber and plywood.
 - 1. Use inorganic boron for items that are continuously protected from liquid water.
 - 2. Use copper naphthenate for items not continuously protected from liquid water.

END OF SECTION – 06 10 00 ROUGH CARPENTRY

06 22 00 MILLWORK

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes plastic-laminate and solid-plastic cabinets, and solid-surface countertops.

1.2 REFERENCES

- A. Architectural Woodwork Institute (AWI)
 - 1. AWI Quality Standards 6th Edition Version 1.1
 - 2. Section 400 "Architectural Cabinets"
 - 3. Section 1500 "Factory Finishing"
- B. Builders Hardware Manufacturers Association (BMHA)
 - 1. A156.9 Cabinet Hardware
 - 2. A156.18 Materials and Finishes

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated, including cabinet hardware and accessories finishing materials and processes.
 - 1. Include manufacturer's literature of specialty items not manufactured by the architectural woodwork or casework fabricator.
- B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components. Shop drawings at a minimum shall show the following:
 - 1. All materials (solid wood, plywood, particleboard, fiberwood board, plastic laminate and hardware).
 - 2. All thicknesses and dimensions.
 - 3. Species, grade, cut, and grain pattern of woods and veneers.
 - 4. Jointing and fasteners.
 - 5. The name of the manufacturer and the model number of all factory fabricated items.
 - 6. Full size details drawn to scale in related and dimensioned positions to facilitate checking of intersecting and string dimensions.
 - 7. Clear description of work to be done in the shop and work to be done in the field.
 - 8. Coordination with electrical and plumbing work.

- C. Do not base shop drawings on reproductions of the contract documents or standard printed data. Provide project-specific information.
 - 1. Indicate dimensions shown on the contract drawings and make specific note of dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements.
 - a. Minor dimension changes and difficult installations will not be considered changes to the contract.
- D. Samples: Not required if providing the exact products and colors indicated on drawing finish schedules.
 - 1. If alternative products are proposed in lieu of basis-of-design products, provide samples for each type of product proposed, in the actual colors and finishes.
 - a. Panel and casework products with shop-applied opaque finishes, including solid plastic panel products, 4x4 inch samples for each finish system and color.
 - b. Plastic laminates, 4x4 inch samples for each type, color, pattern, and surface finish.
 - c. Exposed cabinet hardware and accessories, one unit for each type and finish.
 - d. Solid-surface materials, 4" x 4" minimum size samples for each color, texture, or pattern indicated.
- E. Certification: Submit copies of certificate signed by the woodwork shop certifying that millwork complies with quality grades and other requirements indicated. Form of certificate shall be approved by the Architect.
- F. Maintenance data: Submit manufacturer's care and maintenance data, including repair and cleaning instructions. Include in project close-out documents.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Engage a qualified woodworking firm to assume undivided responsibility for production of interior architectural woodwork to ensure matching of millwork finishes and veneers.
- B. Quality Standard: Unless otherwise indicated, comply with AWI's "Architectural Woodwork Quality Standards" for grades of interior architectural woodwork indicated for construction, finishes, installation, and other requirements shall apply and by reference are hereby made a part of these Contract Documents.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver woodwork until painting and similar operations that could damage woodwork have been completed in installation areas. If woodwork must be stored in other than installation areas, store only in areas where environmental conditions comply with finished interior requirements.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.
- B. Field Measurements: Where woodwork is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
 - 1. Locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before being enclosed, and indicate measurements on Shop Drawings.

1.7 COORDINATION

- A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that interior architectural woodwork can be supported and installed as indicated.
- B. Hardware Coordination: Distribute copies of approved hardware templates to fabricator of architectural woodwork; coordinate Shop Drawings and fabrication with hardware requirements.

PART 2 - PRODUCTS

2.1 PLASTIC AND LAMINATE CASEWORK

- A. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or, if not indicated, as required by woodwork quality standard.
- B. Grade: Premium.
- C. Materials, General:
 - 1. Thickness of panels: 3/4 inch typical, unless specifically noted otherwise.
 - 2. Particleboard: ANSI A208.1, Mat-Formed Particle Board, Grade 1-M-2, with minimum density of 45 pcf. Internal bond of 60 psi, and minimum screw holding capacity of 225 lb. on faces and 200 lb. on edges.
 - 3. Hardboard: Tempered, ANSI 135.4.
 - 4. Melamine Facings: 80 gram melamine, high pressure bond at 320 psi, 300 deg. F.; resistant to water and typical cleaners.
- D. Door and Drawer Fronts: Solid polymer high-density polyethylene (HDPE) panels, not less than 3/4 inch thick, seamless, with eased edges, and with homogenous color and pattern throughout thickness of material.
 - 1. Manufacturer and product for HDPE casework front panels: King Starboard ST by King Plastic Corporation.
 - a. Do not substitute products without Architect's and Owner's full review and approval.

- E. Laminate Cladding for Exposed Surfaces: High-pressure decorative laminate complying with the following requirements:
 - 1. Horizontal Surfaces Other Than Tops: Grade HGS.
 - 2. Postformed Surfaces: Grade HGP.
 - 3. Vertical Surfaces: Grade VGS.
 - 4. Edges: Grade HGS
- F. Edging: Solid, high impact, purified, color thru, acid resistant, 3 mm thick PVC edging, machine applied.
- G. Materials for Semiexposed Surfaces:
 - 1. Surfaces Other Than Drawer Bodies: High-pressure decorative laminate, Grade VGS
 - a. For semiexposed backs of panels with exposed plastic-laminate surfaces, provide surface of high-pressure decorative laminate, Grade VGS.
 - 2. Drawer Sides and Backs: 3/4" thick 7-ply plywood or solid hardboard.
 - a. Drawer Bottoms: 1/2" thick hardwood plywood.
 - b. Drawer boxes are to be boxed in on all four sides and screwed and adhered to the drawer front from the inside.

2.2 COUNTERTOPS, VANITIES, AND WINDOWSILLS

- A. Solid Surface: Non-porous fabricated material composed of proprietary polymers and resins, maintaining the same properties throughout.
 - 1. Manufacturer for solid-surfacing materials: Hanex, by Hyundai L&C USA.
 - a. Do not substitute products without Architect's and Owner's full review and approval.
 - 2. Thickness: 1/2" (12 mm) typ.
 - 3. Edge Detail: Eased, slight radius.
 - 4. Provide 1" or 4" (see Drawings for locations) backsplash at back and sides of countertops. Seal joint where backsplash joins the countertop.
- B. Carefully scribe countertops and window sills which are against other building materials to leave gaps of 1/32" maximum. Seal gaps with sealant tinted to match adjacent surfaces. Do not use additional overlay trim for this purpose.

2.3 CASEWORK HARDWARE

- A. All cabinet hardware shall be furnished and installed by the casework fabricator.
 - 1. Drawer slides: Accuride full extension 3832E, 100 lbs.
 - 2. Shelf standards and brackets: Knape & Vogt No. 255/256.
 - 3. Shelf standards and support clips: Knape & Vogt No. 233/256.
 - 4. Hinges: Concealed casework hinge with self-closing feature.
 - 5. Pulls: 4" brushed aluminum wire pull.

6. Locks: Corbin Cabinet Locks or equal keyed cam lock.

B. All other casework hardware and materials, not specifically described, but required for a complete and proper installation of the millwork items, shall be as selected by the Contractor but subject to the approval of the Architect and Owner.

2.4 INTERIOR STANDING AND RUNNING TRIM

A. Grade: Premium.

B. Softwood Lumber Trim for Transparent Finish (Stain or Clear Finish):

1. Species and Grade: Eastern white pine, Premium Grade; NeLMA or NLGA.
2. Maximum Moisture Content: 15 percent with at least 85 percent of shipment at 12 percent or less.
3. Face Surface: Surfaced (smooth)

C. Hardwood Lumber Trim for Transparent Finish (Stain or Clear Finish):

1. Species and Grade: Red oak, Poplar, or White Maple, Premium Grade, NHLA.
2. Maximum Moisture Content: 12 percent.
3. Finger Jointing: Not allowed.
4. Gluing for Width: Not allowed.
5. Veneered Material: Not allowed.
6. Face Surface: Surfaced (smooth).
7. Matching: Selected for compatible grain and color.

D. Lumber Trim for Opaque Finish (Painted):

1. Species and Grade: Eastern white pine or Poplar, Finish or Custom Grade, NLGA.
2. Maximum Moisture Content: 15 percent with at least 85 percent of shipment at 12 percent or less.
3. Finger Jointing: Not allowed.
4. Face Surface: Surfaced (smooth).

E. For trim items wider than available lumber, use veneered construction. Do not glue for width.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Before installation, condition millwork to average prevailing humidity conditions in installation areas.

B. Backpriming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of woodwork. Apply two coats to back of paneling and to end-grain surfaces.

C. Set and secure casework in place rigid, plumb and square.

- D. Use purpose-designed attachments for wall mounted components. Attach wall mounted cabinets such that they can withstand all superimposed loading.
- E. Use thread steel concealed joint fasteners to align and secure adjoining cabinet units and counter tops.
- F. Permanently fix cabinet and counter bases to floor using appropriate angles and anchorages.
- G. Counter-sink semi-concealed anchorage devices used to wall mount components, and conceal with solid plugs of species to match surrounding wood. Place flush with surrounding surfaces.
- H. Carefully scribe cabinetwork which is against other building materials leaving gaps of 1/32" maximum. Seal gaps with sealant tinted to match adjacent surfaces. Do not use additional overlay trim for this purpose.
- I. Install and adjust cabinet hardware to ensure smooth and correct operation.
- J. Repair damaged and defective millwork wherever possible to eliminate defects functionally and visually; where not possible to repair properly, replace millwork. Adjust joinery for uniform appearance.
- K. Clean hardware, lubricate and make final adjustments for proper operation.
- L. Clean millwork on exposed and semi-exposed surfaces. Touch-up shop-applied finishes to restore damaged or soiled areas.
- M. Provide final protection and maintain conditions, in a manner acceptable to fabricator and installer, which ensures millwork being without damage or deterioration at time of Substantial Completion. Provide protection over countertops until time of Owner's final inspection.
- N. DO NOT USE COUNTERTOPS AS WORK BENCHES, LAY DOWN AREAS, OR STORAGE SHELVES, or for any other construction purpose.

END OF SECTION – 06 22 00 MILLWORK

07 13 53 MEMBRANE WATERPROOFING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
1. Adhered sheet waterproofing membrane systems for below-grade foundations.
 2. Molded-sheet drainage panels and other system accessories.

1.2 SUBMITTALS

- A. Product Data: Complete and fully descriptive manufacturer's literature for each product required to complete the system.
1. Include manufacturer's written instructions for evaluating, preparing, and treating substrate, technical data, and tested physical and performance properties of waterproofing.
- B. Submit statement from the product manufacturer indicating their acceptance of the use of the specified products for the specific conditions of this project, including any modifications recommended to the system.
- C. Shop drawings: Show locations and extent of waterproofing. Include details for substrate joints and cracks, sheet flashings, penetrations, inside and outside corners, tie-ins with adjoining waterproofing, and other termination conditions.

1.3 QUALITY ASSURANCE

- A. Manufacturer's qualifications: Obtain primary waterproofing materials of each type required from a single manufacturer to the greatest extent possible. Provide secondary materials only as recommended by manufacturer of primary materials.
- B. Installer: A firm with not less than 5 waterproofing projects similar to requirements for this Project with satisfactory in-service performance and which is acceptable to primary waterproofing materials manufacturer.
- C. Pre-installation conference: Prior to installing waterproofing and associated work, meet at Project site with installer of each component of associated work, inspection and testing agency representatives (if any), and installers of work requiring coordination with waterproofing work. Review material selections and procedures to be followed in performing work. Notify the Architect at least 48 hours before conducting meeting.

1.4 PROJECT CONDITIONS

- A. Substrate: Proceed with work after substrate construction, openings, and penetrating work have been completed and areas are free of standing or running water, ice, and frost. Verify

that concrete is dry, smooth, and free from sharp or ragged out-angles, honeycombing, rock pockets, depressions, and projections.

- B. Weather: Proceed with waterproofing and associated work only when existing and forecasted weather conditions will permit work to be performed in accordance with manufacturers' recommendations and warranty requirements.

1.5 WARRANTY

- A. Special Manufacturer's Warranty: Manufacturer's standard form in which manufacturer agrees to replace waterproofing material that is defective or that fails within specified warranty period.
 - 1. Warranty Period: Five (5) year from date of Substantial Completion.
- B. Special Installer's Warranty: Form signed by Installer, covering Work of this Section, for warranty period of two (2) years.
 - 1. Warranty includes removing and reinstalling protection board, drainage panels, insulation, and sheet waterproofing materials and accessories as required to restore a watertight assembly as required by project documents.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Waterproofing system shall be capable of performing as a continuous watertight installation and as a moisture drainage plane transitioned to adjacent flashings and discharging water to the building exterior. Waterproofing shall accommodate normal substrate movement, construction material transitions, opening transitions, penetrations, and perimeter conditions without resultant moisture deterioration.
- B. Provide waterproofing system materials that are compatible with adjacent materials under conditions of service and substrates on which product is applied, as recommended by waterproofing manufacturer based on testing and field experience. All products required for the waterproofing system shall be by the same manufacturer.

2.2 SELF-ADHESIVE SHEET WATERPROOFING

- A. Membrane Waterproofing: Self-adhesive, cold-applied composite sheet of rubberized asphalt and a cross-laminated, high density polyethylene film.
- B. Manufacturers: Subject to compliance with requirements, provide:
 - 1. "Bituthene 3000" by GCP Applied Technologies, Inc.
 - 2. Do not substitute products without Architect's and Owner's full review and approval.
- C. Accessory Products: As recommended by the waterproofing manufacturer for project conditions indicated, including, but not limited to:

1. Drainage and Protection Board: Hydroduct 220 and/or Hydroduct 660 Drainage Composite as manufactured by GCP Applied Technologies.
2. Waterstop: “Adcor” hydrophilic waterstop as manufactured by GCP Applied Technologies for non-moving concrete construction joints.
3. Surface conditioners, primers, bonding adhesives, mastic, liquid membrane, tape, joint sealants, backer rods, termination bars, and other accessories specified or acceptable to manufacturer of sheet membrane waterproofing system.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Examine, clean, and prepar substrates, areas, and conditions, with Installer present, for compliance with waterproofing manufacturer’s requirements and other conditions affecting performance.
- B. Ensure surfaces are firm, and free from frost, loose particles, cracks, pits, rough projections, grease, oil and other foreign matter detrimental to adhesion and monolithic application of waterproofing.
- C. Mask off adjoining surfaces not receiving waterproofing to prevent spillage and overspray affecting other construction.
- D. Prepare, treat, and seal vertical and horizontal surfaces at terminations and penetrations through waterproofing and at drains and protrusions.
- E. Verify that substrate is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D-4263.
- F. Concrete substrate preparation: Do not proceed with installation until concrete has properly cured and dried, minimum 7 days.
 1. Fill form tie rod holes with concrete and finish flush with surrounding surface.
 2. Repair bugholes over ½" in length and 1/4" deep and finish flush with surrounding surface.
 3. Remove scaling to sound, unaffected concrete and repair exposed area.
 4. Grind irregular construction joints to suitable flush surface.

3.2 INSTALLATION

- A. Comply with manufacturer’s instructions for handling an installing waterproofing material.
- B. Coordinate installing waterproofing materials with associated work to provide complete system complying with combined recommendations by manufacturers and installers involved in the Work. Schedule installation to minimize exposure of sheet waterproofing materials.
- C. Apply primer at rate recommended by manufacturer. Apply membrane when primer is dry, noting that dry times will vary with temperature and humidity.

- D. Seal projections through membrane and seal seams. Ensure bond to vertical and horizontal surfaces. Seal daily terminations with troweled bead of mastic.
- E. Top edge seal: For vertical and sloped-wall membrane, finish in reglet or termination bar; otherwise finish under flashing or under masonry in joint. Caulk exposed edges with mastic or sealant.
- F. Expansion joints: Install joint filler with protruding rounded surface, as recommended by manufacturer. Apply continuous 8" wide strip of membrane over joint, followed by continuous membrane application.
- G. On walls over 8' high, the membrane shall be applied in two or more sections with the upper section overlapping the lower by at least 2-1/2", or more where recommended by manufacturer.
- H. Cover membrane waterproofing as soon as possible with drainage board. Install with filter fabric on side toward backfill. Backfill immediately and do not leave exposed.

3.3 FIELD QUALITY CONTROL

- A. In place testing of above-grade waterproofed horizontal decks: Before membranes on horizontal surfaces are covered by protection course or other work, flood test for leaks with a 1" minimum depth of water maintained for 24 hours. Repair any leaks. Repeat test and repairs until no leaks remain.

3.4 PROTECTION

- A. Protect completed membrane during installation of other materials or processes over membrane and throughout remainder of construction period. Do not allow traffic of any type on unprotected membrane.

END OF SECTION – 07 13 53 MEMBRANE WATERPROOFING

07 21 13 BOARD INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes:

1. Foil-faced rigid insulation boards, as thermal insulation in exterior wall assemblies, to function as a thermal, moisture, and air barrier system.
2. Foam sheathing for interior exposed applications.
3. Rigid insulation panels for under-slab and below-grade applications.

1.2 SUBMITTALS

- A. Product data:** Manufacturer's product technical sheets including product thicknesses, sizes and shapes, preparation instructions and recommendations, storage and handling requirements and recommendations, installation methods, and current ICC-ES Evaluation Report.

1.3 QUALITY ASSURANCE

- A. Installer to be approved, authorized, or certified by insulation system manufacturer. Obtain each type of insulation from a single manufacturer through a single source.**
- B. Fire-Test-Response Characteristics:** Provide insulation and related materials with the fire-test-response characteristics where indicated, as determined by testing identical products per test method indicated below by a testing and inspecting agency acceptable to authorities having jurisdiction. Identify individual materials with appropriate markings of applicable testing and inspecting agency.
1. Surface-Burning Characteristics: ASTM E-84.
 2. Fire-Resistance Ratings: ASTM E-119.
 3. Combustion Characteristics: ASTM E-136.
 4. Exterior Wall Assemblies: NFPA-285

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Protect insulation materials from physical damage and from deterioration by moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.**
- B. Protect plastic insulation as follows:**
1. Do not expose to sunlight, except to extent necessary for period of installation and concealment.
 2. Protect against ignition at all times. Do not deliver plastic insulating materials to Project site before installation time.

3. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 FOIL-FACED RIGID INSULATION

- A. Manufacturers: Subject to compliance with requirements, provide:
 1. AP Foil-Faced Polyisocyanurate Continuous Insulation by Johns Manville (JM)
 2. Or an approved equal.
- B. Description: Foil-faced, rigid foam insulating sheathing product recommended for concealed uses in commercial construction, complying with ASTM C-1289, Type 1.
 1. Construction: Foam bonded on both sides in the manufacturing process to foil facers. One side has a printed reflective foil facer and the other side has a printed non-reflective foil facer.
 2. Foam: Closed cell polyisocyanurate, CFC- and HCFC-free.
 3. Size: 48 inches wide by 96, 108, or 120 inches long nominal. Refer to the Drawings for required R-Values.
 4. Physical Properties:
 - a. Thermal Resistance, 1 Inch, ASTM C-518: 6.0 degrees F per square foot per hour per BTU.
 - b. Compressive Strength, ASTM D-1621: 16 psi or greater.
 - c. Flexural Strength, ASTM C-203: 40 psi or greater.
 - d. Water Absorption, ASTM C-209: 0.1 percent by volume max.
 - e. Water Vapor Permeance, ASTM E-96, 0.05 perms max.
 - f. Surface Burning Characteristics, ASTM E-84, 25 or less flame spread, 450 or less smoke developed.
 - g. Air Leakage, ASTM E-2357: 0.04 cfm / sq.ft. @ 75 Pa (1.57 lb./sq.ft.) max.
 - h. Air Permeability, ASTM E-2178: 0.004 cfm /sq.ft. @ 75 Pa (1.57 lb./sq.ft.) max.
 5. Foam plastic sheathing panels used as weather-resistive barriers shall comply with ICC-ES-AC71 criteria.
- C. Accessory Materials: as recommended or approved by insulation manufacturer:
 1. Insulation Tape and Flashing: Pressure-sensitive tape of type recommended by insulation manufacturers for sealing joints and penetrations in vapor-retarder facings.
 2. Adhesive for Bonding Insulation: Product with demonstrated capability to bond insulation securely to substrates indicated without damaging insulation and substrates.
 3. Spindle-Type Anchors: Perforated plate type, capable of holding insulation of thickness indicated securely in position indicated.
 - a. Spindle: Copper- or zinc-coated, corrosion-resistant low carbon steel; fully annealed; 0.105 inch in diameter; length to suit depth of insulation indicated.

4. Insulation Standoff: Spacer fabricated from galvanized mild-steel sheet for fitting over spindle of insulation anchor to maintain air space of 1/2 inch minimum between face of insulation and substrate to which anchor is attached.
5. Anchor Adhesive: Product with demonstrated capability to bond insulation anchors securely to substrates indicated without damaging insulation, fasteners, and substrates.
6. Galvanized G90 Z-Girts of depths to match exterior board insulation thicknesses. Installed in a vertical or horizontal orientation to accommodate screw attachment of cladding panels.

2.2 FOAM SHEATHING FOR INTERIOR EXPOSED APPLICATIONS

- A. Manufacturers: Subject to compliance with requirements, provide:
 1. CI-MAX Polyisocyanurate Continuous Insulation by Johns Manville (JM)
 2. Thermax Sheathing by DuPont
 3. Rmax ECOMAXci FR by Rmax, a division of Sika Corporation.
 4. Or an approved equal.
- B. Description: Foil-glass-faced polyisocyanurate foam insulation board, complying with ASTM C-1289 Type 1, where interior side of the insulation is installed exposed.
 1. Designed to be installed in walls and ceilings without the addition of a thermal barrier.
 2. See Drawings for applications, which may include:
 - a. Interior wall insulation.
 - b. Masonry and concrete walls (above grade and tilt up).
 - c. Framed walls.
 - d. Pre-engineered metal buildings.
 - e. Ceilings.
 3. Construction: Foam bonded on both sides in the manufacturing process to foil facers.
 4. Foam: Closed cell polyisocyanurate, CFC- and HCFC-free.
 5. Size: 48 inches wide by 96, 108, or 120 inches long nominal. Refer to the Drawings for required R-Values.
 6. Physical Properties:
 - a. Thermal Resistance, 1 Inch, ASTM C-518: 6.0 degrees F per square foot per hour per BTU.
 - b. Compressive Strength, ASTM D-1621: 16 psi or greater.
 - c. Flexural Strength, ASTM C-203: 40 psi or greater.
 - d. Water Absorption, ASTM C-209: 0.1 percent by volume max.
 - e. Water Vapor Permeance, ASTM E-96, less than 0.05 perms max.
 - f. Surface Burning Characteristics, ASTM E-84, 25 or less flame spread, 450 or less smoke developed.
 - g. Air Leakage, ASTM E-2357: 0.04 cfm / sq.ft. @ 75 Pa (1.57 lb./sq.ft.) max.
 - h. Air Permeability, ASTM E-2178: 0.004 cfm /sq.ft. @ 75 Pa (1.57 lb./sq.ft.) max.
 7. Foam plastic sheathing panels used as weather-resistive barriers shall comply with ICC-ES-AC71 criteria.

2.3 UNDER-SLAB AND PERIMETER INSULATION

- A. Manufacturers: Subject to compliance with requirements, provide:
 - 1. Styrofoam Highload 40 by DuPont
 - 2. Or an approved equal.

- B. Description: Polystyrene Board Insulation for under concrete floor slabs and concrete footings, XPS Type VI or VII per ASTM C-578.
 - 1. Compressive strength: 40 lbs./sq. in., min.
 - 2. Water absorption: 0.1% by volume, max.
 - 3. R-value: 5.0 deg. F./ft. sq./hr/Btu/in. min.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Verify that substrates, adjacent materials, and insulation boards, are dry and ready to receive insulation and any required primers, adhesives, or fasteners. Verify that substrates are flat and free of irregularities and materials that will impede installation.

- B. Clean substrates of substances harmful to insulation, vapor retarders, or weather barriers, including removing projections capable of puncturing membranes or of interfering with insulation attachment.

- C. Verify that insulation boards are unbroken and free of damage, including board skins.

3.2 INSTALLATION OF FOIL-FACED RIGID INSULATION

- A. Begin installation after structural steel, exterior framing and bracing, and structural sheathing is complete.

- B. Insulation is not a structural material. Do not use as a nailing base for other building products.

- C. Install boards horizontally (preferred) over exterior sheathing staggered joints relative to exterior sheathing. The reflective side of the board should be oriented to the exterior, and the non-reflective white side should be oriented to the interior.

- D. Use maximum board lengths to minimize number of joints. Locate joints square to framing members. Center end joints over framing. Provide additional framing as necessary. Stagger each course at least one stud space to minimize continuous vertical seams. Boards may be installed vertically if less seam sealing results.

- E. Butt board edges together tightly, and carefully fit around openings and penetrations.

- F. Fasten insulation boards to the exterior face of the stud framing or sheathing using sheathing manufacturer's recommended fastener.

- G. Space fasteners 16 inches on center at the board perimeter, or consistent with framing spacing, but not greater than 24 inches on center.
- H. Install exterior cladding ties as applicable.
- I. Seal penetrations and panel defects with sheathing manufacturer's recommended sealant.
- J. Repair any boards damaged during installation. Patch holes less than 1 inch across with flashing tape. Patch holes greater than 1 inch across with matching board material and then seal with flashing tape.

3.3 INSTALLATION OF PERIMETER AND UNDER-SLAB INSULATION

- A. On vertical surfaces, set insulation units in adhesive applied according to manufacturer's written instructions. Use adhesive recommended by insulation manufacturer.
 - 1. If not otherwise indicated, extend insulation a minimum of 24 inches below exterior grade line.
- B. On horizontal surfaces, lay insulation units according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.
- C. Protect below-grade insulation on vertical surfaces from damage during backfilling by applying protection course with joints butted. Set in adhesive according to insulation manufacturer's written instructions.
- D. Protect top surface of horizontal insulation from damage during concrete work by applying protection course with joints butted.

END OF SECTION – 07 21 13 BOARD INSULATION

07 21 16 BLANKET INSULATION

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes cavity wall and ceiling batt insulation.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated. Submit manufacturer's catalog data and application instructions for each material proposed for use.
- B. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency for insulation products.

1.3 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of building insulation through one source from a single manufacturer.
- B. Fire-Test-Response Characteristics: Provide insulation and related materials with the fire-test-response characteristics where indicated, as determined by testing identical products per test method indicated below by a testing and inspecting agency acceptable to authorities having jurisdiction. Identify individual materials with appropriate markings of applicable testing and inspecting agency.
 - 1. Surface-Burning Characteristics: ASTM E-84.
 - 2. Fire-Resistance Ratings: ASTM E-119.
 - 3. Combustion Characteristics: ASTM E-136.
 - 4. Exterior Wall Assemblies: NFPA-285

PART 2 - PRODUCTS

2.1 GLASS-FIBER BLANKET INSULATION

- A. Unfaced, Glass-Fiber Blanket Insulation: ASTM C-665, Type I (blankets without membrane facing); consisting of fibers; with maximum flame-spread of 25 and maximum smoke-developed indexes 50; passing ASTM E-136 for combustion characteristics.
- B. Kraft-Faced Glass-Fiber Blanket Insulation: Provide thermal insulation produced by combining glass fibers with thermosetting resins to comply with ASTM C-665, Type II, Class A, Category 1 (blankets with a nonreflective vapor-retarder membrane covering one principal face and functioning as a vapor retarder).

- C. Where glass-fiber blanket insulation is indicated by the following thicknesses, provide blankets in batt or roll form with the following minimum thermal resistances:
1. 3-1/2 inches thick with a thermal resistance of R-13
 2. 5-1/2 inches thick with a thermal resistance of R-19 or R-20 where indicated
 3. 6-1/2 inches thick with a thermal resistance of R-22
 4. 8 inches thick with a thermal resistance of R-25
 5. 10 inches thick with a thermal resistance of R-30
 6. 12 inches thick with a thermal resistance of R-38
- D. Unfaced, Mineral-Wool Blanket Insulation: ASTM C-665, Type IA (blankets without membrane facing); consisting of inorganic fibers; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E-84; passing ASTM E-136 for combustion characteristics.
1. Fire Safing Insulation: Mineral wool unfaced insulation products designed to provide enhanced fire protection in perimeter fire containment systems tested to ASTM E-2307, for floor and wall penetrations, construction joints, and other firestopping applications and fire containment assemblies.
- E. Sound Attenuation Blankets: See Division 09 Section for Acoustical Insulation.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Fastening: Physically and permanently secure batts to framing so as to prevent downward slippage of batts. Support relying on friction alone will not be allowed.
1. Use wire or metal straps to hold insulation in place.
 2. Horizontal locations: Support batt continuously with chicken wire screwed to framing.

END OF SECTION – 07 21 16 BLANKET INSULATION

07 22 16 ROOF BOARD INSULATION

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes rigid insulation panels for use in insulating above deck for roofing assemblies.

1.2 SUBMITTALS

- A. Product data: Manufacturer's literature fully and completely describing each product and its proper method of installation for this Project. Include:
 - 1. Test data and calculations proving that the insulation in the thickness and number of layers to be installed will meet the required "U" or "R" value required.
 - 2. Manufacturer's certification that top layer product facer is compatible with roofing membrane.
- B. Shop Drawings: Roof plan showing layout of boards and fastening patterns. Details showing insulation thickness, cants, and coordination with membrane roofing.

1.3 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of roof deck insulation through one source from a single manufacturer.
- B. Work associated with roof deck insulation including (but not limited to) membrane roofing and flashing shall be performed by and be the responsibility of a single installer.
- C. Roof insulation on combustible or steel decks shall have a flame spread rating not greater than 75 and a smoke developed rating not greater than 150, exclusive of covering, when tested in accordance with ASTM E-84.
- D. The rated R-value shall be clearly identified by an identification mark applied by the manufacturer to each piece of building envelope insulation.
- E. Do not install insulation on roof deck when water of any type is present. Do not apply roofing materials when substrate is damp or wet or when proper temperatures for materials cannot be maintained.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Protect insulation materials from physical damage and from deterioration by moisture, soiling, and other sources. Store in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

- B. Protect board insulation as follows:
 - 1. Do not expose to sunlight, except to extent necessary for period of installation and concealment.
 - 2. Protect against ignition at all times. Do not deliver plastic insulating materials to Project site before installation time.
 - 3. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 ROOF INSULATION – POLYISOCYANURATE BOARD

- A. General: Closed-cell, polyisocyanurate foam core with factory-laminated fiberglass facers conforming to ASTM specification C1289, Type II, Class 1, Grade 2.
 - 1. Facers shall be inorganic and of type compatible with adhered single ply membrane roof material, and thereby avoiding use of recover board.
 - 2. Minimum compressive strength: 20 psi in accordance with ASTM C1289..
 - 3. Minimum density: 1.5 pcf.
 - 4. R-value at 40 deg. F: 6.0 for 1" of thickness.
 - 5. Provide both flat and tapered board.
 - 6. Provide in multiple layers to conform to required thickness and/or R-value.
 - 7. Minimum thickness: See Drawings.
- B. Roof board insulation shall meet requirements in:
 - 1. UL 1256
 - 2. FM 4450
 - 3. IBC 2603
- C. Adhesives: As approved by the roofing system manufacturer for attaching insulation boards to compatible roof decks. Products shall not void the roof system warranty.

PART 3 - EXECUTION

3.1 EXAMINATION AND PREPARATION

- A. Examine substrates and conditions, with Installer and roofing system manufacturer's representative present, for compliance with requirements.
- B. Verify deck is clean and smooth, free of depressions, waves, or projections, properly sloped to drain.
- C. Verify roof openings penetrating elements through roof are solidly set, reglets are in place. Verify deck is supported and secured.

- D. Do not apply to damp, frozen, dirty, dusty, or deck surfaces unacceptable to manufacturer and applicator.
- E. Beginning installation means acceptance of substrate.

3.2 INSTALLATION

- A. General: Installation shall be in accordance with the Contract Documents, the approved submittals, and the manufacturer's current, written instructions.
 - 1. Provide tapered units for crickets. Taper and board thickness shall be as necessitated to achieve required slope.
 - 2. In addition to locations indicated, provide crickets at HVAC roof curbs 4' or more in width.
 - 3. Do not install any more insulation than can be covered by finished roofing in one day. At the end of the day, do not leave the underlayment and the insulation exposed to the elements.
- B. Installation Over Metal Deck:
 - 1. Verify that flutes are dry and clean.
 - 2. Mechanical attachment to deck: Attach insulation to roof deck with manufacturers approved fasteners & plates. Install fasteners in each piece of insulation with a layout and spacing as required by the manufacturer. Install in layers as recommended by roof insulation manufacturer to achieve thickness and slope required. Stagger end joints in adjoining; stagger joints in each layer with those of layer below.
 - 3. Completed installation shall not void the roof system warranty.
- C. Protection of Installed Roof Insulation Material:
 - 1. Protect installed product from weather that might cause damage and the finish surface from damage during the progress of construction. Maintain this protection throughout the installation of the roofing and flashing materials. Do not deform or otherwise damage the roof insulation during entire roofing applications sequences. Deformed or damaged materials will be removed and new materials shall be installed at no additional cost to the Owner.
 - 2. During the installation period and prior to the installation of the roofing membrane, protect the deck underneath the roof insulation from adverse weather or from water penetrating under the insulation.
- D. Upon completion of the installation, visually inspect each insulated area and verify that all insulation is complete and properly installed.

END OF SECTION – 07 22 16 ROOF BOARD INSULATION

07 25 00 WEATHER BARRIERS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Vapor-permeable, Air and Water Barrier for exterior walls – Liquid Applied
 - 2. Vapor-permeable, Air and Water Barrier for exterior walls – Membrane Wrap
 - 3. Seam Tapes, Adhesives, and related accessories

1.2 SUBMITTALS

- A. Product Data: Product Data for each type of weather-resistive barrier component, including individual products, joint treatments, sealants, and flashings.
- B. Shop Drawings: Indicate component materials and dimensions and include project-specific construction and application details.
- C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency for insulation products.
- D. Manufacturer Certificates: Prior to weather-resistive barrier system installation, sub-contractor shall provide a copy of a document signed by weather-resistive barrier system manufacturer certifying that the total system complies with requirements and shall be eligible to receive the manufacturer's warranty.

1.3 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of building weather barrier as a complete system including accessory materials through one source from a single manufacturer.
- B. Installer shall have experience with installation of similar weather barrier assemblies under similar conditions, and when required for warranty requirements, shall be certified or approved by the weather barrier system manufacturer.
- C. Preinstallation Conference:
 - 1. Meet with Installer, membrane system manufacturer's representative, and installers whose work interfaces with or affects the system, including installers of framing, sheathing, and opening products.
 - 2. Review methods and procedures related to weather barrier installation, including manufacturer's written instructions.
 - 3. Review deck substrate requirements for conditions and attachments.
 - 4. Review flashings, special details, drainage, penetrations, and conditions of other construction that affect the waterproofing system.

1.4 COORDINATION

- A. Coordinate sequencing and installation of work related to weather barrier, including foundation waterproofing, roofing, windows, doors and other wall penetrations to provide a continuous weather barrier system.
- B. Install weather barrier prior to installation of windows and doors. Provide protection of wall openings and penetrations as required.
- C. Coordinate with sill and pan flashings to direct water to the exterior before windows and doors are installed. Install head flashings immediately after windows and doors are installed.
- D. Install diverter flashings wherever water might enter the assembly to direct water to the exterior.

1.5 WARRANTY

- A. Manufacturer's Field Service: Register Project with weather barrier manufacturer prior to installation of weather barrier and comply with weather barrier manufacturer's Project registration, pre-construction, and observation processes for warranty execution requirements.
- B. Manufacturer's Product and Labor Warranty: Manufacturer agrees to repair or replace weather barrier product that fails due to manufacturing defects that fails within specified warranty period, including reasonable labor for removal and replacement of affected materials to correct problems caused by the defective product up to manufacturer's limits.
 - 1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 WEATHER BARRIER WRAP

- A. Description: Exterior wall spunbonded polyolefin, non-woven, non-perforated air infiltration barrier and bulk moisture penetration barrier.
- B. Manufacturers: Subject to compliance with requirements, provide:
 - 1. "Tyvek Commercial Wrap-D" System by DuPont, Inc.
 - 2. Or an approved equal.
- C. Performance Characteristics:
 - 1. Air Penetration: <.005 cfm/ft2 at 1.57 psf, when tested in accordance with ASTM E-2178. Type I per ASTM E-1677.
 - 2. Water Vapor Transmission:
 - a. 15 perms or less, when tested in accordance with ASTM E-96, Method A.
 - b. 30 perms or less, when tested in accordance with ASTM E-96, Method B.

3. Water Penetration Resistance: 230 cm minimum when tested in accordance with AATCC Test Method 127.
 4. Air Resistance: 1200 seconds minimum, when tested in accordance with TAPPI Test Method T-460.
 5. Tensile Strength: 30 lbs/in. minimum (each Machine and Cross direction), when tested in accordance with ASTM D-882.
 6. Tear Resistance: 6 N/mm minimum, (each Machine and Cross direction), when tested in accordance with ASTM D-1117.
 7. Surface Burning Characteristics: Class A, when tested in accordance with ASTM E-84. Flame Spread: 15 max, Smoke Developed: 30 max
 8. UV Resistance: 9 months exposure minimum.
- D. Accessories: Provide weather barrier manufacturer's recommended accessory products for the application indicated, including but not limited to:
1. Seam Tape as recommended by the weather barrier manufacturer.
 2. Fasteners: Verify approval with weather barrier manufacturer for compliance with warranty requirements:
 - a. Steel Frame Construction: 1-5/8" rust resistant screw with 2-inch diameter plastic cap or manufacturer approved 1-1/4" or 2" metal gasketed washer.
 - b. Wood Frame Construction: Nail Caps: #4 nails with large 1-inch plastic cap fasteners, or 1-inch plastic cap staples with leg length sufficient to achieve a minimum penetration of 5/8-inch into the wood stud.
 - c. Masonry Construction: Masonry Tapcon fasteners, with 2-inch diameter plastic caps.
 3. Sealants as recommended by the weather barrier manufacturer and comply with ASTM C920, elastomeric polymer to maintain watertight conditions.
 4. Adhesives as recommended by the weather barrier manufacturer.
 5. Primers: Provide flashing manufacturer's recommended primer to assist in adhesion between substrate and flashing.
 6. Flashing: Flexible membrane flashing materials for window openings and penetrations recommended by manufacturer.
 - a. Straight flashing membrane materials for flashing windows and doors and sealing penetrations such as masonry ties, etc. recommended by manufacturer.
 - b. Thru-Wall flashing membrane materials for flashing at changes in direction or elevation (shelf angles, foundations, etc.) and at transitions between different assembly materials.
 - c. Preformed Inside and Outside Corners and End Dams: Preformed three-dimensional shapes to complete the flashing system used in conjunction with Thru-Wall Flashing.

2.2 LIQUID-APPLIED WEATHER BARRIER

- A. Description: Exterior wall single-component, liquid-applied vapor-permeable, air and water barrier which cures to form a tough, seamless, elastomeric membrane to resist air and moisture transmission.
 - 1. Spray or Roller Applied.
 - 2. Thickness: 15 mils min. per coat. Multiple coats over porous substrates as recommended by manufacturer.

- B. Manufacturers: Subject to compliance with requirements, provide:
 - 1. "R-Guard Cat 5" by Prosoco, Inc.
 - 2. Or an approved equal.

- C. Performance Characteristics:
 - 1. Class III vapor retarder minimum.
 - 2. Vapor Permeable: perm rating greater than 10.0 or higher.
 - 3. Water Vapor Permeance ASTM E-96 (Method B): 15 perms minimum.
 - 4. Air Leakage ASTM E-2357: 0.04 cfm / ft.2 @ 75 Pa (1.57 lb./ft.2) max..
 - 5. Air Permeability ASTM E-2178: 0.004 cfm /ft.2 @ 75 Pa (1.57 lb./ft.2) max.
 - 6. Elongation ASTM D-412: 1000% minimum.
 - 7. Flame Spread and Smoke Development, ASTM E-84: Class A.

PART 3 - EXECUTION

3.1 EXAMINATION AND PREPARATION

- A. Verify substrate and surface conditions are in accordance with weather barrier manufacturer recommended tolerances prior to installation of weather barrier and accessories, including removal of sharp protrusions and that substrate is dry.

- B. Inspect concrete and concrete masonry substrates for any unsatisfactory conditions:
 - 1. Contamination, such as algae, chalkiness, dirt, dust, efflorescence, form oil, fungus, grease, mildew or other foreign substances.
 - 2. Cracks: measure crack width and record location of cracks. Record types of repairs made.
 - 3. Moisture content and moisture damage: Use a moisture meter to determine if the surface is dry enough to receive the air and moisture barrier and record any areas of moisture damage or excess moisture.

- C. Report deviations from the requirements of project specifications or other conditions that might adversely affect the weather barrier installation. Do not start work until deviations are corrected.

3.2 INSTALLATION, GENERAL

- A. Install weather barrier over exterior face of exterior wall substrate in accordance with manufacturer's details and written instructions. Apply primers before installing weather barriers as recommended by manufacturer over certain substrates, at adhered flashing locations, and at specified temperature ranges.

3.3 INSTALLATION OF WEATHER BARRIER WRAP

- A. Install weather barrier over exterior face of exterior wall substrate in accordance with manufacturer's details and written recommendations.
- B. Start weather barrier installation at a building bottom corner, leaving 8 or more inches of weather barrier extended beyond corner to overlap.
- C. Fasteners: Use weather barrier manufacturer's recommended fasteners to secure weather barrier, and install fasteners according to weather barrier manufacturer's installation instructions.
- D. Install weather barrier in a horizontal manner starting at the lower portion of the wall surface. Maintain weather barrier plumb and level. Subsequent layers shall overlap lower layers horizontally in a shingling manner, to maintain continuous downward drainage plane.
- E. Lap weather barrier over the top edge of thru-wall flashings and seal weather barrier with sealant or tape. Ensure drainage to weeps in veneer is not blocked.
- F. Window and Door Openings: Extend weather barrier completely over openings, to be cut later. Opening preparation and flashing installation is dependent upon the construction of the opening and construction of the window. Coordinate with other trades for proper detailing at windows, doors and other openings or intersections for proper flashing in accordance with window/door manufacturer guidelines, industry standards and best flashing and waterproofing practices.
- G. Seaming: Seal seams of weather barrier with seam tape at all vertical and horizontal overlapping seams. Seal any tears or cuts as recommended by weather barrier manufacturer.

3.4 INSTALLATION OF LIQUID-APPLIED WEATHER BARRIER

- A. Detail with manufacturer's recommended products to seal joints, transitions, openings, edges, penetrations, and other surface irregularities before spray-applying weather barrier membrane.
- B. Apply primer evenly over surface when required by weather barrier system.
- C. Apply liquid weather barrier membrane product by spray, roller, brush or other method as recommended by weather barrier manufacturer.
- D. Apply product at specified wet mil thickness in accordance with requirements. Verify compliance with weather barrier manufacturer's minimum required thickness by documenting product volume use per area. Perform and document wet mil thickness measurements every 100 square feet, or more frequently if required, to establish uniform and adequate coverage.

- E. Apply additional coats as recommended by weather barrier manufacturer for thickness required at concrete, masonry, wood, or other porous substrates.

3.5 INSTALLATION VERIFICATION

- A. Field Inspection: When each section is complete, the installer and weather barrier system manufacturer's representative shall visually inspect the installation and verify that all layers of material are applied and lapped correctly, that all penetrations and terminations have been sealed correctly and that doors and windows have been properly flashed and integrated into the weather barrier material. The installer shall repair any cuts or tears with approved materials and methods.
- B. Some substrates will require additional material to achieve a continuous coating. Inspect surface after application and touch-up as needed with approved products.
- C. Correct deficiencies or remove air barrier that does not comply with requirements; repair substrates and reapply air-barrier components.

3.6 PROTECTION

- A. Protect installed weather barrier from damage until covered by exterior wall finish materials.
- B. Protect weather barrier from exposure to UV light and harmful weather exposure as recommended in writing by manufacturer. If left exposed to these conditions for longer than recommended, at no additional cost to the Owner, remove and replace weather barrier material or install additional, full-thickness, weather-barrier application after repairing and preparing the overexposed materials in accordance with manufacturer's written instructions.

END OF SECTION – 07 25 00 WEATHER BARRIERS

07 26 16 UNDER-SLAB VAPOR RETARDERS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes below-grade and under-slab sheet vapor retarder.

1.2 SUBMITTALS

- A. Product Data: Provide technical data and tested physical and performance properties of vapor retarder sheet materials and accessories.
 - 1. Include manufacturer's written instructions, including evaluating, preparing, and treating substrate.
 - 2. Manufacturer's installation instructions for sheet placement, seaming, penetration prevention, perimeter sealing, and repairs.
- B. Shop Drawings: Show locations and extent of vapor retarder. Include details for substrate joints, lap seams, penetration flashings, tape locations, sealant locations, inside and outside corners, tie-ins with adjoining waterproofing and insulation, and other important conditions.

1.3 PROJECT CONDITIONS

- A. Environmental Limitations: Apply products within the range of ambient and substrate temperatures recommended by manufacturers. Do not apply vapor retarders to a damp, wet, or frozen substrate. Do not apply waterproofing in snow, rain, fog, or mist.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Vapor Retarder System shall be capable of performing as a continuous water vapor barrier. Vapor retarder shall accommodate normal substrate movement, construction material transitions, and perimeter conditions without deterioration.

2.2 SHEET VAPOR BARRIER

- A. Sheet membrane specifically designed as a below-slab and below-grade vapor barrier manufactured from polyolefin resins.
 - 1. Thickness: 15 mils.
 - 2. Roll width: 10 feet min.
 - 3. Tensile Strength (Membrane): 72 psi (min.), ASTM E-154
 - 4. Elongation: 300% minimum, ASTM D-412
 - 5. Permeance: 0.01 Perm (max), ASTM E-96

6. Puncture Resistance: 2,200 grams (min), ASTM D-1709
7. Exceeds Class A, B, and C strength for ASTM E-1745

B. Products: Subject to compliance with requirements, provide one of the following:

1. "Perminator" 15 mil by W.R. Meadows
2. "Stego-Wrap" 15 mil by Stego Industries Inc.
3. "Griffolyn 15 Mil Green" by Reef Industries, Inc.
4. "Viper II" by ISI Building Products
5. Or approved equal.

2.3 AUXILIARY MATERIALS

- A. General: Furnish auxiliary materials recommended by vapor barrier manufacturer for intended use and compatible with sheet waterproofing.
- B. Seam Tape: minimum 4 inches wide of type required by manufacturer.
- C. Waterproofing and Sheet Flashing Accessories: Provide sealants, pourable sealers, cone and vent flashings for penetrations, inside and outside corner flashings, termination bars, and other accessories recommended by waterproofing manufacturer for intended use.
- D. Pipe boots: Construct pipe boots from vapor barrier material and pressure sensitive tape per manufacturer's instructions.

PART 3 - EXECUTION

3.1 EXAMINATION AND PREPARATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance. Notify Architect in writing of any unacceptable conditions.
- B. Level, tamp, or roll earth or granular material substrates where sheets will be overlaid.

3.2 INSTALLATION

- A. Install vapor barrier in accordance ASTM E-1643.
- B. Install sheets over entire area to receive vapor barrier according to manufacturer's written instructions and recommendations. Unroll vapor barrier with the longest dimension parallel with the direction of the concrete placement and face laps away from the expected direction of the pour whenever possible.
- C. Extend vapor barrier to the perimeter of the slab. If practicable, terminate it at the top of the slab; or otherwise at a point acceptable to the structural engineer, where obstructed by impediments, such as dowels, waterstops, or any other site condition requiring early termination of the vapor barrier. At the point of termination, seal vapor barrier to the foundation wall, grade beam or slab itself.

**DIVISION 7 – THERMAL AND
MOISTURE PROTECTION**

07 26 16 UNDER-SLAB VAPOR RETARDERS Continued

- D. Accurately align sheets and maintain uniform side and end laps of minimum dimensions required, and seal with manufacturer's seam tape.
 - 1. Seal all penetrations, including pipes, per manufacturer's instructions for pipe boots.
- E. Repair tears, voids, and lapped seams in waterproofing, and repair any conditions not complying with requirements. Patch with sheet waterproofing extending a minimum of 6" beyond repaired areas in all directions, taped at all edges.
- F. Do not permit foot or vehicular traffic on unprotected membrane.

END OF SECTION – 07 26 16 UNDER-SLAB VAPOR RETARDERS

07 41 13 METAL ROOF PANELS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes all labor, materials, equipment, and services required to furnish and install metal roof panels including copings, gutters, and flashings contiguous with the panels.
- B. Related Sections Include:
 - 1. Division 05 Sections for metal support framing, including girts, studs, and bracing.
 - 2. Division 07 Sections for thermal insulation and roof deck insulation.
 - 3. Division 07 Sections for Metal Roof Panels and roof accessories.
 - 4. Division 07 Sections for Sheet Metal Flashing and Trim, and Joint Sealants.
 - 5. Division 13 Section for Pre-Engineered Metal Buildings.
- C. Metal Roof Panels may be provided as part of a complete pre-engineered, componentized steel building system involving the design, fabrication, delivery and installation of structural steel framing, metal roof and wall panels, insulation, and other integrated products and accessories.

1.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design metal roof panel assembly, including comprehensive engineering analysis by a qualified professional engineer, to verify panels will withstand the design wind loads without detrimental effects or deflection exceeding L/180. Include effects of thermal differential between the exterior and interior panel facings and resistance to fastener pullout.
- B. Structural Performance: Provide metal roofing panel assemblies capable of withstanding the effects applicable loads and stresses under project-specific conditions indicated, based on testing according to ASTM E-1592.
 - 1. See structural drawings for minimum wind and envelope loads.
 - 2. Metal roof panel supplier and contractor's delegated design engineer shall verify wind and snow loading applicable to the project location.
- C. Air Infiltration: Air leakage through assembly of not more than 0.06 cfm/sq. ft. of roof area when tested according to ASTM E-1680 at the following test-pressure difference:
- D. Water Penetration: No water penetration when tested according to ASTM E-1646.
- E. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 to resist wind uplift at field, perimeter, and corner uplift pressures indicated by the Engineer.
- F. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes. Provide calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

- G. Thermal Performance: Provide insulated metal roof panel assemblies with thermal-resistance value (R-value) where indicated when tested according to ASTM C-518.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of roof panel and accessory.
- B. Samples: Not required if providing the exact products and colors indicated on drawings.
- C. Coordination / Shop Drawings: Roof plans, drawn to scale, on which the following are shown and coordinated with each other, based on input from installers of the items involved:
 - 1. Roof panels and attachments.
 - 2. Purlins and rafters.
 - 3. Roof-mounted items including roof hatches, equipment supports, pipe supports and penetrations, lighting fixtures, snow guards, and items mounted on roof curbs.
 - 4. Accessories: Include details of the following items:
 - a. Flashing and trim.
 - b. Gutters.
 - c. Downspouts.
 - d. Roof curbs.
 - e. Snow guards.
- D. Qualification Data: For Installer and Professional Engineer.
- E. Product Test Reports: Based on evaluations of comprehensive tests performed by a qualified testing agency, for each product.
- F. Maintenance Data: For metal roof panels to include in maintenance manuals.
- G. Manufacturer's Installation Instructions: Provide manufacturer's written installation instructions including proper material storage, material handling, installation sequence, panel location(s), and approved attachment methods for different substrates, and details and required trim and accessories.
- H. Warranties: Copy of project-specific warranty.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: An employer of workers trained and approved by manufacturer.
- B. Preinstallation Conference: Conduct conference at Project site.
 - 1. Meet with Owner's insurer if applicable, testing and inspecting agency representative if applicable, metal roof panel installer, metal roof panel manufacturer's representative, deck, purlin, and rafter installers, and installers whose work interfaces with or affects metal roof panels including installers of roof accessories and roof-mounted equipment.

2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
3. Review methods and procedures related to metal roof panel installation, including manufacturer's written instructions.
4. Examine deck substrate and purlin and rafter conditions for compliance with requirements, including flatness and attachment to structural members.
5. Review structural loading limitations during and after roofing.
6. Review flashings, special roof details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect metal roof panels.
7. Review governing regulations and requirements for insurance, certificates, testing and inspecting, and warranties.
8. Review temporary protection requirements for metal roof panel assembly during and after installation.
9. Review roof observation and repair procedures after metal roof panel installation.
10. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.5 COORDINATION

- A. Coordinate sizes and locations of roof curbs, equipment supports, and roof penetrations with actual equipment provided.
- B. Coordinate metal roof panels with rain drainage work, flashing, trim, and construction of decks, purlins and rafters, parapets, walls, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.6 WARRANTY

- A. Workmanship Warranty: Roof panel Manufacturer jointly with Installer agrees to repair or replace metal roof panel assemblies that fail due to workmanship installation within specified warranty period.
 1. Warranty Period: Two years from date of Substantial Completion.
- B. Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal roof panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
 1. Finish Warranty Period: 20 years from date of Substantial Completion.
- C. Special Weathertightness Warranty for Metal Roof Panel Assemblies: Manufacturer's standard form in which manufacturer agrees to repair or replace metal roof panel assemblies that fail to remain weathertight, including leaks, within specified warranty period.
 1. Weathertightness Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PANEL MATERIALS

- A. Metallic-Coated Steel Sheet: Restricted flatness steel sheet metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A-755.
 - 1. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A-792, structural quality, Grade 50, Coating Class AZ55.
- B. Panel Finishes:
 - 1. Galvalume Plus (typical basis of design): AZ-55 coating, 0.55 ounces per square foot of an aluminum-zinc alloy coating applied to both sides of the sheet steel substrate; "bare" or clear with no color.
 - 2. High-Performance Fluoropolymer Finish: only where specifically indicated by Architect on drawings. Verify if match required with wall, fascia, or soffit panels.
 - a. 2-coat (minimum) fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in color coat.
 - b. Kynar 500 or Hylar 5000 Fluorocarbon coating with a top side film thickness of 0.70 to 0.90 mil over 0.25 to 0.31 mil prime coat to provide a total dry film thickness of 0.95 to 1.25 mil.
 - c. Color to be selected by Architect from manufacturer's standard options (not including mica or metallic colors.)
 - d. Concealed finish of colored panels: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish consisting of prime coat and wash coat.
- C. Panel Sealants:
 - 1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining.
 - 2. Joint Sealant: ASTM C-920; elastomeric polyurethane, polysulfide, or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal roof panels and remain weathertight; and as recommended in writing by metal roof panel manufacturer.
 - 3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C-1311.

2.2 RIBBED METAL ROOF PANELS

- A. Exposed Fastener Lapped Metal Panels: Structural metal roof panel consisting of formed metal sheets, factory roll-formed with a pattern of major and minor corrugated ribs, for use on exterior roofs and soffits.
 - 1. Product: "R-Panel" by McElroy Metal.
 - a. Or an approved equal.
 - 2. Panel Characteristics:
 - a. Material: Steel sheet.
 - b. Sheet Thickness: 26 gauge. (50 ksi steel)

- c. Panel Width: 36" coverage each unit.
- d. Face: Major ribs at 12", with two or more minor ribs in between.
- e. Designed for installation on roofs and soffits with manufacturer's approval.
- f. Exposed fasteners with tape sealants.
- g. Purlin Bearing Legs to be provided per manufacturer's requirements on roof installations.
- h. Minimum Slope: 1 inch per foot (1:12), with sealant as approved by manufacturer.

2.3 STANDING-SEAM METAL ROOF PANELS

- A. Mechanically-seamed, Concealed Fastener, Hydrostatic Metal Roof Panels: Structural metal roof panel consisting of formed metal sheet with vertical ribs at panel edges, installed by lapping and mechanically interlocking edges of adjacent panels, and attaching panels to supports using concealed clips and fasteners in a weathertight installation.
 1. Steel Panel Systems: Unless more stringent requirements are indicated, comply with ASTM E-1514.
- B. Subject to requirements, products that may be incorporated into the work include, but are not limited to, the following:
 1. "Batten-Lok HS" or "Super-Lok" by MBCI
 2. "2.0 Mechanical Seam ARMCO" or "SMI 2.0 SCH Mechanical Seam" by Sheffield Metals
 3. "Tite-Loc" by Pac-Clad, Petersen Aluminum (a Carlisle company)
 4. "High-Seam Tee Panel" by Berridge Manufacturing Company
 5. Or approved equal.
- C. Physical Characteristics:
 1. Seam Height:
 - a. 1-1/2" minimum seam height for roof slopes 1" per foot or greater
 - b. 2" minimum seam height for roof slopes 1/2" per foot or greater.
 2. Material: 24 ga. G-90 hot-dipped galvanized steel panel.
 3. Panel Dimension: 16" or 18" width, verify with Architect.
 4. Texture: Smooth
 5. Flashing and Trim: Steel, 24 ga, matching panels.

2.4 ACCESSORIES

- A. Roof Panel Accessories: Provide components approved by roof panel manufacturer and as required for a complete metal roof panel assembly including trim, copings, fasciae, corner units, ridge closures, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal roof panels unless otherwise indicated.
- B. Ridge Vents: Rigid section metal panel with baffles to deflect rain and snow, designed to vent attic air out from roof ridge without allowing water penetration within metal roof panels.
 1. Minimum Net Free Area: 16 in. per lineal foot minimum.
 2. See Division 13 Section for Pre-Engineered Metal Buildings, for ridge ventilators with operable dampers.

- C. Flashing and Trim: Formed from same material as roof panels, prepainted with coil coating, minimum 0.018 inch thick. Provide flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers. Finish flashing and trim with same finish system as adjacent metal roof panels.
- D. Gutters and Downspouts: Formed from same material as roof panels and metal thickness according to SMACNA's "Architectural Sheet Metal Manual," complete with end pieces, outlet tubes, and other special pieces as required. Finish downspouts to match gutters. See Division 07 Section for Sheet Metal Flashing and Trim.
- E. Slip Sheet: Manufacturer's recommended slip sheet, of type required for application.

2.5 MISCELLANEOUS MATERIALS

- A. Miscellaneous Metal Framing, General: ASTM C-645, cold-formed metallic-coated steel sheet, ASTM A-653 hot-dip galvanized or coating with equivalent corrosion resistance unless otherwise indicated.
- B. Fasteners for Miscellaneous Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten miscellaneous metal framing members to substrates.
 - 1. All fasteners in contact with copper shall be copper, brass or series 300 stainless steel.
- C. Panel Fasteners: Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads and acceptable to roofing manufacturer. Provide exposed fasteners with heads matching color of metal roof panels by means of plastic caps or factory-applied coating. Provide EPDM, PVC, or neoprene sealing washers.
- D. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.
- E. Joint Sealers: Manufacturer's standard or recommended liquid and preformed sealers and tapes, and as follows:
 - 1. Factory-Applied Seam Sealant: Manufacturer's standard hot-melt type.
 - 2. Tape Sealers: Manufacturer's standard non-curing butyl tape, AAMA 809.2.

2.6 SNOW GUARDS

- A. Snow Guards: Prefabricated, noncorrosive units designed to be installed without penetrating metal roof panels, and complete with predrilled holes, clamps, or hooks for anchoring.
 - 1. Surface-Mounted, Metal, Stop-Type Snow Guards: Cast-aluminum stops designed for attachment to pan surface of metal roof panel using construction adhesive, silicone or polyurethane sealant, or adhesive tape.

2.7 FABRICATION

- A. Fabricate and finish metal roof panels and accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes and as necessary to fulfill indicated performance requirements. Comply with indicated profiles and with dimensional and structural requirements.
- B. Fabricate metal roof panel side laps with factory-installed captive gaskets or separator strips that provide a tight seal and prevent metal-to-metal contact, in a manner that will seal weathertight and minimize noise from movements within panel assembly.
- C. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal roof panel supports, and other conditions affecting performance of the Work.
- B. Examine primary and secondary roof framing to verify that rafters, purlins, angles, channels, and other structural panel support members and anchorages have been installed within alignment tolerances required by metal roof panel manufacturer.
- C. Examine roughing-in for components and systems penetrating metal roof panels to verify actual locations of penetrations relative to seam locations of metal roof panels before metal roof panel installation.
- D. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 METAL ROOF PANEL INSTALLATION, GENERAL

- A. Provide metal roof panels of full length from eave to ridge unless otherwise indicated or restricted by shipping limitations.
- B. Avoid attaching accessories through roof panels in a manner that will inhibit thermal movement.
- C. Anchor Clips: Anchor metal roof panels and other components of the Work securely in place, using manufacturer's approved fasteners according to manufacturers' written instructions.
- D. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by metal roof panel manufacturer.

1. Coat back side of roof panels with bituminous coating where roof panels will contact wood, ferrous metal, or cementitious construction.
- E. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of metal roof panel assemblies. Provide types of gaskets, fillers, and sealants indicated or, if not indicated, types recommended by metal roof panel manufacturer.
1. Seal metal roof panel end laps with double beads of tape or sealant, full width of panel. Seal side joints where recommended by metal roof panel manufacturer.
 2. Prepare joints and apply sealants to comply with requirements in Division 07 Section "Joint Sealants."
- F. Standing-Seam Metal Roof Panels: Fasten metal roof panels to supports with concealed clips at each standing-seam joint at location, spacing, and with fasteners recommended by manufacturer.
1. Install clips to supports with self-tapping fasteners.
 2. Install pressure plates at locations indicated in manufacturer's written installation instructions.
 3. Snap Joint: Nest standing seams and fasten together by interlocking and completely engaging factory-applied sealant.
 4. Seamed Joint: Crimp standing seams with manufacturer-approved, motorized seamer tool so clip, metal roof panel, and factory-applied sealant are completely engaged.
- G. Metal Fascia Panels: Align bottom of panels and fasten with blind rivets, bolts, or self-tapping screws. Flash and seal panels with weather closures where fasciae meet soffits, along lower panel edges, and at perimeter of all openings.

3.3 ACCESSORY INSTALLATION

- A. General: Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.
1. Install components required for a complete metal roof panel assembly including trim, copings, ridge closures, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
- B. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual" and with Division 07 Section for Sheet Metal Flashing and Trim.

3.4 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect metal roof panel installation, including accessories. Report results in writing.
- B. Remove and replace applications of metal roof panels where inspections indicate that they do not comply with specified requirements.

END OF SECTION – 07 41 13 METAL ROOF PANELS

07 42 13 METAL WALL PANELS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes all labor, materials, equipment, and services required to furnish and install metal wall panels and metal soffit panels, including flashings and trims contiguous with the panels.
- B. Related Sections Include:
 - 1. Division 05 Sections for metal support framing, including girts, studs, and bracing.
 - 2. Division 07 Sections for thermal insulation and weather-resistive barriers.
 - 3. Division 07 Sections for Metal Roof Panels and roof accessories.
 - 4. Division 07 Sections for Sheet Metal Flashing and Trim, and Joint Sealants.
 - 5. Division 13 Section for Pre-Engineered Metal Buildings.
- C. Metal Wall Panels may be provided as part of a complete pre-engineered, componentized steel building system involving the design, fabrication, delivery and installation of structural steel framing, metal roof and wall panels, insulation, and other integrated products and accessories.

1.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design metal wall panel assembly, including comprehensive engineering analysis by a qualified professional engineer, to verify panels will withstand the design wind loads without detrimental effects or deflection exceeding L/180. Include effects of thermal differential between the exterior and interior panel facings and resistance to fastener pullout.
- B. Structural Performance: Provide metal wall panel assemblies capable of withstanding the effects applicable loads and stresses under project-specific conditions indicated, based on testing according to ASTM E-1592.
 - 1. See structural drawings for minimum wind and envelope loads.
 - 2. Metal wall panel supplier and contractor's delegated design engineer shall verify wind and snow loading applicable to the project location.
- C. Sealed joints shall allow free and silent movement of panels during expansion and contraction while preventing uncontrolled penetration of moisture.
- D. Manufacturing, installation, and sealing shall prevent deformation of exposed surfaces.
- E. Not Permitted: Vibration harmonics; wind whistles; noises caused by thermal movement; thermal movement transmitted to other building elements; loosening, weakening or fracturing of attachments or components of system.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of wall panel and accessory.
- B. Shop Drawings: Project-specific drawings showing wall elevations and soffit plans with layout of panels, screws, and sections of each flashing/trim condition. Submit for approval prior to fabrication. Drawings shall include material type, metal thickness and finish. Drawings shall distinguish between factory and field fabrication.
- C. Samples: Not required if providing the exact products and colors indicated on drawings.
- D. Qualification Data: For Installer. Panel installer shall have a minimum of 5 years experience in installation of metal siding of similar size and scope.
- E. Warranties: Copy of project-specific warranty.

1.4 QUALITY ASSURANCE

- A. Panel fabricator shall have a minimum of ten (10) years of experience in manufacturing architectural wall panels in a permanent indoor facility.
- B. Source Limitations: Obtain each type of metal wall panel from single source from single manufacturer for consistency through the installation.
- C. Field measurements shall be taken by the contractor prior to metal panel fabrication to verify project conditions. Indicate dimensions on Shop Drawings.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Panels and flashings shall be protected and properly packaged to protect against transportation damage in transit to the jobsite.
- B. Upon delivery, exercise care in unloading, stacking, moving, storing, and erecting panels and flashings to prevent twisting, bending, scratching, or denting.
- C. Store panels and flashings in a safe, dry environment under a waterproof covering to prevent water damage. Allow for adequate ventilation to prevent condensation. Panels and flashings with strippable film shall not be stored in direct sunlight.
- D. Retain strippable protective covering on metal wall panels until installation. Upon exposure to direct sunlight, immediately remove strippable film from panels and flashings. Protect panels and flashings from foot traffic and from all other trades.

1.6 COORDINATION

- A. Coordinate metal wall panel assemblies with rain drainage work, flashing, trim, and construction of girts, studs, soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

- B. Pre-installation meeting: Conduct a pre-installation meeting at the job site attended by the Architect, Manufacturer's Technical Representative, Panel Installer, and Contractors of related trades. Coordinate structural support requirements in relation to wall panel system, installation of any separate air/water barriers, treatment of fenestration, and other requirements specific to the project.

1.7 WARRANTY

- A. Panel manufacturer shall provide a twenty (20) year warranty on the paint finish covering chalking, cracking, checking, chipping, blistering, peeling, flaking, and fading.
- B. Installer shall furnish written warranty for a two (2) year period from date of substantial completion of building covering labor and workmanship repairs required to maintain wall and flashings in watertight condition.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Coordinate with Section 133419 for Pre-Engineered Metal Buildings; metal wall and roof panels may be provided by the metal building manufacturer.
- B. Metallic-Coated Steel Sheet: Restricted flatness steel sheet metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A-755.
 - 1. Zinc-Coated (Galvanized) Steel Sheet: ASTM A-653, G90 coating designation; structural quality.
 - 2. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A-792, Class AZ-50 min. coating designation, Grade 40; structural quality.
- C. Panel Finishes:
 - 1. Kynar 500 or Hylar 5000 Fluorocarbon coating with a top side film thickness of 0.70 to 0.90 mil over 0.25 to 0.31 mil prime coat to provide a total dry film thickness of at least 1.20 mil.
 - 2. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish consisting of prime coat and wash coat.
 - 3. Color as selected by the Architect from manufacturer's standard options (mica and metallic colors not included.)

2.2 METAL WALL PANELS

- A. Dock Fasica Smooth Metal Wall Panels, typical unless otherwise noted:
 - 1. Product: Pac-Clad Flush Wall Panels by Peterson Aluminum.
 - 2. Panel Characteristics:
 - a. Material: Steel sheet.
 - b. Sheet Thickness: 24 gauge.
 - c. Panel Width: As indicated on drawings, or typically 16" face.

- d. Face: smooth, no ribs.
- e. Designed for installation either horizontally or vertically with manufacturer's approval.
- f. Concealed fasteners.

B. Dock Fascia Textured Wall Panel option when pre-approved by the owner or when required by local ordinance:

- 1. STK2000 Series as manufactured by TransAmerican Struckturoc, Inc.
- 2. Panel Characteristics:
 - a. Material: Steel sheet.
 - b. Sheet Thickness: 20 gauge.
 - c. Panel Width: 16" face.
 - d. Face: proprietary textured formulation to simulate stucco.
 - e. Concealed fasteners.

C. Dock wall and dock office wall corrugated metal panels:

- 1. "M" Panel by Berridge Manufacturing Co.
 - a. Or an approved equal.
- 2. Panel Characteristics:
 - a. Material: Steel sheet.
 - b. Sheet Thickness: 24 gauge.
 - c. Panel Width: 36" units.
 - d. Face: smooth, corrugated bent profile shapes parallel every 6 inches.
 - e. Designed for installation either horizontally or vertically with manufacturer's approval.
 - f. Standard exposed fasteners.

D. Dock Fasica Smooth Metal Wall Panels, where specifically indicated on drawings:

- 1. Product: Pac-Clad Flush Reveal Wall Panels by Peterson Aluminum.
- 2. Panel Characteristics:
 - a. Material: Steel sheet.
 - b. Sheet Thickness: 24 gauge.
 - c. Panel Width: As indicated on drawings, or typically 12" units
 - d. Face: smooth, no ribs, with profile creating approx. 1" linear reveals.
 - e. Designed for installation either horizontally or vertically with manufacturer's approval.
 - f. Concealed fasteners.

2.3 INSULATED METAL WALL PANELS

A. Building Exterior Wall Panels: Foam core panels with sheet metal facings.

- 1. Characteristics:
 - a. Facing Material: 22 ga. steel sheet.
 - b. Panel Thickness: 2 inches
 - c. Panel Width: 40 inch units
 - d. Face: smooth, flat.

- e. Designed for installation either horizontally or vertically with manufacturer's approval.
 - f. Concealed fasteners.
2. Colors: Verify exterior face color selections with Architect, and see drawings.

B. Fire Performance Characteristics:

- 1. Surface-Burning Characteristics: The foam core shall be tested per ASTM E84, Flame Spread Index 25 or less, Smoke Developed Index 450 or less.
- 2. Fire Propagation: The wall panels shall be tested for fire propagation on exterior wall assemblies per NFPA 285 and ASTM E-119.
- 3. IBC Chapter 26: Insulated metal wall panel assemblies shall meet the requirements of the International Building Code on Foam Plastics.

C. Typical building smooth exterior wall panels: tongue-and-groove offset design.

- 1. Product: Flat FL40 by All Weather Insulated Panels (AWIP).

D. Embossed exterior wall panels where indicated on drawings:

- 1. Product: Striated ST40 by All Weather Insulated Panels (AWIP).

E. Fluted profile exterior wall panels where indicated on drawings:

- 1. Product: "Mesa" DM40 by All Weather Insulated Panels (AWIP).

2.4 METAL SOFFIT PANELS

A. Metal Panels for exterior horizontal ceiling soffits:

- 1. Product: FW-12 by Berridge Manufacturing
 - a. Or an approved equal.
- 2. Panel Characteristics:
 - a. Material: Steel sheet.
 - b. Sheet Thickness: 24 gauge.
 - c. Panel Width: As indicated on drawings, typically 12" units
 - d. Face: smooth, no ribs.
 - e. Designed for installation either horizontally or vertically with manufacturer's approval.
 - f. Concealed fasteners.
 - g. Ventilation perforations in panels where indicated on Drawings.

2.5 ACCESSORY MATERIALS

A. Miscellaneous Metal Framing: ASTM C-645, cold-formed metallic-coated steel, hot-dip Miscellaneous Metal Framing, General: ASTM C-645, cold-formed metallic-coated steel, hot-dip galvanized or coating with equivalent corrosion resistance. Provide manufacturer's standard profiles and sections, of gauge, thickness, material, and dimensions required for the project conditions, including, but not limited to:

- 1. Subgirts
- 2. Zee Clips

3. Base or Sill Angles or Channels
 4. Hat-Shaped, Rigid Furring Channels
- B. Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4 inches, wall attachment flange of 7/8 inch, and depth required to fit insulation thickness indicated.
- C. Panel Fasteners: Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads, of stainless steel or coated as approved by wall panel manufacturer,
1. Where exposed fasteners are used, provide heads matching color of metal wall panels by means of plastic caps or factory-applied coating.
 2. Provide EPDM, PVC, or neoprene sealing washers at all fasteners, for penetration sealing and to isolate materials.
- D. Wall Panel Accessories: Provide components required for a complete metal wall panel assembly including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal wall panels, unless otherwise indicated.
1. Closures: Provide closures at eaves and rakes, fabricated of same metal as metal wall panels.
 2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
 3. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch-thick, flexible closure strips; cut or premolded to match metal wall panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
- E. Flashing and Trim: Formed from zinc-coated (galvanized) steel sheet or aluminum-zinc alloy-coated steel sheet, prepainted with coil coating matching wall panels.
1. Provide flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, bases, drips, sills, jambs, corners, endwalls, framed openings, rakes, fasciae, parapet caps, soffits, reveals, and fillers.
- F. Panel Sealants:
1. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape.
 2. Joint Sealant: ASTM C-920; elastomeric polyurethane, polysulfide, or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal wall panels and remain weathertight; and as recommended in writing by metal wall panel manufacturer.
 3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C-1311.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, framing, and adjacent conditions for compliance with requirements for installation tolerances, metal wall panel supports, and other conditions affecting performance of work.
 - 1. Verify structural support for girt or furring attachments, including vertical and horizontal tolerances for level, plumb, and spacing distance.
- B. Examine roughing-in for components and systems penetrating metal wall panels to verify actual locations of penetrations relative to seam locations of metal wall panels before metal wall panel installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install metal wall panels according to manufacturer's written instructions.
- B. When installed as wall or fascia, panels shall be oriented vertically, unless otherwise shown on Drawings. Install panels plumb, level, and straight with the ribs parallel, conforming to the design as indicated.
- C. Install panel system so it is watertight, without waves, warps, buckles or distortions. Provide weathertight escutcheons for pipe and conduit penetrating exterior walls.
- D. Apply sealant tape or caulking as necessary at flashing and panel joints to prevent water penetration.

3.3 CLEANING AND PROTECTION

- A. Remove temporary protective coverings and strippable films, if any, as metal wall panels are installed, unless otherwise indicated in manufacturer's written installation instructions. Clean finished surfaces as recommended by metal wall panel manufacturer.
- B. After metal wall panel installation, clear drainage channels of obstructions, dirt, and sealant.
- C. Replace metal wall panels that have been damaged beyond successful repair by finish touchup or acceptable minor repair procedures.

END OF SECTION – 07 42 13 METAL WALL PANELS

07 54 23 THERMOPLASTIC-POLYOLEFIN (TPO) ROOFING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes a fully-adhered TPO membrane roofing system.
- B. Coordinate with the following related Sections:
 - 1. Division 05 Sections for metal roof deck and structural steel roof framing.
 - 2. Division 06 Sections for miscellaneous rough carpentry for wood nailers, curbs, blocking, and for roof deck board panels.
 - 3. Division 07 Sections for Thermal Insulation and Roof Deck Insulation.
 - 4. Division 07 Sections for sheet metal and flexible flashings, and joint sealants.
 - 5. Plumbing engineering drawings for plumbing vent, drain, and piping penetrations through roofs.
 - 6. Mechanical engineering drawings for HVAC equipment to be roof-mounted.

1.2 PERFORMANCE REQUIREMENTS

- A. General: Provide installed roofing membrane and base flashings that remain watertight; do not permit the passage of water; and resist specified uplift pressures, thermally induced movement, and exposure to weather without failure.
- B. Delegated Design: Include comprehensive engineering analysis by a qualified professional engineer, to verify that roofing system will withstand wind, thermal, and dynamic loads applicable to the project without detrimental effects or excessive deflection.
- C. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by roofing membrane manufacturer based on testing and field experience.
- D. Fire-Test-Response Characteristics: Provide membrane roofing materials with the fire-test-response characteristics indicated as determined by testing identical products per test method below by UL, FMG, or another testing and inspecting agency acceptable to authorities having jurisdiction. Materials shall be identified with appropriate markings of applicable testing and inspecting agency.
 - 1. Exterior Fire-Test Exposure: Class A, tested per ASTM E-108 and/or UL-790, for application, deck type, and roof slopes indicated.
 - 2. Fire-Resistance Ratings: ASTM E-119, for fire-resistance-rated roof assemblies of which roofing system is a part.
- E. UL 580 Standard for Tests for Uplift Resistance of Roof Assemblies: Class 90.
- F. FMG (Factory Mutual Global) Listing: Provide roofing membrane, base flashings, and component materials as part of a membrane roofing system that comply with requirements

in FMG's "Approval Guide" for Class 1 or noncombustible construction. Identify materials with FMG markings.

1. Fire/Windstorm Classification: Class 1A-90
2. Hail Resistance: SH
3. Note: Roofing system components shall meet FM performance criteria, but FM Insurance will not be required on this project.
4. All TPO roofing shall comply to FM-I-90 uplift rating for high wind testing.

G. Energy Performance per ANSI/CRRC-S100 standard (formerly CRRC-1), Standard Test Methods for Determining Radiative Properties of Materials:

1. Initial solar reflectance: minimum 0.75
2. Initial Thermal emittance: minimum 0.90

1.3 SUBMITTALS

A. Product data: Manufacturer's literature for each type of product proposed to be used in the TPO roofing system.

B. A complete description, including literature and drawings, of all roofing components and flashing systems required for the total roofing system.

1. Provide manufacturer's instructions to installer, marked up to show exactly how all components will be installed; where instructions allow installation options, clearly indicate which option will be used.

C. Shop Drawings: For total roofing system. Include plans, elevations, sections, details, and attachments to other Work, including but not limited to:

1. Outline of roof and roof size.
2. Number of sheets and their respective sizes.
3. Seaming locations.
4. Location and type of all penetrations.
5. Number of flashing rolls by width.
6. Details of termination at eaves, vertical surfaces, and roof penetrations.
7. Insulation thickness and layout.

D. Installer Certificates: Signed by roofing system manufacturer certifying that Installer is approved, authorized, or licensed by manufacturer to install roofing system eligible for warranty.

E. Manufacturer Certificates: Signed by roofing manufacturer certifying that roofing system complies with envelope wind-resistance requirements and shall be eligible to receive the specified manufacturer's warranty.

F. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for components of roofing system.

G. Maintenance Data: For roofing system to include in maintenance manuals for the Owner.

H. Warranties: Manufacturer's and Installer's project-specific warranty forms.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's warranty.
- B. Source Limitations: Obtain components for membrane roofing system from same manufacturer as roofing membrane or as approved by roofing membrane manufacturer.
- C. Manufacturer Qualifications and Field Technical Service: Roofing System Manufacturer must be able to provide technically trained field representatives on site during application to oversee installation methods, and shall be available to perform field problem solving issues with the installer.
- D. Prior to roofing system installation, roofing sub-contractor shall provide a copy of a document issued by the roofing system manufacturer indicating that the project has been reviewed and registered for eligibility to receive the specified warranty.
- E. Pre-installation conference: Before start of roofing work, Contractor shall hold a meeting to discuss the proper installation of materials and requirements to achieve the roofing system warranty. Require attendance with all parties directly influencing the quality of roofing work or affected by the performance of roofing work, including the installer, roofing manufacturer's representative, installers of related work, and other entities concerned with roofing performance, including governing authorities and Owner's representative. Notify all parties at least one week in advance of the conference.

1.5 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

1.6 WARRANTY

- A. Total System Warranty: Manufacturer's standard form, without monetary limitation (NDL, No Dollar Limit), in which manufacturer agrees to repair or replace components of membrane roofing system that fail in materials or workmanship within specified warranty period. Failure includes roof leaks.
 - 1. Special warranty includes roofing membrane, base flashings, and other components of membrane roofing system.
 - 2. Peak Wind Gust Speed: 72 mph.
 - 3. Warranty Period: 20 years from date of Substantial Completion.
 - 4. Hail damage coverage not required.
- B. Special Project Warranty: Submit roofing Installer's warranty, signed by Installer, covering Work of this Section, including all components of membrane roofing system such as roofing membrane, base flashing, roof insulation, fasteners, cover boards, substrate boards, vapor retarders, roof pavers, and walkway products, for the following warranty period:
 - 1. Warranty Period: 5 (five) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 TPO MEMBRANE ROOFING

- A. Fabric-Reinforced Thermoplastic Polyolefin Membrane: ASTM D-6878, heat-weldable sheet composed of thermoplastic polyolefin polymer and ethylene propylene rubber, with internal fabric or scrim reinforcement, for flexible, uniform TPO sheet.
 - 1. Thickness: 60 mils, nominal.
 - 2. Exposed Face Color: White

- B. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Sure-Weld by Carlisle SynTec Incorporated, basis of design.
 - 2. Do not substitute products without Architect's and Owner's full review and approval. Possible products that may be considered may include:
 - a. UltraPly by Elevate, Holcim (previously Firestone Building Products Company)
 - b. EverGuard by GAF Materials Corporation.
 - c. Or approved equal.

2.2 ROOF INSULATION

- A. General: Provide preformed roof insulation boards that comply with TPO system warranty requirements and referenced standards, to provide R-values indicated.

- B. Insulation Fasteners: Factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provisions in FMG 4470, designed for fastening roof insulation to substrate, and acceptable to roofing system manufacturer.

- C. Fluid-Applied Adhesive: Manufacturer's standard fluid-applied adhesive formulated to adhere roof insulation to substrate.

2.3 SUBSTRATE AND COVER BOARDS

- A. Substrate Boards, Cover Boards:
 - 1. ASTM C-1177, glass-mat, water-resistant gypsum substrate acceptable to roofing system manufacturer.
 - 2. ASTM C-1289, rigid cellular polyisocyanurate board, Type II, of a type and with facings on both sides acceptable to roofing system manufacturer.

- B. Protection Mat: Polypropylene fabric used either above the membrane as a slip-sheet for ballast or as an underlayment to the membrane, type, weight, and thickness as acceptable to the roofing system manufacturer.

2.4 AUXILIARY MATERIALS

- A. General: Provide all auxiliary materials recommended by roofing system manufacturer for intended use and compatible with membrane roofing system components.
- B. Sheet Flashing:
 - 1. Manufacturer's standard reinforced thermoplastic polyolefin sheet flashing, 55 mils thick, minimum, of same color as sheet membrane.
 - 2. Manufacturer's non-reinforced thermoplastic polyolefin sheet flashing may be used for flashing pipe penetrations, and inside and outside corners, when the use of pre-formed accessories is not feasible.
- C. Pre-formed Flashings:
 - 1. Manufacturer's thermoplastic polyolefin pre-formed cone and vent sheet flashings for vent stacks, roof drains, and other penetrations.
 - 2. Manufacturer's thermoplastic polyolefin pre-formed inside and outside corner sheet flashings, and T-joint covers.
- D. Bonding Adhesive: Manufacturer's standard.
- E. Metal Termination Bars: Manufacturer's standard, predrilled stainless-steel or aluminum bars, approximately 1 by 1/8 inch thick; with anchors and integral caulk ledge.
- F. Miscellaneous Accessories: Provide pourable sealers, lap sealants, termination reglets, and other accessories as required for complete installation.
- G. Wood Nailers: Install treated wood nailers at the perimeter of the entire roof. Wood shall be #2 or better lumber and pressure treated for fire and rot resistance. Creosote and asphaltic preservatives are not acceptable. Surface height of nailers shall be matched to that of the new insulation thickness being used. See Division 06 for Rough Carpentry.
- H. Flexible Walkways: Factory-formed, nonporous, heavy-duty, solid-rubber, slip-resisting, surface-textured walkway pads or rolls, approximately 3/16 inch (5 mm) thick, 24" or 30" wide, and acceptable to membrane roofing system manufacturer.
 - 1. Provide around roof access hatches, mechanical equipment, along paths of travel on roofs for regular maintenance activities, and where indicated on drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with the following requirements and other conditions affecting performance of roofing system:
 - 1. Verify that roof openings and penetrations are in place and set and braced and that roof drains are securely clamped in place.
 - 2. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.

3. For steel roof decks, verify that surface plane flatness and fastening of steel roof deck complies with requirements.
4. For concrete roof decks, verify that minimum concrete drying period recommended by roofing system manufacturer has passed.
 - a. Verify that concrete substrate is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D-4263.
 - b. Verify that concrete curing compounds that will impair adhesion of roofing components to roof deck have been removed.
5. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections. Prime substrates where recommended for the materials being installed.
- B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.
- C. Provide temporary protection over the roof insulation and to set up areas with 3/4" exterior grade plywood.

3.3 INSTALLATION

- A. Installation, General: Apply materials strictly in accordance with the roofing manufacturer's written instructions. Do no work and install no materials that will in any manner violate or void the roofing warranty.
- B. Start installation of roofing membrane in the presence of the roofing system manufacturer's technical personnel.
- C. When work is stopped at the end of a work day, and when work is stopped because of the probability of precipitation, seal loose edges of roof membrane in accordance with the roofing manufacturer's instructions. Take care to ensure that water does not flow beneath completed sections of roof. When work is resumed, pull the roof membrane free before continuing installation and completely remove any adhesive used.

3.4 PROTECTION AND CLEANING

- A. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion and submit report to Architect and Owner.
- B. After completing roofing and associated work, institute appropriate procedures for surveillance and protection of roofing during the remainder of construction period.

END OF SECTION – 07 54 23 TPO ROOFING

07 62 00 SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 SUMMARY

- A. All sheet metal items are not necessarily individually described. Provide manufactured products and formed/fabricated products as required for the project.

1.2 PERFORMANCE REQUIREMENTS

- A. General: Sheet metal flashing and trim assemblies as indicated shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.
- B. Fabricate and install roof edge flashing and copings capable of resisting the wind uplift forces according to recommendations in FMG Loss Prevention Data Sheets 1-49 and 1-28, for corners, the roof perimeter, and the roof field.
 - 1. FMG Listing: Manufacture and install copings and roof edge flashings that are listed in FMG's "Approval Guide" and approved for Windstorm Classification, Class 1-90. Identify materials with FMG markings.
 - a. Note: Roofing system components shall meet FM performance criteria, but FM Insurance will not be required on this project.
- C. Thermal Movements: Provide manufactured roof specialties that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Provide clips that resist rotation and avoid shear stress as a result of thermal movements.
- D. Where membrane roofing is applicable, comply with the following Single-Ply Roofing Industry standards:
 - 1. ANSI/SPRI ED-1 - Design Standard Edge Systems Low Slope Roofing Systems
 - 2. ANSI/SPRI ES-1 - Test Standard for Edge Systems Used with Low Slope Roofing Systems
 - 3. ANSI/SPRI GT-1 - Test Standard for External Gutter Systems
 - 4. ANSI/SPRI WD-1 - Wind Design Standard Practice for Roofing Assemblies
- E. In addition to complying with all pertinent codes and standards, comply with all pertinent recommendations of the "Architectural Sheet Metal Manual", latest edition, by Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA).

1.3 SUBMITTALS

- A. Complete and fully descriptive manufacturer's literature for all factory fabricated items, detailing all materials, dimensions, finishes and accompanying accessory items.
- B. Complete shop drawings and erection drawings for each product named which shall include a material schedule, details, profiles, gauges, dimensions, layout, anchorage and joint details.
- C. Samples: For items to be provided with factory-applied color finishes exposed to view, provide pieces of actual metal with factory finishes in selected color(s).

1.4 QUALITY ASSURANCE

- A. Sheet metal flashing and trim work associated with roofing shall be performed by and be the responsibility of a single installer for all roof components. Coordinate with other Division 07 Sections.

1.5 WARRANTY

- A. Warranty on Shop-Applied Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace sheet metal flashing and trim fabrications that show evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SHEET METALS

- A. General: Corrosion-resistant metals of minimum nominal 26 gauge (0.019-inch (0.483-mm) thickness).
 - 1. For most roof-related applications, provide sheet metals 22 gauge (0.0216-inch thick, 0.55-mm) minimum.
 - 2. For gutters and downspouts: 20 gauge (0.032-inch thick, 0.81-mm) min.
 - 3. For wall and opening applications: 24 gauge, (0.025-inch thick, 0.70-mm) min.
- B. Aluminum Sheet: ASTM B 209 alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required.
 - 1. Surface: Smooth, flat.
 - 2. Aluminum Sheet Thicknesses:
 - a. For most flat applications, provide aluminum sheet 22 gauge (0.024 inch thick, 0.61 mm) minimum.
 - b. For gutters and downspouts: 18 gauge (0.040 inch thick, 1.0 mm) minimum.
 - c. For scuppers and thru-wall fabrications: 16 gauge, (0.050 inch thick, 1.27 mm) minimum.
 - d. For welded fabrications or applications requiring welding: 14 gauge, (0.063 inch thick, 1.62 mm) minimum.
 - 3. Finish as selected by Architect:

- a. Exposed Color Finish: Coil-coated or powder-coated meeting AAMA 2605.
- C. Stainless-Steel Sheet: ASTM A-240 or ASTM A-666, Type 304, dead soft, fully annealed.
1. Finish: 2D (dull, cold-rolled) unless otherwise indicated.
 2. Surface: Smooth, flat.
 3. Stainless Steel Sheet Thicknesses:
 - a. For most flashing applications, provide stainless-steel sheet 26 gauge (0.0187 inch thick, 0.47 mm) minimum.
 - b. For applications with masonry, provide 24 gauge (0.0250 inch thick, 0.63 mm) minimum.
- D. Metallic (Zinc) Coated Galvanized Steel Sheet: ASTM A-653, G90 (Z275) coating designation; structural quality, by coil-coating process to comply with ASTM A-755.
1. Surface: Smooth, flat.
 2. Surface Finish for concealed locations: standard zinc.
 3. Surface Finish for exposed locations: Coil-coated or powder-coated color meeting AAMA 2605.
 4. Galvanized Sheet Thicknesses:
 - a. For most flat flashing applications, provide galvanized sheet 28 gauge (0.019 inch thick, 0.48 mm) minimum.
 - b. For thru-wall flashing applications, provide 26 gauge (0.022 inch thick, 0.56 mm) minimum.
 - c. For applications with masonry, provide 24 gauge (0.028 inch thick, 0.71 mm) minimum.

2.2 MANUFACTURED ITEMS

- A. Fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, geometry, metal thickness, and other characteristics of item indicated. Fabricate items at the shop to greatest extent possible.
1. Copings: Figures 3-1 (flat lock seam), 3-4 through 3-10.
 2. Hanging gutter: Figures 1-12 and 1-13
 3. Downspouts:
 - a. Profile: Figure 1-32. See Drawings for profile.
 - b. Hanger design: Figure 1-35A or 1-35I.
 - c. Gutter/downspout connection: Figures 1-31 and 1-33, Detail 1.
 4. Formed Fascia: Figure 2-1.
- B. Fascia Flashings and Cap Flashings: Provide counterflashings over base flashings. The apron shall be of sufficient width to overlap the base flashing not less than 3".
1. The lower edge shall be hemmed not less than 1/2" and turned out 3/4" at an angle of 45 degrees to form a drip.

2. Form flashings of sheets not longer than 10'-0", joined by 1" loose lock seams that are filled with sealant.
3. Stone Coping Caps:
 - a. Where the covering extends down over the front face of the stone, the cap flashing shall hook over a continuous base flashing.
 - b. Where the covering does not extend over the face of the stone, a separate continuous locking strip of metal shall be secured into a reglet embedded in the edge of the stone with sealant.

2.3 MISCELLANEOUS MATERIALS AND ACCESSORIES

- A. Fasteners:
 1. Same metal as sheet metal flashing or other non-corrosive metal as recommended by sheet metal manufacturer.
 2. Match finish of exposed heads with material being fastened.
- B. Asphalt mastic: SSPC-Paint 12, solvent-type asphalt mastic, nominally free of sulfur and containing no asbestos fibers, compounded for 15 mil dry film thickness per coat.
- C. Mastic sealant: Polyisobutylene; non-hardening, non-skinning, non-drying, non-migrating sealant.
- D. Caulking and Elastomeric Sealants: Type recommended by sheet metal manufacturer and fabricator of components being sealed, and complying with other Division 07 Section requirements for joint sealants.
- E. Epoxy seam sealer: 2-Part, non-corrosive, aluminum seam cementing compound, recommended by aluminum manufacturer for exterior and interior non-moving joints, including riveted joints.
- F. Adhesives: Type recommended by flashing sheet metal manufacturer for waterproof and weather-resistant seaming and adhesive application of flashing sheet metal.
- G. Paper slip sheet: 5 lb./square red rosin, sized building paper conforming to FS UU-B-790, Type I, style 1b.
- H. Polyethylene underlayment: ASTM D4397, minimum 6 mil thick black polyethylene film, resistant to decay when tested according to ASTM E154.
- I. Metal accessories: Provide sheet metal clips, straps, anchoring devices, and similar accessory units as required for installation of work, matching or compatible with material being installed; non-corrosive; size and thickness required for performance.

2.4 FABRICATION

- A. Comply with details shown to fabricate sheet metal flashing and trim that fit substrates and result in waterproof and weather-resistant performance once installed.

- B. Field Measurements: Verify all dimensions shown on the Drawings by taking field measurements during construction; proper fit and attachment of all parts is required. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
- C. Form all sheet metal accurately to the dimensions and shapes required, finishing all molded and broken surfaces with true, sharp, and straight lines and angles and, where intercepting other members, coping to an accurate fit and soldering securely.
- D. Form exposed sheet metal work that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems.
- E. Seams: Fabricate non-moving seams in aluminum with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
- F. Joints and corners shall be accurately machined, filed and fitted, and rigidly framed together and connected. All components shall be matched to produce perfect continuity of line and design. Joints and connections in exterior face metal shall be made watertight. Faces of metal shall have hairline joints only.
- G. Fabricate cleats and attachment devices from same material as sheet metal component being anchored or from compatible, non-corrosive metal recommended by sheet metal manufacturer.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Expansion: Space movement joints at maximum of 10' with no joints allowed within 24" of corner or intersection. Where lapped or bayonet-type expansion provisions in work cannot be used or would not be sufficiently weatherproof and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1" deep, filled with mastic sealant (concealed with joints).
- B. Sealed joints: Form non-expansion, but movable, joints in metal to accommodate elastomeric sealant to comply with SMACNA standards. Fill joint with sealant and form metal to completely conceal sealant.
- C. Separate metal from non-compatible metal or corrosive substrates by coating concealed surfaces at locations of contact with asphalt mastic or other permanent separation as recommended by the manufacturer.
- D. Fasteners:
 - 1. Conceal fasteners and expansion provisions wherever possible. Exposed fasteners are not allowed on faces of sheet metal trims and fascias exposed to view.
 - a. Whenever possible, secure metal by means of clips or cleats without puncturing through the metal.

2. In general, space all nails, rivets, and screws not more than 8" apart and, when exposed to the weather, use lead washers.
 3. Fasteners in concrete or masonry shall be stainless steel.
 4. Where exposed fasteners cannot be avoided, provide with head finished to match prefinished trim or hanger color.
- E. Underlayment: Where installing aluminum directly on cementitious or wood substrates, install a slip sheet of red-rosin paper and a course of polyethylene underlayment.
- F. Embed all metal in connection with roofs in a solid bed of caulking. Bed flanges of work in a thick coat of roofing cement where required for waterproof performance.
- G. Gutter Installation: Slip the back edge of gutters under drip edges of roof flashing, and hang with specified hangers at no more than 36" o.c. Seal penetrations through gutters and flashings with sealant. Solder joints in gutters wherever possible. At movement joints, install covers over joints so that water cannot run between sections of gutter.
- H. Downspout Installation: Telescope joints in downspouts at least 2". Place one hanger directly below gutter/downspout connection, and one near the bottom end of each downspout. Place intermediate hangers at 6'-0" o.c. maximum. Flash and seal joint between gutters and downspouts.

END OF SECTION – 07 62 00 SHEET METAL FLASHING AND TRIM

07 65 13 LAMINATED SHEET FLASHING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes manufactured through-wall flexible sheet flashing.

1.2 PERFORMANCE REQUIREMENTS

- A. **Manufacturer Qualifications:** Minimum five year manufacturing experience and capability for design, engineering and technical assistance for the selection, application, and installation of appropriate flashing systems for the project.
- B. **Installer Qualifications:** Experienced in the proper use and installation of flashing systems, including coordination with flashing of wall assembly components.
 - 1. Provide at least one person who shall be present at all times during execution of the work of this Section and who shall be thoroughly trained and experienced in the materials and methods required and who shall direct the entire flashing installation. Provide the Architect with the name of responsible person and his job title.

1.3 SUBMITTALS

- A. **Product data:** Manufacturer's product data for each type of flashing and associated accessories. to be installed, with application recommendations and installation instructions for all project conditions.
- B. Provide a schedule or descriptive list of locations where the Contractor intends to use each type of product.
- C. **Samples:** provide two physical samples of each type of flashing required.

PART 2 - PRODUCTS

2.1 LAMINATED SHEET FLASHING

- A. **Copper Core Flashing:** Single sheet of copper with polymer fabric laminated/bonded to both copper faces with non-asphalt adhesive.
 - 1. Copper Weight: 5 oz.
 - 2. Copper meets ASTM B370.
 - 3. Fire resistant: ASTM E84 Class B material.
 - 4. UV Exposure up to 90 days with no deterioration.
 - 5. Provide factory-made preformed corners and end dams of same material.
 - 6. **Product:** Subject to requirements, provide one of the following:

- a. Multi-Flash 500 by York Flashings
 - b. Wall Guardian Copper TWF by STS Coatings, Inc.
 - c. Copper Seal Flashing by Wire-Bond
 - d. Copper Fabric NA Composite Flashing by Hohmann & Barnard, Inc.
 - e. Or an approved equal.
- B. Self-adhering sheet flashing membrane: Cross linked polyethylene sheet laminated to a rubber-asphalt membrane.
1. Thickness: 40 mil.
 2. Tensile Strength per ASTM D-412 : 800 psi. min.
 3. Elongation per ASTM D-412 : 350% min.
 4. Puncture Resistance per ASTM E-154 : 40 lbs. min.
 5. Available in rolls of various widths from 12" up to 36".
 6. Product: Subject to requirements, provide one of the following:
 - a. Perm-A-Barrier Wall membrane by GCP Applied Technologies
 - b. Air-Shield Thru-Wall Flashing by W.R. Meadows
 - c. CCW-705-TWF by Carlisle Coatings & Waterproofing
 - d. Aqua Flash 500 by Wirebond
 - e. Or an approved equal.
- C. Accessories: Provide all other materials not specifically described but required or recommended for a complete and proper flashing installation, subject to approval by the Architect, including, but not limited to:
1. Primers, Adhesives Mastics, and Sealants as recommended by the flashing manufacturer.
 2. Drip Edge: Stainless steel sheet formed drip edge exposed to exterior at bottom edge of thru-wall flashing horizontal lap.
 3. Termination Bar: Stainless steel termination bar fastened to substrate to secure top horizontal edge of flashing membrane above lintel openings and at wall base thru-flashings. Encapsulate bar and fasteners in sealant.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Examine substrates and conditions, with Installer present, to verify actual locations, dimensions and other conditions affecting performance of the Work. Verify compliance with requirements for installation tolerances of substrates, size of allowable gaps, and slopes for drainage.
- B. Surface Preparation: Substrate must be smooth, clean, dry and free of voids, spalled areas, loose substrate, loose nails, other sharp protrusions or other matter that will hinder the adhesion or regularity of the flashing membrane installation.
- C. Coordinate with other exterior work, including weather barrier systems and related opening flashing accessories.

3.2 INSTALLATION

- A. Installation, General: Install where indicated or required in accord with flashing manufacturer's written instructions.
1. Prime walls and substrates when recommended by flashing manufacturer, using approved products.
 2. Seal joints as shown and as required for watertight construction. Apply mastic and sealants over joints, penetrations, and terminations as recommended.
 3. Fold flashing ends at end of openings or horizontal flashing terminations to form end dams, outside corners, and inside corners per flashing manufacturer's instructions; or install with factory-preformed pan, corner, and end dam flashing units.
- B. Masonry Thru-Wall Flashing:
1. Top edge of flashing may be embedded in a horizontal masonry mortar joint instead of mechanically fastened with a termination bar. Lay horizontal flashing in slurry of fresh mortar and top with fresh full bed of mortar to receive masonry units. At vertical surfaces, spot flashing with mastic to hold in place until masonry has set.
 2. Remove mortar or other obstructions from weep holes at flashing lower edge.
 3. Extend flashing 1/4-inch beyond outside face of wall, extend through veneer and airspace, and turn up 8 inches minimum vertically onto wall and bed into mortar joints of masonry backup.
 4. Carry flashing through wall and leave lower edge exposed for inspection.
 5. After inspection, flashing without drip edges may be cut flush with surface of masonry.
- C. Flashing in Frame Construction: Install over solid backing, both vertically and horizontally. Secure in place with embedded in layer of mastic or approved sealant; avoid puncturing installed flashing with nails or other fasteners.
1. Or use a non-corrosive termination bar and fasten it to the backer wall at the top edge of the flashing and seal the top edge with sealant.
 2. At steel lintels, height required to extend above lintel steel at least 2".
- D. Protect flashing until work is complete. Do not allow wind, water, installation of other materials, or other trades to displace flashing.
1. Clean weep holes and exposed edges.

END OF SECTION – 07 65 13 LAMINATED SHEET FLASHING

07 72 00 ROOF ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes:

1. Roof curbs.
2. Equipment supports.
3. Roof hatches.
4. Roof walkways.
5. Preformed flashings.

B. Related Sections include:

1. Division 07 Sections for roofing materials, including metal roof panels and TPO membrane roofing systems.
2. Division 07 Sections for Sheet Metal Flashing and Trim and Flexible Flashing for shop- and field-fabricated metal flashing and counterflashing, roof expansion-joint covers, and miscellaneous sheet metal trim and flashing accessories.
3. Division 13 Sections for Pre-Engineered Metal Buildings and steel building roof framing.

1.2 SUBMITTALS

A. Product Data: For each type of roof accessory indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: Show fabrication and installation details for roof accessories. Show layouts of roof accessories including plans and elevations. Indicate dimensions, weights, loadings, required clearances, method of field assembly, and components. Include plans, elevations, sections, details, and attachments to other work.

C. Coordination Drawings: Roof plans, drawn to scale, and coordinating penetrations and roof-mounted items. Show the following:

1. Show layouts of roof hatches and accessories, including dimensions of hatch, dimensions of clear openings, dimensions of rough openings, and dimensions to other nearby features. Show plans, elevations, sections, details, and attachments to other work.
2. Indicate weights, loadings, required clearances, method of field assembly, and components.
3. Method of attaching roof accessories to roof or building structure.
4. Details at other roof-mounted items including mechanical and electrical equipment, ductwork, piping, and conduit.

1.3 QUALITY ASSURANCE

- A. Coordinate layout and installation of roof accessories with roofing membrane, base flashing and interfacing and adjoining construction to provide a leakproof, weathertight, secure, and noncorrosive installation.
- B. Field Measurements: Verify required openings for each type of roof accessory by field measurements before fabrication and indicate measurements on Shop Drawings.

1.4 WARRANTY

- A. Manufacturer's Warranty for Roof Hatches: Manufacturer's standard warranty that materials shall be free of defects in material and workmanship. Should a part fail to function in normal use within this period, manufacturer shall furnish a new part at no charge.
 - 1. Warranty Period: Five (5) Years from the date of Substantial Completion.
- B. Special Warranty on Pre-Painted or Factory-Applied Finishes: Manufacturer agrees to repair finish or replace roof accessories that show evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 ROOF HATCH

- A. Description: Insulated roof hatch and insulated curb frame with integral deck mounting flange and lid frame counterflashing. Fabricate with welded and sealed corner joints. Provide continuous weathertight perimeter gasketing and equip with corrosion-resistant, hot-dip galvanized, or stainless steel hardware.
 - 1. Material: Aluminum, 11 gauge, mill finish.
 - 2. Size: minimum 36"x36", or as indicated on drawings.
 - 3. Thermally-broken, double-wall curb.
 - 4. Insulation: 3 inch polyiso in curb and cover, R-20.3.
 - 5. Include aluminum curb liner with anchor flange; verify custom height required.
 - 6. Hold Open Arm: Zinc plated steel automatic hold open arm locks cover in open position
 - 7. Latch: interior and exterior turn handles, with interior and exterior padlock hasps.
 - 8. Cover shall automatically lock in the open position with a rigid hold open arm.
 - 9. Products:
 - a. Type E-50TB by the Bilco Company.
 - b. PH-A by Precision Ladders
 - c. BRHT series by Babcock-Davis
 - d. RHTBA-4 by Maxam Metal Products
 - e. Or approved equal.
- B. Provide all other materials, not specifically described but required for a complete and proper installation of roof hatch system, subject to approval by the Architect.

2.2 ROOF CURBS AND EQUIPMENT SUPPORTS

- A. Roof Curbs: Provide metal roof curbs, internally reinforced and capable of supporting superimposed live and dead loads, including equipment loads and other construction to be supported on roof curbs. Fabricate with welded or sealed mechanical corner joints, with integral metal cant and integral formed mounting flange at perimeter bottom. Coordinate dimensions with rough-in information or Shop Drawings of equipment to be supported.
1. Factory install wood nailers at tops of curbs.
 2. On ribbed or fluted metal roofs, form flange at perimeter bottom to conform to roof profile.
 3. Curb height may be determined by adding thickness of roof insulation and minimum base flashing height recommended by roofing membrane manufacturer. Fabricate units to minimum height of 12 inches, unless otherwise indicated.
 4. Sloping Roofs: Where slope of roof deck exceeds 1:48, fabricate curb units with water diverter or cricket and with height tapered to match slope to level tops of units.
- B. Manufacturers: Subject to compliance with requirements, provide one of the following:
1. Thybar Corp.
 2. TECO Metal Products.
 3. Roof Products Inc. (RPI)
 4. Or approved equal.

2.3 PREFORMED FLASHING SLEEVES

- A. Exhaust Vent Flashing: Double-walled aluminum flashing sleeve or boot, insulation filled, with integral deck flange, 12 inches high, with removable metal hood and slotted metal collar.
- B. Vent Stack Flashing: Aluminum flashing sleeve, uninsulated, with integral deck flange.
- C. Pipe flashing units shall accommodate pipes made of steel, cast iron, PVC and sheet metal.
1. Pipe flashings may occur in one of three sizes:
 - a. #3 size for 1/4" to 4" outside pipe diameter.
 - b. #5 size for 4" to 7" outside pipe diameter.
 - c. #8 size for 7" to 13" outside pipe diameter.

2.4 MISCELLANEOUS MATERIALS

- A. Shop Primer: Manufacturer's or fabricator's standard, fast-curing, lead- and chromate-free, universal primer; selected for resistance to normal atmospheric corrosion, for compatibility with substrate and field-applied finish paint system indicated, and for capability to provide a sound foundation for field-applied topcoats despite prolonged exposure.
- B. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.
- C. Fasteners: Same metal as metals being fastened, or nonmagnetic stainless steel or other noncorrosive metal as recommended by roof accessory manufacturer. Match finish of exposed fasteners with finish of material being fastened. Provide nonremovable fastener heads to exterior exposed fasteners.

- D. Gaskets: Manufacturer's standard tubular or fingered design of neoprene, EPDM, or PVC; or flat design of foam rubber, sponge neoprene, or cork.
- E. Elastomeric Sealant: ASTM C-920 sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- F. Butyl Sealant: ASTM C-1311, single-component, solvent-release butyl rubber sealant, polyisobutylene plasticized, and heavy bodied for hooked-type expansion joints with limited movement.
- G. Roofing Cement: ASTM D-4586, nonasbestos, fibrated asphalt cement designed for trowel application or other adhesive compatible with roofing system.
- H. Pre-formed, closed cell, polyethylene closure strips matching the profile of the metal roof panels shall be installed along the eave and the other locations to provide weathertightness.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Installation, General: Install roof accessories according to manufacturer's written instructions. Install roof accessories to fit substrates and to result in watertight performance.
- B. Anchor roof accessories securely in place and capable of resisting forces indicated on structural drawings. Use fasteners, separators, sealants, and other miscellaneous items as required for completing roof accessory installation. Install roof accessories to resist exposure to weather without failing, rattling, leaking, and fastener disengagement.
- C. Check roof hatch for proper operation. Adjust operating mechanism as required. Clean and lubricate joints and hardware.
- D. Touch Up Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A-780.

END OF SECTION – 07 72 00 ROOF ACCESSORIES

07 84 13 PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes through-penetration firestop systems for penetrations through fire-resistance-rated constructions, including both empty openings and openings containing penetrating items.

1.2 REFERENCE STANDARDS

- A. ASTM E-814 - Standard Test Method for Fire Tests of Through-Penetration Fire Stops
- B. ASTM E-1966 - Standard Test Method for Fire Resistive Joint Systems
- C. ASTM E-2307 - Standard Test Method for Determining Fire Resistance of Perimeter Fire Barriers Using Intermediate-Scale, Multi-story Test Apparatus
- D. ASTM E-2837 - Standard Test Method for Determining Fire Resistance of Continuity Head-of-Wall Joint Systems Installed Between Rated Wall Assemblies and Nonrated Horizontal Assemblies
- E. UL 2079 - Standard for Tests for Fire Resistance of Building Joint Systems; Underwriters Laboratories Inc.
- F. UL (FRD) - Fire Resistance Directory; Underwriters Laboratories Inc.

1.3 PERFORMANCE REQUIREMENTS

- A. General: For penetrations through fire-resistance-rated constructions, including both empty openings and openings containing penetrating items, provide through-penetration firestop systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated.
 - 1. Fire-resistance-rated walls including fire partitions and smoke barriers.
 - 2. Fire-resistance-rated horizontal assemblies including floor/ceiling assemblies and ceiling membranes of roof/ceiling assemblies.
- B. Rated Systems: Provide through-penetration firestop systems with the following ratings determined per ASTM E-814 or UL 1479:
 - 1. F-Rated Systems: Provide firestop systems with F-ratings indicated, but not less than that equaling or exceeding fire-resistance rating of constructions penetrated.
 - 2. T-Rated Firestop Systems: Provide firestop systems with T ratings, in addition to F ratings, as determined per ASTM E-814, where indicated and where systems protect

penetrating items exposed to contact with adjacent materials in occupiable floor areas. T-rated assemblies are required where the following conditions exist:

- a. Where firestop systems protect penetrations located outside of wall cavities.
- b. Where firestop systems protect penetrations located outside fire-resistive shaft enclosures.
- c. Where firestop systems protect penetrations located in construction containing doors required to have a temperature-rise rating.
- d. Where firestop systems protect penetrating items larger than a 4-inch-diameter nominal pipe or 16 sq. in. in overall cross-sectional area.

3. Fire-Resistive Joint Sealants: Provide joint sealants with fire-resistance ratings indicated, as determined per ASTM E-119, but not less than that equaling or exceeding the fire-resistance rating of the construction in which the joint occurs.

- C. For firestop system materials exposed to view, traffic, moisture, and physical damage, provide products that, after curing, do not deteriorate when exposed to these conditions both during and after construction.

1. For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration firestop systems.
2. For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of insulation.

- D. For firestop systems exposed to view, provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E-84.

- E. For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of insulation.

- F. Perimeter Fire Containment Firestopping: Use any system that has been tested according to ASTM E-2307 to have fire resistance F Rating equal to required fire rating of the floor assembly.

- G. Head-of-Wall Firestopping at Joints Between Non-Rated Floor and Fire-Rated Wall: Use any system that has been tested according to ASTM E-2837 to have fire resistance F Rating equal to required fire rating of floor or wall, whichever is greater.

- H. Floor-to-Floor, Wall-to-Wall, and Wall-to-Floor Joints, Except Perimeter, Where Both Are Fire-Rated: Use any system that has been tested according to ASTM E-1966 or UL 2079 to have fire resistance F Rating equal to required fire rating of the assembly in which the joint occurs.

- I. Where 2 hour and 3 hour construction is indicated, a design system meeting that rating is also acceptable for use in applications of that rating and less.

1.4 SUBMITTALS

- A. Shop drawings showing each condition requiring penetration seals in dictating proposed UL systems materials, anchorage, methods of installation, and actual adjacent construction.

- B. Copy of UL illustration of each proposed system indicating manufacturer approved modifications.
- C. Manufacturer's data: Specifications, recommendations, installation instructions, and maintenance data for each type of material required. Include letter indicating that each material complies with the requirements and is recommended for the applications shown.

1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain firestop systems, for each kind of penetration and construction condition indicated, through one source from a single manufacturer.
- B. Applicator qualifications: minimum two years experience installing UL Classified firestopping materials and assemblies.
- C. Engineering Judgements: For those firestop applications that exist for which no UL tested system is available through a manufacturer, an engineering judgment derived from similar UL system designs or other tests shall be submitted to local authorities having jurisdiction for their review and approval prior to installation. Engineering judgment drawings must follow requirements set forth by the International Firestop Council.

1.6 COORDINATION

- A. Coordinate construction of openings and penetrating items to ensure that firestop systems are installed according to specified requirements.
- B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate firestop systems.
- C. Do not cover up firestop system installations that will become concealed behind other construction until each installation has been examined by building inspector, if required by authorities having jurisdiction.

PART 2 - PRODUCTS

2.1 FIRESTOPPING, GENERAL

- A. Compatibility: Provide firestop systems that are compatible with one another; with the substrates forming openings; and with the items, if any, penetrating firestop systems, under conditions of service and application, as demonstrated by firestop system manufacturer based on testing and field experience.
 - 1. Accessories: Provide components for each firestop system that are needed to install fill materials and to comply with Part 1 "Performance Requirements" Article. Use only components specified by firestop system manufacturer and approved by qualified testing and inspecting agency for firestop systems indicated.

2.2 FILL MATERIALS

- A. General: Provide firestop systems containing the types of fill materials required by the assembly. Fill materials are those referred to in directories of referenced testing and inspecting agencies as "fill," "void," or "cavity" materials.
1. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.
 2. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced elastomeric sheet bonded to galvanized steel sheet.
 3. Intumescent Putties: Nonhardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.
 4. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.
 5. Sealants: Pourable, self-leveling, or non-sag, of the type required for the firestop system.

2.3 PRODUCTS

- A. Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
1. Hilti FS-ONE Intumescent Firestop Sealant
 2. Hilti CP 653 Speed Sleeve
 3. Hilti CP 606 Flexible Firestop Sealant
 4. Hilti CD 601S Elastomeric Firestop Sealant
 5. Hilti CP 618 Firestop Putty Stick
 6. Hilti CP 643N/644 Firestop Collar
 7. Hilti FS 657 Fire Block
 8. Hilti CP 680-P/M Cast-In Device
 9. Hilti CP 604 Self-Leveling Firestop Sealant
 10. Hilti CP 658 Firestop Plug
 11. Hilti CP 637 Firestop Mortar
 12. Hilti CFS-SP WB Firestop Joint Spray
 13. Or approved equals.
- B. Application types as shown on drawings may include, but are not limited to:
1. Metal pipe or conduit through round opening.
 2. Insulated metal pipe through round opening.
 3. Metal pipes or conduits through large opening.
 4. Busway through rectangular opening.
 5. Blank opening.
 6. Non-metallic (plastic) pipe or conduit through opening.
 7. Metal pipe or conduit through gypsum board wall.
 8. Non-metallic (plastic) pipe or conduit through gypsum board wall.
 9. Cables through gypsum board wall.
 10. Insulated metal pipe through gypsum board wall.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Surface Cleaning: Clean out openings immediately before installing firestop systems to comply with firestop system manufacturer's written instructions and with the following requirements:
 - 1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of firestop systems.
 - 2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with firestop systems. Remove loose particles remaining from cleaning operation.
 - 3. Remove laitance and form-release agents from concrete.
- B. Priming: Prime substrates where recommended in writing by firestop system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

3.2 THROUGH-PENETRATION FIRESTOP SYSTEM INSTALLATION

- A. General: Install through-penetration firestop systems to comply with Part 1 "Performance Requirements" Article and with firestop system manufacturer's written installation instructions and published drawings for products and applications indicated.
- B. Install forming/damming/backing materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
 - 1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of firestop systems.
 - 2. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.3 IDENTIFICATION

- A. Identify firestop systems with preprinted metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of edge of the firestop systems so that labels will be visible to anyone seeking to remove penetrating items or firestop systems. Use mechanical fasteners for metal labels. For plastic labels, use self-adhering type with adhesives capable of permanently bonding labels to surfaces on which labels are placed and, in combination with label material, will result in partial destruction of label if removal is attempted. Include the following information on labels:
 - 1. The words "Warning - Firestop System - Do Not Disturb. Notify Building Management of Any Damage."
 - 2. Contractor's name, address, and phone number.
 - 3. Firestop system designation of applicable testing and inspecting agency.

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4. Date of installation.
5. Firestop system manufacturer's name.
6. Installer's name.

END OF SECTION – 07 84 13 PENETRATION FIRESTOPPING

07 92 00 JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes interior and exterior joint sealants.

1.2 SUBMITTALS

- A. Product data: Manufacturer's product data with application recommendations and installation instructions for each joint sealant to be used.
 - 1. Product data shall include manufacturer's laboratory test data with result information including, but not limited to: dynamic movement capability, tensile strength, elongation, water immersion, and adhesion.
 - 2. Sealants shall be tested for compliance with requirements in ASTM C920. Include test results for hardness, stain resistance, adhesion and cohesion under cyclic movement, low-temperature flexibility, modulus of elasticity, effects of heat aging, and effects of accelerated weathering.
- B. Joint Sealant Schedule: provide a list of all joint sealants to be applied on the project, including the intended application, locations, manufacturer and product name, and color.
 - 1. Include a statement from the manufacturer of each product that the proposed use of the product for the conditions intended is proper.
- C. Samples for colored sealant: Samples consisting of strips of actual cured sealants showing the colors available for each product exposed to view.

1.3 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized Installer who is approved or trained for installation of sealants required for this Project.
- B. Source Limitations: For colored or special-purpose joint sealants, obtain each type of joint sealant through one source from a single manufacturer.

1.4 PROJECT CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
 - 1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
 - 2. When joint substrates are wet.
 - 3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.

4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

PART 2 - PRODUCTS

2.1 SEALANTS, GENERAL

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer, based on testing and field experience.
- B. Typical joint width shall be 3/8" unless otherwise advised by the joint manufacturer for the joint type involved, or indicated differently on the Drawings.

2.2 JOINT SEALANTS

- A. Sealant No. 1 - Expansion Joints, Control Joints, And Perimeter Of Door And Window Frames: Two-component polyurethane.
 1. ASTM C-920, Type M, Grade NS, Class 25/50, use NT, MA, A, G, and O.
 2. Products:
 - a. Dynatrol II by Pecora
 - b. MasterSeal NP2 by Sika
 - c. Or an approved equal.
 3. In all cases at aluminum storefront, curtain wall and windows, ensure and verify that sealant is compatible with aluminum finish.
 - a. If not, notify the Architect immediately in order that a new product may be selected.
 - b. Submit the aluminum storefront, curtain wall and window manufacturer's recommendation as to the type of product that should be substituted.
- B. Sealant No. 2 - General Perimeter Sealing At Toilet Fixtures, Access Doors, Door Frames, Vanities, Etc. In Wet Areas: Mildew-Resistant, Single-Component, Nonsag, Neutral-Curing Silicone.
 1. ASTM C-920, Type S, Class 25/50, Grade NS, Use NT, G, A, and O.
 2. Products:
 - a. 898NST by Pecora
 - b. Tremsil 200 by Tremco
 - c. Or an approved equal.
- C. Sealant No. 3 - Setting Thresholds; Flashing; And General Interior Sealing Not Otherwise Delegated: Single-Component, Nonsag, Siliconized Acrylic Latex Caulk.
 1. ASTM C-834, Type OP, field paintable.
 2. Products:
 - a. AC-20+Silicone by Pecora
 - b. Tremflex 834 by Tremco

- c. Or an approved equal.

2.3 ACCESSORY MATERIALS

- A. Backer rod: Non-absorbent, compressible closed-cell polyethylene foam rope, designed to be wedged into a joint to control sealant depth.
 - 1. Diameter: Sized approx. 25% larger than the finished joint width.
 - 2. Compressible up to a maximum of 50% size.
 - 3. Surface includes a “skin” that prevents bonding between the sealant and the backer rod.
 - 4. Meeting ASTM C-1330 Type B or Type C.
 - 5. Does not out-gas when ruptured.
 - 6. Where joint depth does not permit use of joint backing, a release paper or bond breaker may be used.
- B. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- C. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions.
 - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
- B. Prime joint substrates where recommended by joint sealant manufacturer based on preconstruction joint sealant-substrate tests or prior experience. Apply primer to comply with joint sealant manufacturer's recommendations. Confine primers to areas of joint sealant bond; do not allow spillage or migration onto adjoining surfaces.

3.2 INSTALLATION

- A. Install sealant in strict accordance with the manufacturer's recommendations, taking care to produce beads of proper width and depth, to tool as recommended by the manufacturer, and to immediately remove all surplus sealant.

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- B. Carefully study the Drawings and furnish and install the proper sealant at each point where called for on the Drawings plus at all other points, whether specifically designated or not, where sealant is essential in maintaining the continued integrity of the intended water and airtight barrier.
- C. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products and substrates on which joints occur.
- D. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion.

END OF SECTION – 07 92 00 JOINT SEALANTS

08 11 13 HOLLOW METAL

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes interior and exterior steel doors and frames.

1.2 REFERENCES

- A. American National Standards Institute (ANSI) and the Steel Door Institute (SDI):
 1. ANSI/SDI A250.8 – Recommended Specifications for Standard Steel Doors and Frames.
 2. ANSI/SDI A250.4 – Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames, Frames Anchors and Hardware Reinforcing.
 3. ANSI/SDI A250.6 – Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames.
 4. ANSI/SDI A250.10 – Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames.
 5. ANSI/SDI A250.11 – Recommended Erection Instructions for Steel Frames.
 6. SDI-122 – Installation and Troubleshooting Guide for Standard Steel Doors and Frames.
- B. BHMA A156.115 – Hardware Preparation in Steel Doors and Frames.
- C. National Fire Protection Association (NFPA):
 1. NFPA 80 – Standard for Fire Doors and Other Opening Protectives
 2. NFPA 105 – Standard for the Installation of Smoke Door Assemblies.
 3. NFPA 252 – Standard Methods of Fire Tests of Door Assemblies
 4. NFPA 257 – Standard on Fire Test for Window and Glass Block Assemblies
- D. HMMA – Hollow Metal Manufacturers Association
- E. NAAMM – National Association of Architectural Metal Manufacturers
- F. Underwriters Laboratories (UL):
 1. UL 9 - Standard for Fire Tests of Window Assemblies
 2. UL 10B - Standard for Safety, Fire Tests of Door Assemblies
 3. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies
 4. UL 1784 - Standard for Air Leakage Tests of Door Assemblies and Other Opening Protectives.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, core descriptions, hardware reinforcements, profiles, anchors, fire-resistance rating, and finishes.
- B. Door hardware supplier is to furnish templates, template reference number and/or physical hardware to the steel door and frame supplier in order to prepare the doors and frames to receive the finish hardware items.
- C. Shop Drawings: Include the following:
 - 1. Elevations of each door, lite, and frame design.
 - 2. Details of doors, including vertical and horizontal edge details and metal thicknesses.
 - 3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
 - 4. Locations of reinforcement and preparations for hardware.
 - 5. Details of each different wall opening condition.
 - 6. Details of anchorages, joints, field splices, and connections.
 - 7. Details of accessories, moldings, removable stops, and glazing.
 - 8. Details of conduit and preparations for power, signal, and control systems.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain hollow metal work from single source from single manufacturer.
- B. Fire-Rated Door Assemblies: Assemblies shall comply with NFPA 80, and shall be listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing according to NFPA 252 and/or UL 10C.
 - 1. Temperature-Rise Limit: At all vertical exit enclosures and exit passageways, provide doors that meet the temperature-rise test criteria, and have a maximum transmitted temperature end point of not more than 450 degrees F above ambient after 30 minutes of fire-test exposure.
- C. Fire-Rated, Borrowed-Light Frame Assemblies: Assemblies shall comply with NFPA 80 and shall be listed and labeled for fire-protection ratings indicated, based on testing according to NFPA 257 and/or UL 9, including the hose-stream test. Label each individual glazed lite.
- D. Smoke-Control Door Assemblies: Assemblies shall be tested in accordance with UL 1784, shall comply with NFPA 105, and include smoke and draft control gasketing applied to frame and on meeting stiles of pair doors.
- E. Exterior Door Energy Ratings: Comply with minimum thermal ratings, based on testing per ASTM C-1363. Comply with maximum air infiltration ratings, based on testing per ASTM E-283.
- F. Pre-Installation Conference: Conduct conference with attendance by representatives of supplier, installer, and other affected trades to review proper methods and procedures for installing hollow metal doors and frames, and to verify coordination of electrical and conduit where electrified or access control hardware is indicated.

1.5 WARRANTY

- A. Manufacturer's standard form in which manufacturer agrees to repair or replace doors and frames that fail in materials or workmanship within one year from the date of Substantial Completion.

PART 2 - PRODUCTS

2.1 COMMERCIAL FLUSH HOLLOW METAL DOORS

- A. Manufacturers: Subject to compliance with requirements, provide steel doors and frames from an SDI Certified manufacturer:
 - 1. Ceco or Curries, Assa Abloy Group brands.
 - 2. Steelcraft or Republic, Allegion brands.
 - 3. Or an approved equal.

- B. General: Provide doors of designs indicated on drawings; fabricated with smooth surfaces, without visible joints or seams on exposed faces unless otherwise indicated. Comply with ANSI A250.8 for level and model and meeting SDI A250.4 for physical performance.
 - 1. Core Construction: Manufacturer's standard kraft-paper honeycomb, polystyrene, polyurethane, polyisocyanurate, mineral-board, or vertical steel-stiffener core, as required for use and location indicated.
 - a. Fire Door Core: As required to provide fire-protection and temperature-rise ratings indicated.
 - 2. Tolerances: Comply with SDI 117, "Manufacturing Tolerances for Standard Steel Doors and Frames."
 - 3. Thickness: 1-3/4 inches minimum.
 - 4. Full Flush: Each door face shall be formed from a single sheet of steel with no visible seams on the faces.
 - 5. Top and Bottom Edges: Reinforce tops and bottoms of doors with a continuous steel channel not less than 16 gauge, extending the full width of the door and welded to the face sheet. Doors with an inverted top channel to include a steel closure channel, screw attached, with the web of the channel flush with the face sheets of the door. Plastic or composite channel fillers are not acceptable.
 - 6. Hinge Reinforcement: Minimum 7 gauge (3/16") plate 1-1/4" x 9" or minimum 14 gauge continuous channel with pierced holes, drilled and tapped.

- C. Exterior Doors:
 - 1. Door Construction: Level 4 and Physical Performance Level A (Maximum Heavy Duty), Model 2 (Seamless Edge).
 - a. 14 ga. face sheets.
 - b. Core: Steel-stiffened with polystyrene foam.
 - c. Edge seams: Filled: edge seams are tack welded and filled smooth with structural adhesive.
 - 2. Exterior Door Steel: Galvanized (A60 galvanized coating).
 - 3. Thermal Performance: U-Factor of 0.50 maximum, R-Value of 2.0 minimum.

4. Acoustical Performance: Minimum STC 32.
5. Prepped for heavy-duty hardware.

D. Interior Doors:

1. Door Construction: Level 3 and Physical Performance Level A (Extra Heavy Duty), Model 1 (Full Flush).
 - a. 16 ga. face sheets.
 - b. Core: Standard honeycomb
 - c. Edge seams: Standard visible: single full-height seam with mechanically interlocked edges.
 - d. Prepped for both heavy-duty hardware or standard duty hardware.
2. Interior Door Steel: Cold-rolled at dry locations; galvanized at locations that may be subject to moisture or humidity.

E. Hardware Reinforcement: Fabricate according to ANSI A250.6 with reinforcing plates from same material as door face sheets.

F. Fire Door Cores: Mineral fiber or as required to provide fire-protection and temperature-rise ratings.

2.2 COMMERCIAL HOLLOW METAL FRAMES

A. General: Comply with ANSI A250.8 and with details indicated for type and profile.

1. Thickness: Minimum sheet steel thickness 2 gauge thicker than face sheets of doors, 14 ga. sheet steel minimum.

B. Exterior Frames: Tested for thermal performance in accordance with NFRC 102, and resistance to air infiltration in accordance with NFRC 400.

1. Provide thermally broken frame profiles available for use in both masonry and stud construction. Fabricate with a positive thermal break and integral weatherstripping.

C. Interior Frames:

1. Fabricate frames with mitered or coped corners.
2. Fabricate frames as full profile welded unless otherwise indicated.
3. Knocked-down, drywall slip-on frames are acceptable for in-place gypsum board partitions.
4. Minimum 16 gauge steel with welded joints dressed and ground smooth.
5. Provide rust-inhibitive primer, either air-drying or baking, suitable as base for specified finish paints.
6. Standard double-rabbeted frame style unless otherwise indicated.

D. Hardware Reinforcement: Fabricate according to SDI A250.6 with reinforcement plates and channels, welded.

E. Frame Face Width: 2" typical.

1. 4" at head of masonry openings where required.

- F. Fire rated frames: Fabricate frames in accordance with NFPA 80, listed and labeled by a qualified testing agency, for fire-protection ratings indicated.
 - 1. The UL physical label shall be affixed to all labeled units as evidence of compliance with the procedures of the labeling agency.

- G. Frame Anchors:
 - 1. Jamb Anchors:
 - a. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.
 - b. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick.
 - c. Compression Type for Drywall Slip-on Frames: Adjustable compression anchors.
 - d. Postinstalled Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch-diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.
 - 2. Floor Anchors: Formed from same material as frames, not less than 0.042 inch thick.
 - a. At Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.

2.3 STOPS AND MOLDINGS

- A. Moldings for Glazed Lites in Doors: Form corners of stops and moldings with butted or mitered hairline joints at fabricator's shop.
 - 1. Fixed Frame Moldings: Formed integral with hollow metal frames, a minimum of 5/8 inch high maximum unless otherwise indicated.
 - 2. Loose Stops for Glazed Lites in Frames: Minimum 0.034 inch (22 gauge) thick, fabricated from same material as frames in which they are installed.

- B. Preformed Metal Frames for Light Openings: Manufacturer's standard frame formed of 0.047 inch (18 gauge) thick, cold rolled steel sheet; with baked enamel or powder coated finish; and approved for use in doors of fire protection rating indicated. Match pre-finished door paint color where applicable.

2.4 FABRICATION

- A. Fabricate hollow metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.
 - 1. Tolerances shall comply with SDI-117 "Manufacturing Tolerances Standard Steel Doors and Frames."

- B. Advise the Architect prior to fabricating if any door or frame that is required to be fire-rated cannot qualify for appropriate labeling because of its design, hardware or for any other reason.
- C. Hollow Metal Frames:
1. Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
 2. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
 - a. Welded frames may be provided with two steel spreaders temporarily attached to the bottom of both jambs to serve as a brace during shipping and handling. Spreader bars are for bracing only and are not to be used to size the frame opening.
 3. Sidelight Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
 4. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated for removable stops; provide security screws at exterior locations.
 5. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
 6. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
 7. Jamb Anchors: Provide number and spacing of anchors as follows:
 - a. Masonry Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
 - 1) Two anchors per jamb up to 60 inches high.
 - 2) Three anchors per jamb from 60 to 90 inches high.
 - 3) Four anchors per jamb from 90 to 120 inches high.
 - b. Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
 - 1) Three anchors per jamb up to 60 inches high.
 - 2) Four anchors per jamb from 60 to 90 inches high.
 - 3) Five anchors per jamb from 90 to 96 inches high.
 - 4) Five anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.
 - 5) Two anchors per head for frames above 42 inches wide and mounted in metal-stud partitions.
 - c. Compression Type: Not less than two anchors in each jamb.
 - d. Postinstalled Expansion Type: Locate anchors not more than 6 inches from top and bottom of frame. Space anchors not more than 26 inches o.c.
 8. Door Silencers: Except on weather-stripped doors, drill stops to receive door silencers as follows. Keep holes clear during construction.
 - a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
 - b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.

- D. Fabricate concealed stiffeners, edge channels, and hardware reinforcement from either cold- or hot-rolled steel sheet.
- E. Hardware Preparation: Factory prepare hollow metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to the Door Hardware Schedule and templates furnished as specified in Division 08 Sections for Door Hardware.
 - 1. Locate hardware according to ANSI A250.8 or HMMA 861.
 - 2. Reinforce doors and frames to receive non-templated, mortised and surface-mounted door hardware.
 - 3. Comply with applicable requirements in ANSI A250.6 and DHI A115 Series specifications for preparation of hollow metal work for hardware.
 - 4. Coordinate locations of conduit and wiring boxes for electrical connections with Division 26 and 28 Sections.
 - 5. Continuous Hinge Reinforcement: Provide welded continuous 12 gauge strap where continuous hinges are indicated in hardware sets.
- F. Stops and Moldings: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints.
 - 1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow metal work.
 - 2. Multiple Glazed Lites: Provide fixed and removable stops and moldings so that each glazed lite is capable of being removed independently.
 - 3. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
 - 4. Provide loose stops and moldings on inside of hollow metal work.
 - 5. Coordinate rabbet width between fixed and removable stops with type of glazing and type of installation indicated.

2.5 STEEL FINISHES

- A. Prime Finish (typical unless otherwise noted): Doors and frames to be cleaned, and chemically treated to insure maximum finish paint adhesion. Surfaces of the door and frame exposed to view to receive a factory applied coat of rust inhibiting shop primer,
 - 1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.
 - 2. Field painting per Division 09 Sections.
- B. Factory-Applied Paint Finish (where specifically indicated on drawings): Manufacturer's standard, complying with SDI A250.3 for performance and acceptance criteria.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.
- C. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install hollow metal work plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.
 - 1. Metal-Stud Partitions: Solidly pack mineral-fiber insulation behind frames.
 - 2. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.
 - 3. Concrete Walls: Solidly fill space between frames and concrete with grout. Take precautions, including bracing frames, to ensure that frames are not deformed or damaged by grout forces.
 - 4. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
 - 5. In-Place Gypsum Board Partitions: Secure frames in place with postinstalled expansion anchors through floor anchors at each jamb. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
- B. Hollow Metal Doors:
 - 1. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
 - 2. Smoke-Control Doors: Install doors according to NFPA 105.

3.3 ADJUSTING AND CLEANING

- A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Remove and replace defective work, including hollow metal that is warped, bowed, or otherwise unacceptable.
- B. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer, zinc rich primer (at exterior and galvanized openings), and finish paint.
- C. Metallic-Coated Surfaces: Clean abraded areas and repair with galvanizing repair paint.

END OF SECTION – 08 11 13 HOLLOW METAL

08 14 00 WOOD DOORS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes Interior solid-core doors with wood-veneer faces.

1.2 REFERENCES

- A. WDMA – Window & Door Manufacturer’s Association
 - 1. ANSI/WDMA I.S. 1A - Interior Architectural Wood Flush Doors
- B. American National Standards Institute (ANSI):
 - 1. ANSI A208.1 - Standard for Particleboard
 - 2. ANSI A208.2 - Standard for MDF for Interior Applications
- C. American Society for Testing and Materials (ASTM International):
 - 1. ASTM D-5751 - Standard Specification for Adhesives Used for Laminate Joints in Nonstructural Lumber Products
 - 2. ASTM D-5572 - Standard Specification for Adhesives Used for Finger Joints in Nonstructural Lumber Products
- D. National Fire Protection Association (NFPA):
 - 1. NFPA 80 – Standard for Fire Doors and Other Opening Protectives
 - 2. NFPA 105 – Standard for the Installation of Smoke Door Assemblies.
 - 3. NFPA 252 – Standard Methods of Fire Tests of Door Assemblies
 - 4. NFPA 257 – Standard on Fire Test for Window and Glass Block Assemblies

1.3 SUBMITTALS

- A. Product Data: For each type of door indicated. Include details of core types and edge construction, and trim for openings, fire-resistance rating, and finishes.
- B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; location and extent of hardware blocking; and other pertinent data.
 - 1. Show elevations of each door and lite design.
 - 2. Indicate dimensions and locations of mortises and holes for hardware and factory cutouts.
 - 3. Indicate requirements for veneer matching.
 - 4. Indicate doors to be factory finished and finish requirements.
 - 5. Indicate fire-protection ratings for fire-rated doors
 - 6. Details of accessories, moldings, removable stops, and glazing.
 - 7. Details of conduit and preparations for power, signal, and control systems.

- C. Samples: Finishes applied to actual door face veneer, approximately 8 by 8 inch samples for each material and finish. For each wood species and transparent finish, provide set of three samples showing typical range of color and grain to be expected in the finished work.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain flush wood doors from single manufacturer.
- B. Quality Standard: In addition to requirements specified, comply with AWI's "Architectural Woodwork Quality Standards Illustrated," WDMA I.S.1A, "Architectural Wood Flush Doors," and WI's "Manual of Millwork."
- C. Fire-Rated Door Assemblies: Assemblies shall comply with NFPA 80, and shall be listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing according to NFPA 252 and/or UL 10C.
 - 1. Temperature-Rise Limit: At all vertical exit enclosures and exit passageways, provide doors that meet the temperature-rise test criteria, and have a maximum transmitted temperature end point of not more than 450 degrees F above ambient after 30 minutes of fire-test exposure.
- D. Fire-Rated, Borrowed-Light Frame Assemblies: Assemblies shall comply with NFPA 80 and shall be listed and labeled for fire-protection ratings indicated, based on testing according to NFPA 257 and/or UL 9, including the hose-stream test. Label each individual glazed lite.
- E. Smoke-Control Door Assemblies: Assemblies shall be tested in accordance with UL 1784, shall comply with NFPA 105, and include smoke and draft control gasketing applied to frame and on meeting stiles of pair doors.
- F. Pre-Installation Conference: Conduct conference with attendance by representatives of supplier, installer, and other affected trades to review proper methods and procedures for installing hollow metal doors and frames, and to verify coordination of electrical and conduit where electrified or access control hardware is indicated.

1.5 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install interior wood doors until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

1.6 WARRANTY

- A. Wood Door Warranty: Manufacturer's project-specific form in which manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Warping (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section.
 - b. Telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch span.

2. Warranty shall also include coverage of installation and finishing costs that may be required due to repair or replacement of defective doors.
- B. Warranty Period for Interior Doors: Life of installation.
- C. Warranty Period for Exterior and all Fire-Rated Doors: Five (5) Years.

PART 2 - PRODUCTS**2.1 DOOR CONSTRUCTION, GENERAL**

- A. Bonded Core Assembly: stiles, rails and blocking securely glued to core prior to application of plys. Non-bonded cores are not allowed.
- B. WDMA I.S.1A Performance Grade:
1. Standard Duty, typical unless otherwise indicated.
 - a. Core: Particleboard. ANSI A208.1, LD-2, 28 lbs/ft density min.
 - b. Construction: Five or seven plies. Stiles and rails are bonded to core, then entire unit abrasive planed before veneering.
- C. Fire-Protection-Rated Doors: Provide core specified or mineral core as needed to provide fire-protection rating indicated.
1. Edge Construction: Provide edge construction with intumescent seals when required, concealed by outer stile.
 2. Pairs: Provide fire-retardant stiles that are listed and labeled for applications indicated without formed-steel edges and astragals. Comply with specified requirements for exposed edges.
 3. Internal Blocking: Provide composite blocking approved for use in doors of fire-protection ratings indicated, as needed to maintain WDMA performance level, and eliminate through-bolting hardware.

2.2 MANUFACTURERS

- A. Subject to compliance with requirements, available manufacturers and products that may be incorporated into the Work include, but are not limited to, the following:
1. VT Industries, Inc.
 2. "Cendura" or "Aspiro" series by Forte Opening Solutions (formerly Masonite).
 3. Or an approved equal.

2.3 INTERIOR WOOD VENEERED-FACED DOORS

- A. Interior Solid-Core Doors with Transparent Finish:
1. Grade: AWI Custom, with Grade A faces.
 2. Species: Select Red Oak, or as selected by Architect.
 3. Cut: Plain sliced (flat sliced)

4. Match between Veneer Leaves: Book match.
5. Assembly of Veneer Leaves on Door Faces: Running match.
6. Pair and Set Match: Provide for doors hung in same opening.
7. Room Match: Provide door faces of compatible color and grain within each separate room or area of building.
8. Exposed Vertical and Top Edges: Same species as faces or a compatible species.
9. Thickness: 1-3/4"
10. Finish: Factory-applied transparent stain, color by manufacturer's standards.

2.4 LABELED DOORS

- A. Fire doors shall bear labels approved by Underwriters Laboratories, Inc. Any discrepancies between the Drawings and the procedures and limitations as set forth by the testing agencies shall be brought to the architects attention. Fire doors shall bear labels approved by Underwriters Laboratories, Inc. Notify Architect immediately of any discrepancies between the drawings and the procedures and limitations as set forth by the testing agencies.
- B. Provide each fire rated door with a label permanently attached to either the hinge stile or to the top rail, showing testing agency approval for classification scheduled.
- C. Fire-Rated Door Assembly: Conform to NFPA 80 and local codes and ordinances for fire-rated class as indicated.
- D. Factory Glazing: for view panels in rated flush wood doors, provide clear fire-rated safety glazing as allowable for door rating.
- E. Mineral-Core Doors: Noncombustible mineral product complying with requirements of referenced quality standard and testing and inspecting agency for fire-protection rating indicated.
 1. Blocking: Provide composite blocking with improved screw-holding capability approved for use in doors of fire-protection ratings indicated as needed to eliminate through-bolting hardware.

2.5 FABRICATION

- A. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.
 1. Comply with requirements in NFPA 80 for fire-rated doors.
- B. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, DHI A115-W series standards, and hardware templates.
 1. Coordinate with hardware mortises in metal frames to verify dimensions and alignment before factory machining.
 2. Metal Astragals: Factory machine astragals and formed-steel edges for hardware for pairs of fire-rated doors.
- C. Openings: Cut and trim openings through doors in factory.

1. Lite Openings: Trim openings with moldings of material to match door, straight profile.
2. Glazing: Factory install glazing in doors indicated to be factory finished. Comply with applicable requirements in Division 08 Section "Glazing."
3. Louvers: Sight-proof, flat slat, matching appearance and performance of door.

2.6 SHOP PRIMING

2.7 FINISHING

- A. General: Comply with referenced quality standard for factory finishing. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.
- B. Transparent Finish: Shop prime doors with stain or other required pretreatments, and first coat of stain or transparent finish. Seal all four edges, edges of cutouts, and mortises with first coat of finish.
- C. Finish doors at factory with final coats of transparent finish. Stain color to be selected by Architect from manufacturer's standard range.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Installation Instructions: Install doors to comply with manufacturer's written instructions and the referenced quality standard, and as indicated.
 1. Install fire-rated doors in corresponding fire-rated frames according to NFPA 80.
- B. Job-Fitted Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors. Machine doors for hardware. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.
 1. Clearances: Provide 1/8 inch at heads, jambs, and between pairs of doors. Provide 1/8 inch from bottom of door to top of decorative floor finish or covering unless otherwise indicated. Where threshold is shown or scheduled, provide 1/4 inch from bottom of door to top of threshold unless otherwise indicated.
 - a. Comply with NFPA 80 for fire-rated doors.
 2. Bevel non-fire-rated doors 1/8 inch in 2 inches at lock and hinge edges.
 3. Bevel fire-rated doors 1/8 inch in 2 inches at lock edge; trim stiles and rails only to extent permitted by labeling agency.
- C. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.
- D. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

3.2 ADJUSTING

- A. Operation: Rehang or replace doors that do not swing or operate freely.
- B. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION – 08 14 00 WOOD DOORS

08 33 13 COILING COUNTER SHUTTERS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes manually-operated fire-rated counter shutter door assemblies.

1.2 PERFORMANCE REQUIREMENTS

- A. Structural Performance for Exterior Counter Shutters: Exterior overhead coiling shutters shall withstand the wind loads, the effects of gravity loads, and loads and stresses applicable to the project location under conditions indicated according to SEI/ASCE7.
 - 1. Deflection Limits: Design overhead coiling doors to withstand design wind load without evidencing permanent deformation or disengagement of door components.
 - 2. Operability under Wind Load: Design overhead coiling shutters to remain operable under design wind load, acting inward and outward.
- B. Operation Cycles: Provide overhead coiling door components and operators capable of operating for not less than 20,000 cycles and 10 cycles per day. One operation cycle is complete when a door is opened from the closed position to the fully open position and returned to the closed position.

1.3 SUBMITTALS

- A. Product Data: For each type and size of overhead coiling door and accessory. Include the following:
 - 1. Construction details, material descriptions, dimensions of individual components, profiles for slats, and finishes.
 - 2. Rated capacities, operating characteristics, and furnished accessories.
 - 3. For fire-rated doors, description of automatic fire-release system including testing and resetting instructions.
- B. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - 2. Show locations of replaceable fusible links.
- C. Samples: Not required if providing the exact products and colors indicated on drawing finish schedules.
 - 1. If alternative products are proposed in lieu of basis-of-design products, provide samples of actual materials with color finished for Architect review and approval.

- D. Qualification Data: For qualified Installer.
- E. Maintenance Data: For overhead coiling counter shutters to include in maintenance manuals.
 - 1. Include lubrication requirements and frequency, and periodic adjustments required.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for both installation and maintenance of units required for this Project.
- B. Source Limitations: Obtain overhead coiling counter shutters from single source from single manufacturer.
 - 1. Obtain operators and controls from overhead coiling door manufacturer.
- C. Fire-Rated Counter Shutter Door Assemblies: Assemblies shall comply with NFPA 80, and shall be listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing according to NFPA 252 and/or UL 10C.
 - 1. Temperature-Rise Limit: Where counter shutters occur in vertical exit enclosures and in spaces designated as exit passageways, provide doors that meet the temperature-rise test criteria, and have a maximum transmitted temperature end point of not more than 450 degrees F above ambient after 30 minutes of fire-test exposure.
 - 2. Smoke Control: In corridors and smoke partitions, provide doors that are listed and labeled with the letter "S" on the fire-rating label by a qualified testing agency. Assemblies shall be tested in accordance with UL 1784, shall comply with NFPA 105, and include smoke and draft control gasketing.
- D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.5 WARRANTY

- A. Provide Manufacturer's standard form in which manufacturer agrees to repair or replace doors, parts, and accessories that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Two (2) Years from date of Substantial Completion

PART 2 - PRODUCTS

2.1 FIRE RATED COUNTER SHUTTER DOOR ASSEMBLY

- A. Subject to compliance with requirements, available manufacturers and products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Rolling Counter Fire Door by The Cookson Company, Inc.
 - 2. ERC10 Rolling Counter Fire Doors by CornellCookson, with SmokeShield
 - 3. FireCurtain Standard by Raynor Garage Doors
 - 4. 550 Series by Janus International Group

5. Or an approved equal
- B. Fire-Rated Counter Shutter: Overhead coiling counter shutter door formed with curtain of interlocking metal slats, labeled for use in fire-rated assemblies.
1. Provide UL labeled smoke protection. Comply with UL label for "Leakage Rated Assembly" or "S" label.
 2. Fire Rating as required by the rating of the wall assembly in which installed but not less than UL or ULC 1-1/2-Hour Class B Label.
 3. Factory welded head and jambs (Integral countertop or sill not required; countertop installed separately.)
- C. Door Curtain Slats: Interlocked flat-faced slats.
1. Slat Size: approx. 1-1/2 inches high by 1/2 inch thick.
 2. Door Curtain Material: Minimum 22 gauge galvanized steel flat slats.
 3. Finish: factory-coated baked-enamel or powder-coated finish, color as selected by Architect from manufacturer's full range.
- D. Mounting:
1. At framed construction: Slip-In from interior side, with trim provided to wrap the exterior side. Verify and coordinate total wall thickness with finishes.
 2. At masonry openings: Between jambs.
- E. Curtain Jamb Guides: Galvanized steel with exposed finish matching curtain slats. Provide continuous integral wear strips to prevent metal-to-metal contact and to minimize operational noise.
- F. Smoke Seals: Equip each fire-rated door with smoke-seal perimeter gaskets for smoke and draft control as required for door listing and labeling by a qualified testing agency.
- G. Hood: square shape, formed to fit the mounting brackets with reinforced top and bottom edges.
1. 24 gauge galvanized sheet steel to match slats.
- H. Manual Operation:
1. Push-up, for counter shutters up to 6 feet wide max.
 2. Gear-reduction hand crank wand, for shutter doors more than 6 feet wide.
- I. Locking Devices: Equip door with slide bolt for padlock locking on interior/room side.
- J. Push/Pull Handles: Equip each push-up-operated and/or emergency-operated door with lifting handles on each side of door, finished to match door.
- K. Automatic-Closing Devices for Fire-Rated Doors:
1. Electric Hardwired Automatic-Closing: Typical unless specifically approved otherwise by Architect.

- a. An automatic-closing device that is inoperative during normal door operations, designed to be activated by the building fire-detection and/or alarm system.
 - 1) Automatically closes counter shutter doors at fire alarm or detection device actuation.
 - 2) Operator Location: Manufacturer’s standard, within hood.
 - 3) Emergency Manual Operation: Push-up or chain.
- 2. At Manual Fire-Rated Doors: Only where specifically allowed by Architect.
 - a. Door closure is initiated by any one of three fusible links that melt at a pre-determined temperature.
 - 1) Emergency Manual Operation: Push-up or wand crank.

2.2 NON-RATED COUNTER SHUTTER DOOR ASSEMBLY

- A. Subject to compliance with requirements, available manufacturers and products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. ESC10 or ESC20 Rolling Counter Fire Doors by CornellCookson, LLC
 - 2. 700 Series by Janus International Group
 - 3. Or an approved equal.
- B. Manual Operation:
 - 1. Push-up, for counter shutters up to 6 feet wide max.
 - 2. Gear-reduction hand crank wand, for shutter doors more than 6 feet wide.
- C. Door Curtain Slats: Interlocked flat-faced slats.
 - 1. Slat Size: approx. 1-1/2 inches high by 1/2 inch thick.
 - 2. Door Curtain Material: Minimum 22 gauge galvanized steel flat slats.
 - 3. Finish: factory-coated baked-enamel or powder-coated finish, color as selected by Architect from manufacturer's full range.
- D. Locking Devices: Equip door with slide bolt for padlock locking on interior/room side.
- E. Push/Pull Handles: Equip each push-up-operated and/or emergency-operated door with lifting handles on each side of door, finished to match door.
- F. At exterior coiling shutters:
 - 1. Provide weather-stripping gaskets fitted to entire perimeter of door for a weathertight installation.
 - 2. Delegated design for manufacturer to configure exterior counter shutters to withstand envelope loading requirements indicated on structural drawings, or 20 psf, minimum.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install overhead coiling doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.
- B. Accessibility: Install overhead coiling door manual controls along accessible routes in compliance with regulatory requirements for accessibility.
- C. Fire-Rated Doors: Install according to NFPA 80.
- D. Smoke-Control Doors: Install according to NFPA 80 and NFPA 105.
- E. Adjust hardware and moving parts to function smoothly so that doors operate easily, free of warp, twist, or distortion. Lubricate bearings and sliding parts as recommended by manufacturer.

3.2 STARTUP SERVICE

- A. Engage a factory-authorized service representative to perform startup service.
 - 1. Perform installation and startup checks according to manufacturer's written instructions.
 - 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 - 3. Test door closing when activated by detector or alarm-connected fire-release system. Reset door-closing mechanism after successful test.
- B. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain counter shutter doors.

END OF SECTION – 08 33 13 COILING COUNTER SHUTTERS

08 33 23 OVERHEAD COILING DOORS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes overhead rolling sheet-type service doors.

1.2 PERFORMANCE REQUIREMENTS

- A. Structural Performance, Exterior Doors: Exterior overhead coiling doors shall withstand wind loads, the effects of gravity loads, and dynamic loads and stresses applicable to the project location and under the conditions indicated according to SEI/ASCE7.
 - 1. Minimum Operability under Wind Load: Design overhead coiling doors to remain operable under design wind load, acting inward and outward, under a uniform pressure (velocity pressure) of 20 lbf/sq. ft. minimum.
 - 2. For projects located in high-wind or hurricane regions, follow local requirements for wind loading resistance; verify with Architect.
 - 3. Deflection Limits: Design overhead coiling doors to withstand design wind load without evidencing permanent deformation or disengagement of door components.

1.3 SUBMITTALS

- A. Product Data: For each type and size of overhead coiling door and accessory. Include the following:
 - 1. Construction details, material descriptions, dimensions of individual components, profiles for slats, and finishes.
- B. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
- C. Samples: Not required if providing the exact products and colors indicated on drawing finish schedules.
 - 1. If alternative products are proposed in lieu of basis-of-design products, provide samples of actual materials with color finished for Architect review and approval.
- D. Maintenance Data: For overhead coiling doors to include in maintenance manuals.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for both installation and maintenance of units required for this Project.
- B. Source Limitations: Obtain overhead coiling doors from single source from single manufacturer for consistency throughout project.

1.5 WARRANTY

- A. Manufacturer's standard form in which manufacturer agrees to repair or replace components of overhead doors 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. Faulty operation of hardware.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use; rust through.
 - d. Delamination of exterior or interior color coating materials.
 - e. Failure of electrical operator and its component parts.
 - 2. Warranty Period on door panels, rollers, hinges, and tracks: One (1) year from date of Substantial Completion.
 - 3. Warranty Period on color coating finish: Three (3) years.

PART 2 - PRODUCTS

2.1 COILING ROLL-UP DOOR ASSEMBLY

- A. Service Door: Overhead coiling door formed with curtain of corrugated sheet steel sections.
 - 1. Basis of Design: Janus Commercial Rolling Doors, including brands DBCI and Asta, manufactured by Janus International Group LLC.
 - 2. Do not substitute products without Architect's full review and approval. Possible products that may be considered may include Rolling Steel Doors by Wayne Dalton or Overhead Door Corporation, or an approved equal
- B. Door Curtain Material: Galvanized steel, 26 gauge sheet minimum thickness. Approximately 20-inch-tall sections, the full width of the door, interlocked and permanently seamed together at horizontal joints to form a continuous curtain.
- C. Curtain Jamb Guides: Galvanized steel not less than 16 gauge thick (or thicker as required for the size of the door opening) with exposed finish matching curtain slats.
- D. Hood: Not required.
- E. Draft Stops and Weatherseals: provide header seal in addition to top and side draft-stopping.
 - 1. Bottom bar with full width bulb astragal seal.
- F. Head Plates: Heavy-duty steel plates for lateral jamb support mounting door to walls.

- G. Door Finish: Manufacturer’s standard exterior-grade, corrosion-resistant, baked-enamel or powder-coated finish. Color as selected by Architect from manufacturer's full range.
- H. Door Operation: Manual chain hoist, also with manual push-up; provide lift handles on bottom bar.
- I. Locking Devices: Slide bolt on both sides of bottom bar, with padlock loops.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install overhead coiling doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.
- B. Install overhead coiling doors, hoods, and operators at the mounting locations indicated for each door, as verified with Architect and Owner.

3.2 STARTUP SERVICE

- A. Engage a factory-authorized service representative to perform startup service.
 - 1. Perform installation and startup checks according to manufacturer's written instructions.
 - 2. Adjust hardware and moving parts to function smoothly so that doors operate easily, free of warp, twist, or distortion.
 - 3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- B. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain overhead coiling doors.

END OF SECTION – 08 33 23 OVERHEAD COILING DOORS

08 36 13 OVERHEAD SECTIONAL DOORS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes overhead sectional commercial garage-type doors.

1.2 PERFORMANCE REQUIREMENTS

- A. Structural Performance, Exterior overhead sectional doors shall withstand wind loads, the effects of gravity loads, and dynamic loads and stresses applicable to the project location and under the conditions indicated according to SEI/ASCE7.
 - 1. Minimum Operability under Wind Load: Design overhead coiling doors to remain operable under design wind load, acting inward and outward, under a uniform pressure (velocity pressure) of 20 lbf/sq. ft. minimum.
 - 2. For projects located in high-wind or hurricane regions, follow local requirements for wind loading resistance; verify with Architect.
- B. Electrical Requirements: see electrical drawings for wiring characteristics, typically 460 volts, three phase, 60 Hz; verify with project design.

1.3 SUBMITTALS

- A. Product Data: For each type and size of overhead sectional door and accessory. Include the following:
 - 1. Construction details, material descriptions, dimensions of individual components, profiles and textures for panels, and finishes.
 - 2. Rated capacities, operating characteristics, electrical characteristics, and furnished accessories.
 - 3. Motors: For electrically-operated doors, provide nameplate data and ratings, characteristics, and mounting arrangements.
- B. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - 2. Wiring Diagrams: For power, signal, and control wiring for electric operators.
- C. Samples: Manufacturer's finish charts showing full range of colors and textures available for units with factory-applied panel finishes.
 - 1. Include similar samples of required or optional accessories involving color selection.

- D. Qualification Data: For qualified Installer.
- E. Maintenance Data: For overhead sectional doors to include in maintenance manuals.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for both installation and maintenance of units required for this Project.
- B. Source Limitations: Obtain overhead sectional doors from single source from single manufacturer for consistency throughout project.
 - 1. Obtain operators and controls from same overhead door manufacturer.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.5 WARRANTY

- A. Manufacturer's standard form in which manufacturer agrees to repair or replace components of overhead doors 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. Faulty operation of hardware.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use; rust through.
 - d. Delamination of exterior or interior color coating materials.
 - e. Failure of electrical operator and its component parts.
 - 2. Warranty Period on door panels, rollers, hinges, and tracks: One (1) year from date of Substantial Completion.
 - 3. Warranty Period on electrical components and motor assembly: Two (2) years.
 - 4. Warranty Period on color coating finish: Three (3) years.

PART 2 - PRODUCTS

2.1 INSULATED SECTIONAL STEEL DOORS

- A. Construct door sections including face sheets and frames from zinc-coated (galvanized), cold-rolled, commercial steel (CS) sheet, complying with ASTM A-653.
 - 1. Minimum Base-Metal Thickness for Section Faces: 20 gauge steel.
 - 2. Center and End Stiles: 16 gauge steel minimum, or as required for wind performance.
- B. Thermally Insulated Doors: Continuous thermal-break construction, separating faces of door.
 - 1. Insulate inner core of steel sections with door manufacturer's standard polystyrene or polyurethane board insulation, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, according to ASTM E-84; or with glass-fiber-board

insulation. Enclose insulation completely within steel sections that incorporate inside facing material, with no exposed insulation material evident.

- a. U Value: 0.10 min.
- b. R Value: 17.4 min.

- C. Manufacturers: Subject to compliance with requirements, manufacturers and products that may be incorporated into the Work include the following:
1. Thermospan Model 200-20 by Wayne Dalton (Basis of Design)
 2. Thermacore Model 596 by Overhead Door Corporation
 3. Energy Series with Intellicore Model 3722 by Clopay Corporation
 4. ThermaSeal TM200C by Raynor Garage Doors
 5. Or an approved equal
- D. Fabricate door panels from a single sheet to provide sections not more than 24 inches high and nominally 2 inches deep. Roll horizontal meeting edges to a continuous, interlocking, keyed, rabbeted, shiplap, or tongue-in-groove weathertight seal, with a reinforcing flange return.
1. Reinforce bottom section with a continuous channel or angle complying with bottom-section profile and allowing installation of weatherstripping.
 2. Provide reinforcement for hardware and hinge attachments.
- E. Draft Stops and Weatherseals: provide header seal in addition to top and side draft-stopping.
1. Bottom bar with full width bulb astragal seal.
- F. Door Finish: Manufacturer's standard exterior-grade, corrosion-resistant, baked-enamel or powder-coated finish. Color as selected by Architect from manufacturer's full range.
- G. Door Operation: Electrical motor, typical unless otherwise noted.
1. Manual push-up during loss- of power; also provide lift handles on bottom bar.
- H. Locking Devices: Slide bolt on both sides of bottom bar, with padlock loops.
1. For electronically operated doors, provide interlock switch to disengage motor when door is mechanically locked.

2.2 TRACKS, SUPPORTS, AND ACCESSORIES

- A. Tracks: Manufacturer's galvanized steel track system, sized for door size and weight, designed for lift type indicated on drawings and clearances shown.
1. High-Lift or Vertical Lift Tracks: Typical at all locations, as shown on drawings.
 2. Provide complete track assembly including brackets, bracing, and reinforcement for rigid support of ball-bearing roller guides for required door type and size.
 3. Slope tracks at proper angle from vertical or design to ensure tight closure at jambs when door unit is closed. Weld or bolt to track supports.
- B. View Lite Panels:

1. Glazing: 1/2 inch, Insulated impact-rated tempered glazing, in panel sections shown in drawings.
 - a. Two panes of 1/8 glass separated by a sealed airspace, with Low-E coating.
 - b. Clear (no tint).
2. Size: Approx 6” tall x 24” wide, or as shown on drawings.
3. Quantity: One view lite on each panel in the same horizontal row at approximately 36” to 48” a.f.f. Verify with Architect in submittals.

2.3 ELECTRIC DOOR OPERATOR

- A. Operation Cycles: Provide overhead coiling door components and operators capable of operating cycles and speeds indicated. One operation cycle is complete when a door is opened from the closed position to the fully open position and returned to the closed position.
 1. Operation Cycles: rated for not less than 20,000 cycles.
- B. Electric Door Operator: Hoist-type, standard duty, for high-lift or vertical lift large doors.
 1. Operator Location: As shown on Drawings or as confirmed with Owner.
 2. Motor Exposure: Interior.
 3. Emergency Manual Operation: Push-up or chain hoist.
 4. Remote-Control Station: Open, Close, and Stop buttons or switches in an interior control box, mounted where shown on drawings, or where indicated by Owner.
- C. Obstruction Detection Devices: Provide electric operator accessories to signal the door to automatically reverse and open when the devices sense an obstruction:
 1. Automatic electric sensor edge on bottom bar to physically detect obstructions under the curtain.
 2. Photo eye and reflector at sides of door designed for both indoor and outdoor exposure.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install overhead sectional doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.
- B. Install overhead sectional doors, tracks, and operators at the mounting locations indicated on drawings for each door, as verified with Architect and Owner.

3.2 STARTUP SERVICE

- A. Engage a factory-authorized service representative to perform startup service.
 1. Perform installation and startup checks according to manufacturer's written instructions.

2. Adjust hardware and moving parts to function smoothly so that doors operate easily, free of warp, twist, or distortion.
 3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- B. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain overhead sectional doors.

END OF SECTION – 08 36 13 OVERHEAD SECTIONAL DOORS

08 41 13 ALUMINUM ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes exterior and interior factory-fabricated and pre-finished aluminum doors and window frames for field assembly and glazing.

1.2 PERFORMANCE REQUIREMENTS

- A. General Performance: Systems shall withstand movements of supporting structure indicated on Drawings including, but not limited to, story drift and deflection from uniformly distributed and concentrated live loads.
- B. Delegated Design: Design aluminum-framed systems, including comprehensive engineering analysis by a qualified professional engineer, to verify that products, supports, connections and fasteners will withstand wind and dynamic loads applicable to the project without detrimental effects or excessive deflection, including the effects of thermal differentials and fastener pullout resistance.
- C. Deflection of Framing Members:
 - 1. Deflection Normal to Wall Plane: Limited to L/175 of the glass edge length for each individual glazing lite or an amount that restricts edge deflection of individual glazing lites to 3/4 inch, whichever is less.
 - 2. Deflection Parallel to Glazing Plane: Limited to L/360 of clear span or 1/8 inch, whichever is smaller.
- D. Structural-Test Performance: Provide aluminum-framed systems tested according to ASTM E-330 as follows:
 - 1. When tested at positive and negative wind-load design pressures, systems do not evidence deflection exceeding specified limits.
 - 2. When tested at 150 percent of positive and negative wind-load design pressures, systems, including anchorage, do not evidence material failures, structural distress, and permanent deformation of main framing members exceeding 0.2 percent of span.
- E. Air Infiltration: Provide aluminum-framed systems with maximum air leakage through fixed glazing and framing areas of 0.06 cfm/sq. ft. of fixed wall area when tested according to ASTM E-283 at a minimum static-air-pressure difference of 6.24 lbf/sq. ft.
- F. Water Penetration under Static Pressure: Provide aluminum-framed systems that do not evidence water penetration through fixed glazing and framing areas when tested according to ASTM E-331 at a minimum static-air-pressure difference of 20 percent of positive wind-load design pressure, but not less than 6.24 lbs/sq.ft.

- G. Water Penetration under Dynamic Pressure: Provide aluminum-framed systems that do not evidence water leakage through fixed glazing and framing areas when tested according to AAMA 501.1 under dynamic pressure equal to 20 percent of positive wind-load design pressure, but not less than 6.24 lbs/sq.ft.
- H. Thermal Movements: Provide aluminum-framed systems that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. 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.
- I. Condensation Resistance: Provide aluminum-framed systems with fixed glazing and framing areas having condensation-resistance factor (CRF) of not less than 41 (frame) and 63 (glass) when tested according to AAMA 1503.
- J. Thermal Conductance: Provide aluminum-framed systems with fixed glazing and framing areas having an average U-factor of not more than 0.30 Btu/sq. ft. x h x deg F when tested according to AAMA 1503.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for aluminum-framed systems.
- B. Shop Drawings: For aluminum-framed systems. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Include details of provisions for system expansion and contraction and for drainage of moisture in the system to the exterior.
 - 2. Include field measurements of framing and openings.
- C. Samples: Not required if providing clear anodized, or the exact color indicated on drawing finish schedules.
- D. 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.
- E. Delegated-Design Submittal: For aluminum-framed systems indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- F. Seismic Qualification Certificates: For aluminum-framed systems to meet seismic requirements in project location, including accessories and components.

- G. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for aluminum-framed systems, indicating compliance with performance requirements.
- H. Maintenance Data: For aluminum-framed systems to include in maintenance manuals.
- I. Warranties: Sample of project specific warranties.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized contractor who is trained and approved for installation of units required for this Project.
- B. Engineering Responsibility: Prepare data for aluminum-framed systems, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in systems similar to those indicated for this Project.
- C. Source Limitations for Aluminum-Framed Systems: Obtain all types on the project from a single source from single manufacturer to the greatest extent possible.
- D. Product Options: Do not revise intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If revisions are proposed, submit comprehensive explanatory data to Architect for review.
- E. Accessible Entrances: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

1.5 WARRANTY

- A. Project Warranty: Manufacturer's form in which manufacturer agrees to repair or replace components of aluminum-framed systems 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 caused by thermal movements.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - d. Adhesive or cohesive sealant failures.
 - e. Water leakage through fixed glazing and framing areas.
 - f. Failure of operating components.
 - 2. Warranty Period: Two (2) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 ALUMINUM STOREFRONT FRAMING SYSTEMS

- A. Manufacturer's standard extruded-aluminum framing members of thickness required and reinforced as required to support imposed loads.
 - 1. Construction: Thermally broken at exterior locations.
 - a. Standard without thermal break at interior locations.
 - 2. Glazing System: Retained mechanically with gaskets on four sides.
 - 3. Glazing Plane: Center set.
 - 4. Frame Depth: 4-1/2 inches, unless otherwise noted on drawings.
 - 5. Sightline: 2 inches, unless otherwise noted on drawings.

- B. Sound Transmission: Provide aluminum-framed exterior systems with fixed glazing and framing areas having the following sound-transmission characteristics:
 - 1. Sound Transmission Class (STC): Minimum 32 STC, laboratory tested.
 - 2. Outdoor-Indoor Transmission Class (OITC): Minimum 26 OITC when tested for laboratory sound transmission loss according to ASTM E-90 and determined by ASTM E-1332.

- C. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. "VersaGlaze 451/451T" series by Kawneer Company (Basis of Design)
 - 2. "T/E14000 Series" by Tubelite, Inc.
 - 3. Oldcastle Building Envelope
 - 4. YKK AP America Inc.
 - 5. Or an approved equal.

- D. Glazing: As specified in other Division 08 Sections for Glazing.
 - 1. 1-inch insulated Low-E at exterior locations.
 - 2. Tempered 1/4-inch safety glazing at interior locations.

- E. Accessory Materials:
 - 1. Joint Sealants: For installation at perimeter of aluminum-framed systems.
 - 2. Storefront manufacturer shall provide sub-sill flashing pans with sealed end dams custom fitted to openings.

2.2 ALUMINUM FINISHES

- A. Clear Anodic Finish, typical at all locations as basis of design: AAMA 611, Class I, 0.018 mm.

- B. Color finishes, only where specifically indicated by Architect on drawings:
 - 1. Baked-Enamel or Powder-Coat Color Finish (at interior locations, where specifically noted): AAMA 2603 except with a minimum dry film thickness of 1.5 mils (0.04 mm). Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
 - 2. High-Performance Color Finish (at exterior locations, where specifically noted): 2-coat fluoropolymer finish complying with AAMA 2605 and containing not less than 70

percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

2.3 ENTRANCE DOOR SYSTEMS

- A. Entrance Doors: Heavy-Duty glazed entrance doors for manual-swing operation.
 - 1. Basis of Design: “350 Tuffline” Entrances by Kawneer Company.
 - 2. Door Construction: 2-inch overall thickness extruded-aluminum tubular rail and stile members.
 - a. 3/16-inch aluminum wall thickness for high-traffic applications.
 - 3. Door Design: Medium stile, 3-1/2-inch nominal face frame width.
 - a. Accessible Doors: Bottom stile to be smooth surfaced for width of door in area within 10 inches above floor or ground plane.
 - 4. Glazing Stops and Gaskets: Provide nonremovable glazing stops on outside of door.

2.4 ENTRANCE DOOR HARDWARE

- A. General: Provide entrance door hardware for each entrance door to comply with requirements in this Section.
 - 1. Entrance Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and products equivalent in function and comparable in quality to named products.
 - 2. Sequence of Operation: Provide electrified door hardware function, sequence of operation, and interface with other building control systems indicated.
 - 3. Opening-Force Requirements:
 - a. Egress Doors: Not more than 15 lbf to release the latch and not more than 30 lbf to set the door in motion and not more than 15 lbf to open the door to its minimum required width.
 - b. Accessible Interior Doors: Not more than 5 lbf to fully open door.
- B. Pivot Hinges: BHMA A156.4, Grade 1. Typical unless specifically approved otherwise,
- C. Butt Hinges: Only where specifically approved by Architect and Owner.
 - 1. BHMA A156.1, Grade 1, radius corner.
 - 2. Nonremovable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while entrance door is closed.
 - 3. Exterior Hinges: Stainless steel, with stainless-steel pin
- D. Full-Mortise Continuous Gear Hinges, BHMA A156.26, Grade 1. (where approved.)
- E. Mortise Auxiliary Locks: BHMA A156.5, Grade 1.
- F. Manual Flush Bolts: BHMA A156.16, Grade 1.

- G. Panic Exit Devices: BHMA A156.3, Grade 1, listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for panic protection, based on testing according to UL 305.
- H. Cylinders: Coordinate with Division 08 Section "Door Hardware."
- I. Operating Trim: BHMA A156.6.
- J. Closers: BHMA A156.4, Grade 1, with accessories required for a complete installation, sized as required by door size, exposure to weather, and anticipated frequency of use; adjustable to meet field conditions and requirements for opening force.
- K. Surface-Mounted Holders: BHMA A156.16, Grade 1.
- L. Door Stops: BHMA A156.16, Grade 1, floor or wall mounted, as appropriate for door location indicated, with integral rubber bumper.
- M. Weather Stripping: Manufacturer's standard replaceable components.
- N. Weather Sweeps: Manufacturer's standard exterior-door bottom sweep with concealed fasteners on mounting strip.
- O. Silencers: BHMA A156.16, Grade 1.
- P. Thresholds: BHMA A156.21, ADA compliant raised thresholds beveled with a slope of not more than 1:2, with maximum height of 1/2 inch total, 1/4" max. vertical.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General:
 - 1. Comply with manufacturer's written instructions.
 - 2. Do not install damaged components.
 - 3. Fit joints to produce hairline joints free of burrs and distortion.
 - 4. Rigidly secure nonmovement joints.
 - 5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration.
 - 6. Seal joints watertight.
 - 7. No discoloration on visible surfaces will be acceptable.
- B. Metal Protection:
 - 1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or applying sealant or tape, or by installing nonconductive spacers as recommended by manufacturer for this purpose.
 - 2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

- C. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.
- D. Sealants:
1. Set continuous sill members and flashing in full sealant bed to produce weathertight installation.
 2. Provide three lines of continuous sealant around perimeter of aluminum framing at head, jambs, and sills, applied at the exterior frame face edge to the adjacent materials, primary dryline (middle sealant), and interior frame face edge to the adjacent finishes.
 3. All joints between metal frames and adjacent surfaces, interior and exterior, shall be caulked with appropriate sealant.
- E. Entrance Doors: Install doors to produce smooth operation and tight fit at contact points.
1. Exterior Doors: Install to produce weathertight enclosure and tight fit at weather stripping.
 2. Install entrance door hardware according to entrance door hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.
 3. For entrance doors accessible to people with disabilities, adjust closers to provide a 3-second closer sweep period for doors to move from a 70-degree open position to 3 inches from the latch, measured to the leading door edge.

END OF SECTION – 08 41 13 ALUMINUM ENTRANCES AND STOREFRONTS

08 56 19 ALUMINUM SLIDING PASS WINDOW

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes Manual pass, service and teller window units.

1.2 PERFORMANCE REQUIREMENTS

- A. System Design: Window components are to withstand dead loads and live loads caused by pressure and negative wind loads acting normal to plane of window as calculated in accordance with applicable code.
- B. System Internal Drainage: Drain water entering joints, condensation occurring in glazing channels, and migrating moisture occurring within system, to exterior by weep drainage network.
- C. Air and Vapor Seal: Maintain continuous air barrier and vapor retarder throughout assembly.

1.3 SUBMITTALS

- A. Product Data: Submit manufacturer's product data for specified Products indicating materials, operation characteristics, and finishes.
- B. Shop Drawings: Indicate configuration, sizes, rough-in, mounting, construction and glazing details as well as installation clearances and finishes.
- C. Samples: none required.
- D. Test Reports: Indicate compliance with performance testing.
- E. Installation Instructions: Provide Manufacturer's installation instructions with requirements to accommodate specific site conditions.
- F. Maintenance and Operation Data: Provide Manufacturer's recommended procedures for maintenance, including information on service providers, and parts list.

1.4 COORDINATION

- A. Coordinate installation of anchorages for transaction windows. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and flashings.

1.5 WARRANTY

- A. Furnish manufacturer's standard warranty document, executed by an authorized Quikserv Corp. officer in which manufacturer agrees to repair or replace windows, drawers and air curtains that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: One (1) Year from the date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Aluminum Extrusions: ASTM B-221. Provide alloy and temper recommended by manufacturer for strength, corrosion resistance, and application of required finish, but not less than 22,000-psi ultimate tensile strength and not less than 0.125 inch thick at any location for main frame and sash members.
- B. Steel Plates, Shapes, and Bars: ASTM A-36.
- C. Metallic-Coated Steel Sheet: ASTM A-653, CS (Commercial Steel), Type B; with G90 zinc (galvanized) coating designation.
- D. Stainless Steel Sheet, Strip, Plate, and Flat Bars: ASTM A-666, Type 304.
- E. Concealed Bolts: ASTM A-307, Grade A.
- F. Cast-in-Place Anchors in Concrete: Fabricated from corrosion-resistant materials, threaded or wedge type; either ASTM A-27 cast steel or ASTM A-47 malleable iron. Provide bolts, washers, and shims as required; hot-dip galvanized.
- G. Bituminous Paint: Cold-applied, asphalt-mastic paint.
- H. Sealants: For sealants required within fabricated security windows, provide type recommended by manufacturer for joint size and movement. Sealant shall remain permanently elastic, nonshrinking, and nonmigrating.
- I. Gaskets: For gaskets required within fabricated security windows, provide type recommended by manufacturer for joint size and movement.

2.2 SELF-CLOSING MANUAL EXTERIOR SERVICE WINDOWS

- A. Extruded aluminum-framed, horizontal-sliding, manual-opening, self-closing, transaction window unit. Typical between conditioned space and unconditioned dock or exterior.
 - 1. Track: Top-hung with no bottom track.
 - 2. Slides: Stainless steel slide rail, ball bearing type.
 - 3. Frame Depth: 4-1/2 inches.
 - 4. Opening Size and Handing: See Drawings.
 - 5. Glazing: Manufacturer's standard dual-pane insulated.
 - 6. Finish: Clear Anodized.

- B. Subject to compliance with requirements, manufacturers and products that may be incorporated into the Work include the following:
 - 1. Basis of Design: model IFSC-4040 by Quikserv, Inc.
 - 2. Do not substitute products without Architect's full review and approval.
- C. Accessories and Fabrications:
 - 1. Weather Stripping: Factory applied.
 - 2. Bottom Sills: Stainless steel construction, no bottom tracks and no pop rivets.
 - 3. Handles: Stainless steel, manufacturer's standard profile and finish.
- D. Exterior Window Fabrication:
 - 1. Provide weep holes and internal water passages for exterior security windows to conduct infiltrating water to the exterior.
 - 2. Rigidly fit joints and corners. Accurately fit and secure corners tight. Make corner joints flush, hairline, and weatherproof. Seal corner joints with sealant.

2.3 MANUAL INTERIOR SERVICE WINDOWS

- A. Extruded aluminum-framed, horizontal-sliding, manually operated transaction window unit.
 - 1. Track: Top-hung with no bottom track.
 - 2. Slides: Stainless steel slide rail, ball bearing type.
 - 3. Frame Depth: +/-4-1/2 inches.
 - 4. Opening Size and Handing: See Drawings.
 - 5. Glazing: Manufacturer's standard 1/4" tempered safety glass.
 - 6. Finish: Clear Anodized.
- B. Subject to compliance with requirements, manufacturers and products that may be incorporated into the Work include the following:
 - 1. Basis of Design: model DW1800A by CRL, C.R. Laurence Co. Inc.
 - 2. Do not substitute products without Architect's full review and approval.

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.
- B. At exterior locations, examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure a coordinated, weathertight window installation.

3.2

3.3 INSTALLATION

- A. Comply with Drawings, Shop Drawings, and manufacturer's written instructions for installing windows, hardware, accessories, and other components.
- B. At exterior locations:
 - 1. Set sill members in bed of sealant or with gaskets, as indicated, for weathertight construction.
 - 2. Install windows and components to drain condensation, water penetrating joints, and moisture migrating within windows to the exterior.
- C. Metal Protection:
 - 1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or applying sealant or tape, or by installing nonconductive spacers as recommended by manufacturer for this purpose.
 - 2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

3.4 ADJUSTING, CLEANING, AND PROTECTION

- A. Adjust horizontal-sliding, transaction security windows to provide a tight fit at contact points for smooth operation and a secure enclosure. Lubricate hardware and moving parts.
- B. Clean factory-glazed glass immediately after installing windows. Comply with manufacturer's written recommendations for final cleaning and maintenance. Remove nonpermanent labels, and clean surfaces.
- C. Remove and replace units that are broken, chipped, cracked, abraded, or damaged by construction activities at no additional cost to the Owner.

END OF SECTION – 08 56 19 ALUMINUM SLIDING PASS WINDOW

08 71 00 DOOR HARDWARE

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes Commercial door hardware for wood and metal doors, including cylinders and keying for doors.

1.2 SUBMITTALS

- A. Product Data: Provide one set of manufacturer's catalog and technical data for each hardware item used, highlighting design, function, fasteners, accessories, and options to facilitate review with each hardware schedule submitted.
 - 1. Coordinate submittal of door hardware with related items including metal doors and frames and electrified components to be integrated with doors.
- B. Shop Drawings: Including elevations of each door with dimensions for hardware mounting.
 - 1. Include construction and installation details, material descriptions, dimensions of individual components and profiles, and finishes.
 - 2. For electrified hardware, 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.
- C. Templates: Provide manufacturer's templating information upon receipt of approved hardware schedule to the door and frame supplier(s). Include requirements for internal reinforcements required for mounting hardware.
- D. Maintenance Data: For each type of door hardware to include in maintenance manuals. Include final as-built hardware, keying schedules, wiring diagrams, and parts lists.
- E. Warranty: Copies of manufacturer and installer warranties for products provided in this Section.
- F. Door Hardware Set Schedule: Prepared by or under the supervision of Installer or Architectural Hardware Consultant, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final door hardware sets with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
 - 1. Format: Use same scheduling sequence and format and use same door numbers as in the Contract Documents.
 - 2. Content: Include the following information:
 - a. Identification number, location, hand, fire rating, and material of each door and frame.

- b. Type, style, function, size, quantity, and finish of each door hardware item. Include description and function of each lockset and exit device.
- c. Complete designations of every item required for each door or opening including model and manufacturer.
- d. Fastenings and other pertinent information.
- e. Location of each door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
- f. Explanation of abbreviations, symbols, and codes contained in schedule.
- g. Mounting locations for door hardware.
- h. Door and frame sizes and materials.
- i. Description of each electrified door hardware function, including location, sequence of operation, and interface with other building control systems.
 - 1) Sequence of Operation: Include description of component functions that occur in the following situations: authorized person wants to enter; authorized person wants to exit; unauthorized person wants to enter; unauthorized person wants to exit.
- j. List of related door devices specified in other Sections.

G. Submittal Sequence: Submit the final door hardware sets at earliest possible date, particularly where approval of the door hardware sets must precede fabrication of other work that is critical in Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the door hardware sets.

H. Keying Schedule: Prepared by or under the supervision of Installer or Architectural Hardware Consultant, detailing Owner's final keying instructions for locks. Include schematic keying diagram and index each key set to unique door designations.

- 1. Conduct a meeting with Owner, Architect, and hardware supplier to determine and confirm keying requirements.
- 2. Owner must approve submitted keying schedule prior to the ordering of permanent cylinders/cores.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by lock manufacturer.

- 1. Installer's responsibilities include supplying and installing door hardware and providing a qualified Architectural Hardware Consultant available during the course of the Work to consult with Contractor, Architect, and Owner about door hardware and keying.
- 2. Installer shall have warehousing facilities in Project's vicinity and shall have a permanent office staffed with permanent employees located within a 150 mile radius of the project site. Installer's employees shall include an Architectural Hardware Consultant who shall be available during normal business hours for hardware consultation to the Owner, Architect, and Contractor.
- 3. Scheduling Responsibility: Preparation of door hardware and keying schedules.

B. Architectural Hardware Consultant Qualifications: A person who is currently certified by DHI as an Architectural Hardware Consultant and who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project.

- C. Source Limitations: Obtain each type and variety of door hardware from a single manufacturer, unless otherwise indicated.
- D. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 252. Latching hardware, door closers, ball-bearing hinges, and smoke seals are required for fire-rated openings, whether or not listed specifically in the door hardware schedule.
- E. Keying Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system with the Owner:
 - 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.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Inventory and itemize door hardware on receipt and provide secure lock-up for door hardware delivered to Project site to protect against loss, theft and damage.
- B. Tag each item or package separately with identification related to the final door hardware sets, and include basic installation instructions, templates, and necessary fasteners with each item or package.

1.5 COORDINATION

- A. Templates: Distribute door hardware templates for doors, frames, and other work specified to be factory prepared for installing door hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.
- B. Existing Openings: Where new hardware components are scheduled for application to existing construction or where modifications to existing door hardware are required, field verify existing conditions and coordinate installation of door hardware to suit opening conditions and to provide for proper operation.
- C. Pre-Installation Conference: Conduct coordination conference with attendance by representatives of suppliers, installers, and subcontractors of related trades to review proper methods and the procedures for handling, organizing, and installing door hardware.
 - 1. For electrified hardware, inspect and discuss electrical rough-in, power supply connections, and other preparatory work required.

1.6 WARRANTY

- A. Manufacturer's standard forms in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including excessive deflection, cracking, or breakage.
 - b. Faulty operation of operators and door hardware.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.
 - d. Electrical component defects and failure to operate as designed.
 - 2. Warranty Period: **Seven** years from date of Substantial Completion, except as follows:
 - a. Closers: **Ten** years from date of Substantial Completion.
 - b. Exit Devices: **Three** years from date of Substantial Completion.
 - c. Electronic Components: **One** year from date of Substantial Completion.

1.7 MAINTENANCE SERVICE

- A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.
- B. Continuing Service: Beginning at Substantial Completion, and running concurrent with the specified warranty period, provide continuous (6) months full maintenance including repair and replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper door opening operation.

PART 2 - PRODUCTS

- A. Door Hardware Finishes, General: Per ANSI/BHMA A156.18 for Materials and Finishes:
 - 1. Basis of Design: US26D Satin Chromium Plated, typical at all available items.
 - 2. Similar finishes that may be considered include:
 - a. US32D Satin Stainless Steel is an approved alternate.
 - b. US15 Satin Nickel only where specifically reviewed by Architect.
- B. Butt Hinges: BHMA A156.1.
 - 1. Types and Materials: Unless otherwise noted on drawings or schedules, provide:
 - a. Hinges for Exterior Doors:
 - 1) Five-knuckle, heavy-weight, full-mortise, anti-friction plain-bearing.
 - 2) Stainless steel with stainless steel, non-removable pin
 - b. Hinges for Exterior Doors with Closers or Operators:
 - 1) Five-knuckle, heavy-weight, full mortise, ball-bearing or oil-impregnated bearing.
 - 2) Stainless steel with stainless steel, non-removable pin
 - c. Hinges for Interior Doors:
 - 1) Five-knuckle, standard weight, full-mortise, anti-friction plain-bearing.
 - 2) Steel with Steel pin, non-rising removable button-top.
 - d. Hinges for Interior Doors with Closers:
 - 1) Five-knuckle standard weight full-mortise ball-bearing or oil-impregnated bearing.

- 2) Steel with Steel pin, non-rising removable button-top.
- 2. Quantity: Provide the following, unless otherwise indicated:
 - a. Two Hinges: For doors with heights up to 60 inches
 - b. Three Hinges: For doors with heights 61 to 90 inches
 - 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.
- 3. Hinge Size: Unless otherwise noted on drawings or schedules, provide:
 - a. For interior doors up to 1-3/8" thick: 4" hinge height
 - b. For interior and exterior doors up to 1-3/4" thick and up to 36" wide: 4-1/2" hinge height
 - c. For doors over 36" to 42" wide: 5" hinge height
- 4. Hinge Options: Where indicated in door hardware sets or on Drawings:
 - a. Hospital Tips: Slope ends of hinge barrel.
 - b. Safety Stud: Designed for stud in one leaf to engage hole in opposing leaf.
 - c. Maximum Security Pin: Fix pin in hinge barrel after it is inserted.
 - d. Nonremovable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed.
- C. Continuous Geared Hinges: Aluminum hinge that extends entire length of the door leaf consisting of two pieces with interlocking gears rotating on a series of bearings, protected by a continuous cover channel. Coordinate for type, inset, and thickness of door.
 - 1. Subject to compliance with requirements, available manufacturers and products that may be incorporated into the Work include:
 - a. Model 110HD or 240HD by Architectural Builders Hardware Manufacturing, Inc.
 - b. Model 112HD or 224 HD by Ives, an Allegion brand
 - c. Or an approved equal.
- D. Pivot Hinges: Mounted in openings in the floor and the top of the door frame.
- E. Fasteners: Comply with the following:
 - 1. Machine Screws: For metal doors and frames. Install into drilled and tapped holes.
 - 2. Provide self-tapping screws for sweeps and stop applied weatherstripping.
 - 3. Wood Screws: For wood doors and frames.
 - 4. Threaded-to-the-Head Wood Screws: For fire-rated wood doors.
 - 5. Screws: Phillips flat-head; machine screws
 - 6. Finish screw heads to match surface of hinges.

2.2 LOCKS AND LATCHES, GENERAL

- A. Accessibility Requirements: Where indicated to comply with accessibility requirements, comply with the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG)." ANSI A117.1. and FED-STD-795, "Uniform Federal Accessibility Standards."
 - 1. Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf.

- B. Latches and Locks for Means of Egress Doors: Comply with NFPA 101. Latches shall not require more than 15 lbf to release the latch. Locks shall not require use of a key, tool, or special knowledge for operation.
- C. Lock Trim:
 - 1. Levers at exterior doors: Heavy-duty BHMA for A156.2, Series 4000, Grade 1.
 - 2. Levers at interior doors: Standard-duty BHMA for A156.2, Series 4000, Grade 2, unless otherwise noted for Grade 1 at high-use locations.
 - 3. ADA-Compliant, "L"-shaped or curved-shape return, non-handed lever design.
 - 4. Adjustable to fit door thickness.
 - 5. Non-handed and fully field reversible.
- D. Lock Throw: Comply with testing requirements for length of bolts required for labeled fire doors, and as follows:
 - 1. Bored Locks: Stainless Steel or non-corrosive materials, 1/2" throw, deadlocking latchbolt on keyed and exterior functions. 3/4" throw anti-friction latch for pairs of doors.
 - 2. Mortise Locks: Minimum 3/4-inch latchbolt throw.
 - 3. Deadbolts: Minimum 3/4 inch bolt throw.
- E. Backset: 2-3/4 inches standard.
- F. Strikes: Manufacturer's standard strike with strike box for each latchbolt or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, and as follows:
 - 1. Provide dust-proof strikes for foot bolts.
 - 2. Provide roller-type strikes where recommended by the manufacturer of the latch and lock units.
 - 3. Strikes for Bored Locks and Latches: BHMA A156.2.
 - 4. Strikes for Mortise Locks and Latches: BHMA A156.13.
 - 5. Strikes for Interconnected Locks and Latches: BHMA A156.12.
 - 6. Strikes for Auxiliary Deadlocks: BHMA A156.5.
 - 7. Extra-Long-Lip Strikes: For use on frames with deeper thickness or applied casing trim.
 - 8. Aluminum-Frame Strike Box: Manufacturer's special strike box fabricated for aluminum framing.
 - 9. Double-lipped strikes: For locks at double acting doors. Furnish with retractable stop for rescue hardware applications.

2.3 MECHANICAL LOCKS AND LATCHES

- A. Grade 1 Cylindrical Levers and Locksets: Subject to compliance with requirements, available manufacturers and products that may be incorporated into the Work include the following:
 - 1. Schlage: ND-Series (Basis of Design)
 - 2. Do not substitute products without Architect's full review and approval. Similar products that may be considered include:
 - a. Best Access Systems: 9K Series
 - b. Sargent 10-Line Series.
 - c. Accentra 5400LN Series by Assa Abloy (previously Yale)
 - d. Falcon: T-Series
 - e. Or approved equal.

2.4 LOCK CYLINDERS

- A. Standard Lock Cylinders: BHMA A156.5, Grade 1.
- B. Cylinders: Manufacturer's standard tumbler type, constructed from brass or bronze, stainless steel, or nickel silver, and complying with the following:
 - 1. Compatible with Best SFIC (Small Format Interchangeable Core)
 - 2. Number of Pins:
 - a. 6-pin typical unless otherwise noted.
 - b. 7-pin where required for compatibility with owner's existing system.
- C. Permanent Cores: Manufacturer's standard; finish face to match lockset; complying with the following:
 - 1. Interchangeable Cores: Core insert, removable by use of a special key; usable with other manufacturers' cylinders, keyed into the existing Grand Master Key system with a restricted keyway.

2.5 KEYING

- A. Keying System: Factory registered, complying with guidelines in BHMA A156.28, Appendix A. Coordinate with Owner, and incorporate decisions made in keying conference with Owner.
- B. Key Material: Provide keys of nickel-silver only. Keys shall be stamped "Do Not Duplicate."
- C. Key Quantity: Verify with Owner, but starting assumption to provide 3 change keys for each lock, 6 master keys for each master system, and 6 grandmaster keys for each grandmaster system.
- D. Construction Keying: Comply with the following:
 - 1. Construction Master Keys: Provide cylinders with feature that permits voiding of construction keys without cylinder removal.
 - 2. Construction Cores: Provide construction cores that are replaceable by permanent cores.
 - a. Replace construction cores with permanent cores at Substantial Completion, or as directed by Owner.
- E. Manufacturer: Same manufacturer as for locks and latches.

2.6 EXIT DEVICES

- A. Exit Devices: BHMA A156.3, Grade 1.
 - 1. Independent certification to 1,000,000 cycles.
 - 2. Push-through touch pad design. No exposed touch bar fasteners, no exposed cavities when operated. Push and return stroke shall have sound dampers.
 - 3. 3/4-inch throw deadlocking latchbolts.

4. Non-handed basic device design with center case interchangeable with all functions, no extra parts required for effect of change in function. Device handing and functions must be convertible in the field.
5. Releasable with 32-pound maximum pressure under 250-pound load to the door.
6. Rim-type where possible.
7. No exposed bottom vertical rods (fully concealed vertical rods wherever possible).
8. Provide cylinder dogging (not hex dogging) on non-fire-rated devices.

B. Approved Manufacturers:

1. Von Duprin 98/99 Series
2. Precision Apex 2000 Series
3. Accentra 7000 Series by Assa Abloy (previously Yale)
4. Sargent 80 Series
5. Or approved equal.

C. Exit Devices for Means of Egress Doors: Comply with NFPA 101. Exit devices shall not require more than 15 lbf to release the latch. Locks shall not require use of a key, tool, or special knowledge for operation.

D. Panic Exit Devices: Listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for panic protection, based on testing according to UL 305.

E. Fire Exit Devices: Devices complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire and panic protection, based on testing according to UL 305 and NFPA 252.

F. Outside Trim: Functions and shapes indicated, material and finish to match locksets.

2.7 CLOSERS

A. Manufacturers: Subject to compliance with the following requirements, provide one of the following:

1. LCN Closers 4040XP Series
2. Stanley D-4550 Series (Best Access HD8000 Series)
3. Dorma 8900 Series
4. Accentra 4400 Series by Assa Abloy (previously Yale)
5. Or an approved equal.

B. Surface Closers: BHMA A156.4 Grade 1. Provide type of arm required for closer to be located on interior, non-public side of door, parallel arm wherever possible, unless specifically indicated otherwise.

1. Closers are to have heavy-duty forged arms. Stamped or form break arms will not be accepted.
2. For corrosion protection, all cast iron shall be either powder coated or supplied with a special rust inhibitor coating.
3. The use of door closers with a “dead stop” on the arm bracket is prohibited. Where floor, wall, or overhead stops will not work, use “spring-cush stop” on the arm.

4. Closers shall have hydraulic fluid with a consistent velocity range of no less than 0 degrees to 100 degrees Fahrenheit to eliminate the need for seasonal adjustments.
 5. On fire-rated doors, closers shall comply with UL-10C for Positive Pressure Fire Test and be U.L. listed.
- C. Door Closers for Means of Egress Doors: Comply with NFPA 101. Door closers shall not require more than 30 lbf to set door in motion and not more than 15 lbf to open door to minimum required width.
- D. Hold-Open Closers must be coordinated and interface with integral smoke detector and connect to fire alarm system.
- E. Size of Units: Unless otherwise indicated, comply with manufacturer's written recommendations for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.

2.8 ELECTRONIC LOCKS

- A. General: BHMA A156.23; electrically powered, of strength and configuration appropriate to application indicated; with electromagnet attached to frame and armature plate attached to door.
1. Security Grade: Activated from secure side of door by initiating device.
 2. Movement Grade: Activated by door movement as initiating device.
- B. Delayed-Egress Locks: BHMA A156.24; used in connection with conventional exit devices or locks causing the doors to remain locked after releasing actuation for a predetermined length of time.
1. Means of Egress Doors: Lock releases within 15 seconds after applying a force not more than 15 lbf for not more than 3 seconds, as required by NFPA 101.

2.9 STOPS, HOLDERS, AND TRIM

- A. Stops and Bumpers: BHMA A156.16 Grade 1.
1. Provide wall stops for doors unless floor or other type stops are scheduled or indicated. Do not mount floor stops where they will impede traffic. Where floor or wall stops are not appropriate, provide overhead holders.
- B. Mechanical Door Holders: BHMA A156.16.
- C. Combination Floor and Wall Stops and Holders: BHMA A156.8.
- D. Combination Overhead Stops and Holders: BHMA A156.8.
- E. Silencers for Metal Door Frames: BHMA A156.16, Grade 1; neoprene or rubber, minimum diameter 1/2 inch, fabricated for drilled-in application to frame.

- F. Flush Bolts and Surface Bolts: Provide products conforming to ANSI/BHMA A156.3 and A156.16, Grade 1.
 - 1. Furnish dust proof strikes for bottom bolts.
 - 2. Provide related accessories (mounting brackets, strikes, coordinators, etc.) as required for appropriate installation and operation.
- G. Push Plates and Pulls: ANSI/BHMA A156.6 door pushes and pull units of type and design specified on drawings and schedules, fabricated from Stainless Steel.
 - 1. 4 inches wide x 16 inches tall, unless otherwise noted.
 - 2. Standard curved pull approx. 3/4 inch diameter by 6 inches high.
- H. Protection Plates: ANSI/BHMA A156.6 protection plates (kick or mop), fabricated from Stainless Steel, 300 grade, .050-inch thick.
 - 1. Width: 2 inches less than door width.
 - 2. Height: 8 inches, unless otherwise noted.

2.10 SEALS AND GASKETS

- A. General: Thresholds, weatherstripping, sweeps, and gasket seals to be of type and design as specified on the drawings 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 required or subject to moisture.
- B. Smoke Gasketing: At smoke-labeled openings and on metal doors in smoke- or fire-rated partitions, provide assemblies complying with NFPA 105 for smoke control ratings indicated, based on testing according to UL 1784.
- C. Fire Labeled Gasketing: At wood doors in fire-rated openings, provide intumescent assemblies complying with NFPA 80 for fire ratings indicated, based on testing according to UL-10C Standard for Positive Pressure Fire Tests of Door Assemblies, and UBC 7-2, Fire Tests of Door Assemblies.
- D. Thresholds for Means of Egress Doors: Comply with NFPA 101 and ADA.

2.11 FABRICATION

- A. Manufacturer's Nameplate: Do not provide products that have manufacturer's name or trade name displayed in a visible location except in conjunction with required fire-rated labels and as otherwise approved by Architect.
- B. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to commercially recognized industry standards for application intended, except aluminum fasteners are not permitted.

PART 3 - EXECUTION**3.1 EXAMINATION**

- A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, floor finish thicknesses, and other conditions affecting performance.
- B. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.
- C. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed.

3.2 INSTALLATION

- A. Mounting Heights: Mount door hardware units at heights indicated, unless otherwise required to comply with governing regulations.
 - 1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
 - 2. Custom Steel Doors and Frames: DHI's "Recommended Locations for Builders' Hardware for Custom Steel Doors and Frames."
 - 3. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
- B. Trim, cut, and notch thresholds and saddles neatly to minimally fit the profile of the door frame. Set thresholds in bed of mastic sealant, forming tight seal between threshold and surface to which set.

3.3 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.
- B. Test electrified devices tied into fire alarm system to confirm functioning upon activation of fire alarm. Test electrified hardware and access control to verify systems operate as required in each mode of operation.
- C. Occupancy Adjustment: Approximately three months after date of Substantial Completion, Installer shall examine and readjust, including adjusting operating forces, each item of door hardware as necessary to ensure function of doors, door hardware, and electrified door hardware.

3.4 CLEANING AND PROTECTION

- A. Clean adjacent surfaces soiled by door hardware installation. Clean operating items as necessary to restore proper function and finish.

- B. Provide wraps or masking protection where necessary, and maintain conditions that ensure that door hardware is without damage or deterioration at time of Substantial Completion.

3.5 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain door hardware and door hardware finishes.

END OF SECTION – 08 71 00 DOOR HARDWARE

08 80 00 GLAZING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section.
 - 1. Glass for windows, doors, storefront, glazed curtain walls, and skylight assemblies.
 - 2. Glazing sealants and accessories.

1.2 PERFORMANCE REQUIREMENTS

- A. General: Provide glazing systems capable of withstanding normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, and installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.
- B. Glass Design: Glass thickness designations indicated are minimums and are for detailing only. Confirm glass thicknesses by analyzing Project loads and in-service conditions.
 - 1. Delegated Design: Design glass, including comprehensive engineering analysis according to ASTM E-1300 by a qualified professional engineer.
 - 2. Design Wind Pressures: Determine design wind pressures applicable to Project according to ASCE/SEI 7, based on heights above grade indicated on Drawings.
 - 3. Maximum Lateral Deflection: For glass supported on all four edges, limit center-of-glass deflection at design wind pressure to not more than 1/50 times the short-side length or 1 inch, whichever is less.
 - 4. Differential Shading: Design glass to resist thermal stresses induced by differential shading within individual glass lites.
 - 5. Glass Thicknesses: Select minimum glass thicknesses to comply with ASTM E-1300.
 - 6. Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.
 - 7. Safety Glazing: For glass panels that are accessible to pedestrians (and not protected by an 18" high obstruction) provide safety glazing, either laminated or fully tempered glass.

1.3 SUBMITTALS

- A. Product Data: For each glass product and glazing material indicated.
- B. Samples: not required.

- C. Glazing Schedule: Use same designations indicated on Drawings for glazed openings in preparing a schedule listing glass types and thicknesses for each size opening and location.
- D. Product Test Listings for Fire Rated Glass: From UL indicating fire-rated glass complies with requirements, based on comprehensive testing of current product.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed glazing similar in material, design, and extent to that indicated for this Project; whose work has resulted in glass installations with a record of successful in-service performance; and who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.
- B. Source Limitations for Glass: Obtain each glass type with associated glazing accessories through one source from a single manufacturer.
- C. Glazing for Fire-Rated Door Assemblies: Glazing for assemblies that comply with NFPA 80 and that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 252.
- D. Glazing for Fire-Rated Window Assemblies: Glazing for assemblies that comply with NFPA 80 and 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 NFPA 257.
- E. Safety Glazing Products: Comply with testing requirements in 16 CFR 1201, "Safety Standard for Architectural Glazing Materials under the Consumer Product Safety Act" to reduce risks of injuries associated with walking, running, or falling through or against glazing materials.
 - 1. Subject to compliance with requirements, obtain safety glazing products permanently marked with certification label of the Safety Glazing Certification Council or another certification agency or manufacturer acceptable to authorities having jurisdiction.
 - 2. Glazing shall be impact tested in accordance with 16 CFR 1201:
 - a. For glazing lites more than 9 sq.ft. in exposed surface area of one side, provide glazing products that comply with Category II materials
 - b. For lites 9 sq.ft. or less in exposed surface area of one side, provide glazing products that comply with Category I or II materials.
 - 3. Provide safety glazing in all "hazardous" locations as defined by codes, including (but not limited to):
 - a. In fixed and operable panels of swinging, sliding, and bi-fold doors
 - b. Within 24" of the sides of doors
 - c. Where walking surfaces are within 36" of the plane of the glazing
 - d. Within 60" of the bottoms of stairs

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Protect glazing materials according to manufacturer's written instructions and as needed to prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.
- B. For insulating-glass units that will be exposed to substantial altitude changes, comply with insulating-glass manufacturer's written recommendations for venting and sealing to avoid hermetic seal ruptures.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.
 - 1. Do not install liquid glazing sealants when ambient and substrate temperature conditions are outside limits permitted by glazing sealant manufacturer or below 40 deg F.

1.7 WARRANTY

- A. Low-E and other Coated Glass: Manufacturer's standard form, made out to Owner and signed by insulating-glass manufacturer agreeing to replace insulating-glass units that deteriorate within specified warranty period indicated below.
 - 1. Warranty Period: Ten (10) years from date of Substantial Completion to be free of peeling or other deterioration of the coating.
- B. Glazing Sealants: Warrant for Ten (10) years per sealant manufacturer's standard warranty. Warranty shall certify that cured sealants:
 - 1. Will perform as a watertight weatherseal.
 - 2. Will not become brittle or crack due to weathering or normal expansion and contraction of adjacent surfaces.
 - 3. Will not harden beyond a Shore A durometer of 50, nor soften below a durometer of 10.
 - 4. Will not change color when used with compatible back-up materials.
 - 5. Will not bleed.
- C. Special Warranty for Fire Rated Glass:
 - 1. Warranty period: **Five (5)** years from date of shipment by manufacturer.

PART 2 - PRODUCTS

2.1 GLASS PRODUCTS

- A. Heat-Treated Float Glass: ASTM C-1048; Type I (transparent flat glass); Quality-Q3.
 - 1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed, unless otherwise indicated.

2. Kind FT (Fully Tempered) float glass where safety glass is indicated, complying with ANSI Z97.1 and 16 CFR 1201 criteria.
- B. Insulating-Glass Units, General: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace.
1. Two panes of glass separated by a dehydrated 1/2 inch space, and hermetically sealed.
 2. Glazed systems (including frames) shall be rated as appropriate to climate zone and as applicable to window type, and shall be tested according to NFRC 100 and NFRC 200 procedures.
 3. Spacer shall be black, roll-formed, steel-reinforced butyl rubber with bent or tightly welded or keyed and sealed joints to completely seal the spacer periphery and eliminate moisture and hydrocarbon vapor transmission into airspace through the corners.
 4. Primary seal shall be compressed polyisobutylene and the secondary seal shall be a specially formulated silicone.
 5. Provide Kind HS (heat-strengthened) float glass in place of annealed glass where needed to resist thermal stresses induced by differential shading of individual glass lites.
 6. Provide Kind FT (fully tempered) glass lites where safety glass is indicated.
- C. Spandrel Glass: Glass panes receiving an opaque coating shall be heat strengthened or fully tempered flat glass.
1. The opacifying coating shall be a silicone, waterbase, elastomer which will have a minimum thickness of 5 mils dry (.005"/.127mm). The silicone rubber material shall be medium modulus, self-extinguishing, and noncorrosive.
 2. Products:
 - a. Opaci-Coat-300 by ICD High Performance Coatings
 - b. Deco HT by Guardian Glass
 - c. Or an approved equal.
 - d. Color: selected by Architect, applied to the interior side of the inboard lite.

2.2 GLAZING

- A. Subject to compliance with requirements, available manufacturers and products that may be incorporated into the Work include the following:
1. Basis of Design: Vitro Architectural Glass
- B. Glazing for Exterior Windows and Doors:
1. Insulating Glass Units: Vitro Solarban 60 (2) SolarGray + Clear
 - a. 1/4 inch exterior clear float glass, fully tempered where indicated on drawings or required by codes.
 - b. Low-E coating on surface #2 or surface #3 as required for performance indicated.
 - c. 1/2 inch space; gas fill = air.
 - d. 1/4 inch interior clear float glass, fully tempered where indicated on drawings or required by codes.

- 2. Performance Requirements:
 - a. U-Value (Center of Glazing): 0.29 max.
 - b. Solar Heat Gain Coefficient: 0.25 max.
 - c. Visible Light Transmission: 35% min.

- C. Glazing for windows and doors between conditioned space to unconditioned interior dock/shop areas:
 - 1. Insulating Glass Units: Vitro Solarban 60 (2) Clear + Clear
 - 2. Performance Requirements:
 - a. U-Value (Center of Glazing): 0.29 max.
 - b. Solar Heat Gain Coefficient: 0.39 max.
 - c. Visible Light Transmission: 70% min.

- D. Interior Single-Pane Glazing: Thickness: 1/4 inch minimum, or more if required to meet deflection limits for the size and configurations shown on the drawings.

- E. See Drawings for specific regional energy code information; notify Architect if drawing requirements indicate difference performance characteristics. Do not substitute without Architect's approval after full review.

2.3 FIRE-RATED GLAZING

- A. Fire-Rated, Safety Glazing: multi-layered fire resistant glass sheets made of ceramic float glass laminated with special transparent interlayers, designed for impact locations.
 - 1. Fire-Protection Rating: minutes or hours as indicated on drawings, and permanently labeled by a testing and inspecting agency acceptable to authorities having jurisdiction.

- B. Subject to compliance with requirements, available manufacturers and products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. "FireLite Plus" or "FireLite Premium", by TGP (Technical Glass Products)
 - 2. Or an approved equal.

- C. Properties:
 - 1. Thickness, depending on fire rating requirement:
 - a. Single glazing for Interior use: 3/8" to 1-7/16"
 - b. Insulated glazing units for Exterior use: 1-5/16" to 2-3/8"
 - 2. Fire-rating: As indicated on drawings for the partition assembly requirements.
 - 3. Impact Safety Resistance: ANSI Z97.1 and CPSC 16CFR1201 (Cat. I and II).

- D. Fire Rating: Fire rating listed and labeled by UL for fire rating scheduled at opening locations on drawings, when tested in accordance with ASTM E-119 and UL 263.

- E. Accessories for Fire-Rated Glazing:
 - 1. 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:

- a. Dow Corning 795 - Dow Corning Corp.
 - b. Silglaze-II 2800 - General Electric Co.
 - c. Spectrem 2 - Tremco Inc.
 - d. Or an approved equal.
2. Setting Blocks: Hardwood or calcium silicate; glass width by 4 inches by 3/16 inch thick.
 3. Spacers: Neoprene or other resilient blocks of 40 to 50 Shore A durometer hardness, adhesive-backed on one face only, tested for compatibility with specified glazing compound.
 4. Fire-Rated Glazing Tape: Manufacturer's standard product, identical to products used in test assemblies to obtain fire-protection rating.
 5. Perimeter Insulation for Fire-Resistive Glazing: Identical to product used in test assembly to obtain fire-resistance rating.

2.4 GLAZING SEALANTS

- A. General: Provide products of type indicated, complying with the following requirements:
 1. Compatibility: Select glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
 2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
 3. Colors of Exposed Glazing Sealants: Verify with Architect.
- B. Elastomeric Glazing Sealants: The sealant shall be a single or multi-component, non-acid curing, silicone sealant which meets the requirements of ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.
- C. Glazing Sealants for Fire-Resistive Glazing Products: Identical to products used in test assemblies to obtain fire-protection rating.

2.5 MISCELLANEOUS GLAZING MATERIALS

- A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
- B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

- C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
- D. Spacers: Elastomeric blocks or continuous extrusions with a Shore, Type A durometer hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
- E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).
- F. Cylindrical Glazing Sealant Backing: ASTM C-1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.
- G. Perimeter Insulation for Fire-Resistive Glazing: Identical to product used in test assembly to obtain fire-resistance rating.
- H. Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the specific application.

2.6 FABRICATION OF GLAZING UNITS

- A. Fabricate glazing units in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.
- B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites in a manner that produces square edges with slight kerfs at junctions with outdoor and indoor faces.
- C. Grind smooth and polish exposed glass edges and corners.

2.7 ARCHITECTURAL WINDOW FILMS

- A. Field-applied semi-opaque window film for interior windows, where indicated on drawings.
 - 1. Frosted white film, 4.3 mil thick, coated with a premium dry erase surface with a clear polyester release liner and a permanent acrylic pressure-sensitive adhesive.
 - a. 2 mil Polyester Dry Erase Surface + 2.3 mil Polypropylene.
 - b. Surface burning characteristics when tested in accordance with ASTM E-84, meeting Class A.
- B. Manufacturers: Subject to compliance with requirements, provide:
 - 1. "SOLYX SX-2090 White Dry Erase" by Decorative Films LLC.
 - 2. Do not substitute products without Architect's full review and approval.

PART 3 - EXECUTION**3.1 EXAMINATION**

- A. Examine framing glazing, with Installer present, for compliance with the following:
 - 1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
 - 2. Presence and functioning of weep system.
 - 3. Minimum required face or edge clearances.
 - 4. Effective sealing between joints of glass-framing members.
- B. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

3.2 GLAZING, GENERAL

- A. Comply with GANA standards and combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
- B. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction sealant-substrate testing.
- C. Install in vision panels in fire-rated doors to requirements of NFPA 80.
- D. Install so that appropriate UL and fire rating markings remain permanently visible.

3.3 CLEANING AND PROTECTION

- A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface.
- B. Protect glass from contact with contaminating substances resulting from construction operations, including weld splatter. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended by glass manufacturer.
- C. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.
 - 1. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.
- D. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

END OF SECTION – 08 80 00 GLAZING

00 21 16 GYPSUM BOARD ASSEMBLIES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes gypsum-based interior and exterior wall and ceiling panels.
- B. Related Sections include the following:
 - 1. Division 05 Sections for structural and non-structural Cold-Formed Metal Framing
 - 2. Division 07 Sections for batt insulation.
 - 3. Division 09 Sections for Acoustical Insulation and Joint Sealants
 - 4. Division 09 Sections for Painting and other finishes.

1.2 REFERENCE STANDARDS

- A. American Society for Testing and Materials (ASTM International):
 - 1. ASTM C-1396 – Standard Specification for Gypsum Board.
 - 2. ASTM C-475 – Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board
 - 3. ASTM C-645 Standard Specification for Nonstructural Steel Framing Members.
 - 4. ASTM C-754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products
 - 5. ASTM C-840 – Standard Specification for Application and Finishing of Gypsum Board, for methods and materials for use in conforming to specific assembly details.
 - 6. ASTM C954 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness
 - 7. ASTM C-1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs
 - 8. ASTM C-1047 – Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base, for accessories used in conjunction with assemblies of gypsum wallboard and gypsum veneer base to protect edges and corners and to provide architectural features.
 - 9. ASTM C-1278 – Standard Specification for Fiber-Reinforced Gypsum Panels, for physical properties, dimensions and tolerances, and edges of various types of interior fiber-reinforced gypsum panels.
 - 10. ASTM C-1280 - Standard Specification for Application of Exterior Gypsum Panel Products for Use as Sheathing
 - 11. ASTM C-1396 - Standard Specification for Gypsum Board
 - 12. ASTM E-119 - Standard Test Methods for Fire Tests of Building Construction and Materials
- B. Gypsum Association: All publications may be applicable, including, but not limited to:
 - 1. GA-214 - Gypsum Association’s Levels of Finish for Gypsum Panel Products

2. GA-216 - Application and Finishing of Gypsum Panel Products
3. GA-226 - Application of Gypsum Board to Form Curved Surfaces

C. UL Fire Resistive Assemblies and Designs.

1.3 SUBMITTALS

A. Product Data: Cut sheets for each type of product indicated and accessory to be used.

1. Include information on fasteners to be used, member sizes, and spans.

B. Samples: not required.

C. Shop Drawings: Show layout, spacings, sizes, thicknesses, and types of framing; fabrication; and fastening and anchorage details, including mechanical fasteners. Show reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.

D. Test Reports: For walls noted in the drawings to be fire rated, provide the UL test report for the wall assembly showing components demonstrating compliance with wall rating.

1.4 QUALITY ASSURANCE

A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assemblies indicated according to UL 263 / ASTM E-119 by an independent testing agency.

1. Fire rated assemblies shall conform to all tested requirements for the specified U.L. assembly. It shall be the contractor's responsibility to review all detailing and material requirements for the specified U.L. assemblies. Some U.L. assemblies may contain proprietary materials. It shall be the Contractor's responsibility to obtain approval from the Architect and AHJ for alternatives to the proprietary materials.
2. Contractor shall maintain continuity of fire rated assemblies at electrical and data boxes, mounted or recessed equipment, control and perimeter joints, and rated openings.

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assemblies indicated according to ASTM E-90 and classified according to ASTM E-413.

C. Delegated Design: Engage a qualified professional engineer to design shaft wall and partition steel framing and to select products, supports, connections and fasteners that will withstand loads applicable to the project without detrimental effects or excessive deflection.

1.5 STORAGE AND HANDLING

A. Store materials inside under cover and keep them dry and protected against damage from weather, condensation, direct sunlight, construction traffic, and other causes. Stack panels flat to prevent sagging.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Comply with ASTM C-840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.
- B. Do not install interior products until installation areas are enclosed and conditioned.

PART 2 - PRODUCTS

2.1 GYPSUM BOARD PANELS, GENERAL

- A. Provide in maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Georgia-Pacific Gypsum LLC.
 - 2. National Gypsum Company.
 - 3. USG Corporation.
 - 4. Certainteed Gypsum Inc.
 - 5. Or an approved equal.

2.2 INTERIOR GYPSUM BOARD

- A. General: Complying with ASTM C-36 or ASTM C-1396, as applicable to type of gypsum board indicated and whichever is more stringent.
- B. Regular Interior Type: Gypsum core panel with paper sheathing both sides.
 - 1. Thickness: 5/8 inch or as noted on drawings.
 - 2. Long Edges: Tapered and featured (rounded or beveled) for prefilling.
- C. Fire-Resistant: Gypsum core panel specially formulated for use in fire-resistive assemblies.
 - 1. Type X for most fire-resistive applications
 - 2. Type C where required for certain fire-resistive assemblies indicated on drawings.
 - 3. Thickness: 5/8 inch typical minimum, or as noted on drawings.
 - 4. Long Edges: Tapered and featured (rounded or beveled) for prefilling.
- D. Ceiling Type: Gypsum core panels manufactured to have more sag resistance than regular-type gypsum board.
 - 1. Thickness: 5/8 inch minimum or as noted on drawings.
 - 2. Long Edges: Tapered.
- E. Abuse-Resistant: Denser gypsum core reinforced with glass fibers, with fiberglass coating both sides, manufactured to produce greater resistance to surface indentation and abrasion, with the following characteristics per ASTM C-1629:
 - 1. Soft-Body Impact resistance: Level 2 or better
 - 2. Hard-Body Impact resistance: Level 1 or better

- F. Impact-Resistant: Denser gypsum core reinforced with embedded fiberglass mesh, coated with fiberglass mats both sides, manufactured to produce greater resistance to surface indentation and abrasion, with the following characteristics per ASTM C-1629:
 - 1. Soft-Body Impact resistance: Level 3 minimum
 - 2. Hard-Body Impact resistance: Level 2 or better

- G. Moisture- and Mold-Resistant: Fiberglass-mat facer coatings on both sides of a moisture-resistance treated gypsum core.
 - 1. Application: Bathroom and toilet room walls and ceilings; at backsplash walls behind base and upper cabinets at sink areas; and other similar locations prone to moisture exposure.
 - 2. Note: “green-board” paper-faced gypsum panels are NOT acceptable for use in moisture-resistant applications.

- H. Shaft Liner Board: Non-combustible gypsum core treated to be moisture-resistant, with fiberglass facer on both sides, specially designed for use in shaftwall assembly designs.
 - 1. 1” thick panels designed to be friction-fit within special steel shaft wall studs and tracks that will meet designated fire-resistive assembly requirements.

- I. Acoustical: High-density gypsum layers laminated with a sound-dampening polymer core, for higher STC rated wall and ceiling assemblies.
 - 1. Thickness: 5/8” thick (unless 1/2” thick is specifically noted on drawings as allowed).
 - 2. For assemblies achieving STC 50 and higher.
 - 3. Type X where required on drawings for rated assemblies.
 - 4. Subject to compliance with requirements, available manufacturers and products that may be incorporated into the Work include, but are not limited to, the following:
 - a. QuietRock by Pabco Gypsum
 - b. Silent FX by Certainteed
 - c. Gold Bond SoundBreak XP by National Gypsum
 - d. Or an approved equal.

2.3 EXTERIOR GYPSUM BOARD

- A. Regular Exterior Sheathing Board: Gypsum core soffit panel with glass-fiber reinforced sag resistant and moisture-resistant core treatments, and water-resistant facings for exterior use.
 - 1. Reference ASTM C-1177 Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
 - 2. Fiberglass-mat faced, moisture and mold resistant gypsum sheathing panels, Non-Rated:
 - a. Type and Thickness: Regular, 1/2 inch or 5/8 inch as indicated by assembly.
 - b. Size: 48 x 96 inches min.
 - c. Product: Subject to compliance with requirements, provide one of the following:
 - 1) “DensGlass Sheathing” by Georgia Pacific Building Products
 - 2) “GlasRoc Sheathing” by CertainTeed.
 - 3) “Securock” by United States Gypsum Company
 - 4) Or an approved equal.

2.4 NON-LOAD-BEARING STEEL FRAMING, GENERAL

- A. Framing Members, General: Comply with ASTM C-754 for conditions indicated.
 - 1. Steel Sheet Components: Comply with ASTM C-645 requirements for metal.
 - 2. Protective Coating: Hot-dip galvanized, unless otherwise indicated.
- B. Design Loads: As indicated on Drawings or 5 lbf/sq. ft. minimum as required by the IBC.
 - 1. Horizontal Deflection: For non-composite wall framing, limited to 1/360 of the wall height based on horizontal loading of 5 lbf/sq. ft. min.

2.5 SUSPENSION SYSTEM COMPONENTS

- A. Tie Wire: ASTM A-641, steel wire with Class 1 zinc coating, soft temper, 0.047-inch-diameter (18 gauge) wire.
- B. Hanger Wire: ASTM A-641, steel wire with Class 1 zinc coating, 0.148-inch-diameter (9 gauge) wire, minimum, or thicker if required by load imposed with safety factor.
- C. Hanger Attachments to Concrete:
 - 1. Anchors: Fabricated from corrosion-resistant materials with holes or loops for attaching wire hangers and capable of sustaining, without failure, a load equal to 5 times that imposed by construction.
 - 2. Powder-Actuated Fasteners: Suitable for application indicated, fabricated from corrosion-resistant materials with clips or other devices for attaching hangers of type indicated, and capable of sustaining, without failure, a load equal to 10 times that imposed by construction.
- D. Furring Channels:
 - 1. Hat-Shaped, Rigid Furring Channels: ASTM C-645, 0.0538-inch (18 gauge) steel thickness, 7/8 inch deep unless otherwise noted, or 1-1/2 inch deep where indicated on drawings.
 - 2. Resilient Furring Channels: 1/2-inch-deep steel single-leg members designed to reduce sound transmission.
- E. Grid Suspension System for Ceilings: ASTM C-645, direct-hung system composed of main beams and cross-furring members that interlock.
- F. Pre-engineered ceiling framing system:
 - 1. Armstrong ShortSpan Drywall Grid System
 - 2. USG Wall to Wall Drywall Suspension system
 - 3. Or an approved equal.

2.6 STEEL FRAMING FOR FRAMED ASSEMBLIES

- A. Steel Studs and Runners: ASTM C-645 with deflection limits per ASTM C-754.
 - 1. Protective coating: G40, or equivalent or better corrosion resistance.
- B. Firestop Tracks: Top runner manufactured to allow partition heads to expand and contract with movement of the structure while maintaining continuity of fire-resistance-rated assembly

indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.

- C. Steel Framing Stud and Deflection Track Wall System: Self-locking steel studs with telescoping stud extension with knockout in each flange to allow for up to 1 inch of deflection for fire-rated head-of-wall deflection systems.
- D. Slip-Type Head System: Designed for use in head-of-wall deflection conditions that provide a positive attachment of studs to tracks while allowing up to 1-1/2-inches minimum vertical movement in non-rated assemblies.
- E. Shaftwall Framing: Provide gypsum board shaft-wall assemblies capable of withstanding the full air-pressure loads indicated for maximum heights of partitions without failing and while maintaining an airtight and smoke-tight seal. Evidence of failure includes deflections exceeding limits indicated, bending stresses causing studs to break or to distort, and end-reaction shear causing track (runners) to bend or to shear and studs to become crippled.
 - 1. Depth: 2-1/2 inch CH-shaped studs, unless otherwise indicated or required to comply with span and deflection design criteria.
 - 2. Minimum Base Metal Thickness: 0.018 inches unless otherwise indicated or required to comply with span and deflection design criteria.
 - 3. Runner Tracks: Manufacturer's standard J-profile track with manufacturer's standard long-leg length, but at least 2 inches long and matching studs in depth.
 - 4. Engineering Responsibility: Engage a qualified professional engineer to determine design calculations and required member sizes for the specific application shown.
- F. Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4 inches, wall attachment flange of 3/4 inch min., minimum base-steel thickness of 0.0179 inch, and depth required to fit insulation thicknesses indicated.
- G. Cold-Rolled Bridging Channels: 0.0538-inch (18 gauge) bare-steel thickness, with minimum 1/2-inch-wide flanges, 3/4 inch deep.

2.7 TRIM ACCESSORIES

- A. Interior Drywall Trim: ASTM C-1047 extruded accessories.
 - 1. Material: Galvanized or aluminum-coated steel sheet, aluminum, rolled zinc, stainless steel, or plastic.
 - 2. Shapes:
 - a. Cornerbead.
 - b. Bullnose bead.
 - c. LC-Bead: J-shaped; exposed long flange receives joint compound.
 - d. L-Bead: L-shaped; exposed long flange receives joint compound.
 - e. U-Bead: J-shaped; exposed short flange does not receive joint compound.
 - f. Expansion (control) joints.
 - 3. Aluminum: Alloy and temper with not less than the strength and durability properties of ASTM B-221, Alloy 6063-T5.
 - 4. Finish: Corrosion-resistant, compatible with joint compound and finish materials specified.

- B. Drywall trim products that may be incorporated into the Work include:
 - 1. USG Paper-Faced Metal Bead and Trim, including Sheetrock brand and Beadex brand
 - 2. Include bullnose corners where indicated on drawings, with transition caps from bullnose to 90-degree corners at wall bases and other applied trims.

2.8 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C-475.
- B. Joint Tape:
 - 1. Interior Gypsum Wallboard: Cross-fiber paper.
 - 2. Glass-Mat Gypsum Sheathing Board: 2-inch self-adhering fiberglass mesh.
- C. Joint Compound for Interior Gypsum Wallboard: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats, and appropriate for tape application, spotting of fasteners, drywall trim, and complete joint finishing and sanding.
- D. Ready-mixed vinyl-based joint compound with dust reduction formulation.
 - 1. National Gypsum; ProForm XP Ready Mix Joint Compound with Dust-Tech
 - 2. USG; Sheetrock Lightweight All Purpose Joint Compound with Dust Control
 - 3. Lafarge; Rapid Coat Low Dust Joint Compound
 - 4. Certainteed; ProRoc Dust Away Renovation Mud Joint Compound
 - 5. Or an approved equal.

2.9 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.
 - 1. Fasteners for Gypsum Board Assemblies: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten panels to steel members and substrates.
- B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.
 - 1. Use adhesives that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- C. Steel Drill Screws: ASTM C-1002, unless otherwise indicated.
 - 1. Use screws complying with ASTM C-954 for fastening panels to steel members from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick.
- D. Sound Attenuation Blankets: ASTM C-665, Type I (blankets without membrane facing) as specified in Division 07 Sections for Batt Insulation.
 - 1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.
- E. Acoustical Sealant: As specified in Division 07 Section "Joint Sealants."

- F. Foam Gasket Isolation Strips for Wall Tracks: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch thick, in width to suit steel stud size.

2.10 CORNER GUARDS

- A. Surface-Mounted, Stainless Steel Corner Guards: Fabricated from one-piece, formed or extruded stainless steel with formed edges
 - 1. Adhesive application.
 - 2. Angle of 90-degrees, or other angle to match wall condition.
 - 3. Finish: brushed #4 satin.
 - 4. Leg Lengths: 3 inches minimum.
 - 5. Height: Full height of exposed wall indicated on drawings, up to 10 feet.
 - 6. Products: Subject to compliance with requirements, available manufacturers and products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Construction Specialties Inc (the CS Group).
 - b. InPro Architectural Products.
 - c. ProTek Systems, Inc.
 - d. Or approved equal.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance.

3.2 PREPARATION

- A. Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.
 - 1. Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.

3.3 INSTALLATION, GENERAL

- A. Comply with ASTM C-840 and ASTM C-754.
- B. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, furnishings, or similar construction.
- C. Install bracing at terminations in assemblies.

- D. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.
- E. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.
- F. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4-wide spaces at these locations, and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- G. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C-919 and with manufacturer's written recommendations for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.

3.4 APPLYING INTERIOR GYPSUM BOARD

- A. Install interior gypsum board in the following locations:
 - 1. Regular Type: Vertical surfaces, unless otherwise indicated.
 - 2. Type X: Where required for fire-resistance-rated assembly.
 - 3. Ceiling Type: Ceiling and soffit surfaces.
- B. Single-Layer Application:
 - 1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing, unless otherwise indicated.
 - 2. On partitions/walls, apply gypsum panels to minimize end joints.
 - a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
 - b. At stairwells and other high walls, install panels horizontally, unless otherwise indicated or required by fire-resistance-rated assembly.
 - 3. On Z-furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
 - 4. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

3.5 CONTROL JOINTS

- A. Control Joints: Install control joints according to ASTM C-840 and in specific locations approved by Architect for visual effects.
 - 1. Control Joints: One-piece-type, M-shaped or double V shaped configuration designed for gypsum board edges on either side of the control joint.
 - 2. Expansion Joints: Two-piece slip-joint type with straight square edges at joint, allowing each side to move independently without cracking.

- B. Install control joints at the minimum following locations and conditions:
 - 1. Where a partition, wall, or ceiling traverses a construction joint in the base building structure.
 - a. An expansion joint may be required for joints larger than 1/4 inch; verify with Architect.
 - b. An expansion joint shall be installed where a gypsum board joint traverses a building expansion, seismic, or movement control joint. Verify size and width with Architect.
 - 2. Where a wall or partition runs in an uninterrupted straight plane exceeding 30 linear feet.
 - 3. Control joints in gypsum board interior ceilings without perimeter relief shall be installed so that linear dimensions between control joints do not exceed 30 feet and total area between control joints does not exceed 900 sq.ft.
 - 4. Control joints in gypsum board interior ceilings with perimeter relief shall be installed so that linear dimensions between control joints do not exceed 50 feet and total area between control joints does not exceed 2,500 sq.ft.
 - 5. Control joints in exterior ceilings and soffits shall be installed so that linear dimensions between control joints do not exceed 30 feet and total area between control joints does not exceed 900 sq.ft.
 - 6. A control joint or intermediate blocking shall be installed where framing members change direction.
 - 7. Full height door frames shall be considered equivalent to a control joint.

- C. Where a control joint occurs in an acoustical or fire-rated system, blocking shall be provided behind the control joint by using a backing material such as minimum 5/8 in. type X gypsum board, mineral fiber, or other tested equivalent approved for that rated assembly.

3.6 TRIM ACCESSORIES

- A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
 - 1. Material:
 - a. Vinyl or PVC typical unless otherwise noted.
 - b. Galvanized steel G60, 26 ga. min. for exterior locations.
 - c. Zinc Alloy 99%+ for locations requiring higher corrosion resistance.

- B. Interior Trim:
 - 1. Cornerbead: Use at all outside corners, square edge typical, unless bullnose is specifically indicated by the Architect.
 - 2. Reveal trims of specific sizes, shapes, materials, and colors when and where indicated by the Architect.
 - 3. Edge Beads (J or L shaped) where required to terminate exposed gypsum board edges.

3.7 FINISHING GYPSUM BOARD

- A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
 - 1. Prefill open joints, rounded or beveled edges, and damaged surface areas.
 - 2. Apply joint tape over gypsum board joints, except those with trim having flanges not intended for tape.

- B. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to GA-214 and ASTM C-840:
 - 1. Level 2: Joints shall have tape embedded in joint compound and wiped with a joint knife leaving a thin coating of joint compound. Fastener heads and accessories shall be covered with one coat of joint compound. Surface shall be free of excess joint compound. Tool marks are acceptable.
 - a. At concealed locations only, such as above finished ceilings and in attics.
 - 2. Level 3: Joints and shall have tape embedded in joint compound and shall be wiped with a joint knife leaving a thin coating of joint compound over all joints. One additional coat of joint compound shall be applied over all joints. Fastener heads and accessories shall be covered with two separate coats of joint compound. The surface shall be smooth and free of tool marks.
 - a. At surfaces to receive heavy-texture finishes or textured spray finishes.
 - 3. Level 4: Joints shall have tape embedded in joint compound and shall be immediately wiped with a joint knife leaving a thin coating of joint compound. Two separate coats of joint compound shall be applied over all flat joints and one separate coat of joint compound shall be applied over interior angles. Fastener heads and accessories shall be covered with three separate coats of joint compound. The surface shall be smooth and free of tool marks.
 - a. Typical at all walls to receive paint or sheet wallcoverings, unless otherwise noted.
 - 4. Level 5: Joints shall have tape embedded in joint compound and shall be immediately wiped with a joint knife leaving a thin consistent coating of joint compound over all joints and interior angles. Two separate coats of joint compound shall be applied over all flat joints and one separate coat of joint compound shall be applied over interior angles. Fastener heads and accessories shall be covered with three separate coats of joint compound. An additional skim coat of joint compound or a material manufactured especially for this purpose shall be applied to the entire surface. The surface shall be very smooth and free of tool marks.
 - a. Where indicated by Architect for dark paint colors and glossy colors.

3.8 PROTECTION

- A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

- B. Remove and replace panels that are wet, moisture damaged, and mold damaged.

END OF SECTION – 09 21 16 GYPSUM BOARD ASSEMBLIES

09 30 00 TILE

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes installation systems for ceramic wall and floor tile, including edge strips, thresholds, and waterproofing and crack-suppression membranes.
- B. See Drawings for specific product selection and color information. Do not substitute without Architect's approval after full review.
- C. Related Sections include the following:
 - 1. Division 07 Sections for Joint Sealants
 - 2. Division 09 Sections for Gypsum Board, cementitious backer units, and glass-mat, water-resistant backer board.
 - 3. Engineer drawings for floor drains and plumbing fixtures to be coordinated with tile.

1.2 REFERENCES

- A. American National Standards Institute (ANSI):
 - 1. ANSI A137.1 – Standard Specification for Ceramic Tile
 - 2. ANSI A137.3 – Specifications For Gauged Porcelain Tile And Gauged Porcelain Tile Panels/Slabs (Material And Installation Standards) – applicable to tiles 1 square meter or larger.
 - 3. ANSI A108 – Specification for the Installation of Ceramic Tile
 - a. A108.01 General Requirements: Subsurfaces and Preparations by Other Trades
 - b. A108.02 General Requirements: Materials, Environmental, and Workmanship
 - c. A108.1A Installation of Ceramic Tile in the Wet-Set Method, with Portland Cement Mortar
 - d. A108.4 Installation of Ceramic Tile with Organic Adhesive or Water Cleanable Tile-Setting Epoxy Adhesive
 - e. A108.5 Installation of Ceramic Tile with Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar
 - f. A108.6 Installation of Ceramic Tile with Chemical Resistant, Water Cleanable Tile-Setting and -Grout Epoxy
 - g. A108.8 Installation of Ceramic Tile with Chemical Resistant Furan Resin Mortar and Grout
 - h. A108.9 Installation of Ceramic Tile with Modified Epoxy Emulsion Mortar/Grout
 - i. A108.10 Installation of Grout in Tilework
 - j. A108.11 Interior Installation of Cementitious Backer Units
 - k. A108.13 Installation of Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone
 - l. A108.17 Installation of Crack Isolation Membranes for Thin-Set Ceramic Tile and Dimension Stone

- m. A108.19 Interior Installation of Gauged Porcelain Tiles and Gauged Porcelain Tile Panels/Slabs by the Thin-Bed Method bonded with Modified Dry-Set Cement Mortar or Improved Modified Dry-Set Cement Mortar
 - n. A108.20 Exterior Installation of Gauged Porcelain Tiles and Gauged Porcelain Tile Panels/Slabs
- 4. ANSI A118 – Materials Specifications for Ceramic Tile
 - 5. A326.3 American National Standard Test Method for Measuring Dynamic Coefficient of Friction of Hard Surface Flooring Materials
- B. Tile Council of North America, Inc. (TCNA) Handbook.
 - C. American Society for Testing and Materials (ASTM International):
 - 1. ASTM C-1028 - Standard Test Method for Determining the Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer Pull-Meter Method

1.3 SUBMITTALS

- A. Product data: Manufacturer’s product data with application recommendations and installation instructions for each type of indicated product and all accessories.
- B. Shop Drawings: Show locations of each type of tile and tile pattern. Show widths, details, and locations of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces.
- C. Samples: Not required if providing the exact products and colors indicated on drawing finish schedules.
 - 1. If alternative products are proposed in lieu of basis-of-design products, provide full-size tile samples and grout joint samples for each type of system required, in the actual colors and finishes to be installed.

1.4 QUALITY ASSURANCE

- A. In addition to complying with all applicable codes and regulations, comply with the following:
 - 1. “Handbook for Ceramic Tile Installation” (latest edition) as published by the Tile Council of America, Inc.
 - 2. “Recommended Standard Specifications for Ceramic Tile” as published by the Tile Council of America, Inc.
 - 3. American National Standards Institute (ANSI) publications as applicable.
 - 4. American Society for Testing and Materials (ASTM) publications as applicable.
- B. Source Limitations for Tile: Obtain all tile of same type and color or finish from one source or producer. Obtain tile from same production run and of consistent quality in appearance and physical properties for each contiguous area.
- C. Source Limitations for Setting and Grouting Materials: Obtain and mix ingredients of a uniform quality for each mortar, adhesive, and grout component from a single manufacturer, and each aggregate from one source or producer, for uniformity throughout the project.

- D. Source Limitations for Other Products: Obtain each type of product required by this Section through one source from a single manufacturer, for uniformity throughout the project.
- E. Environmental Limitations: Do not install tile until ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

PART 2 - PRODUCTS

2.1 PRODUCTS, GENERAL

- A. Colors, Textures, and Patterns: Where materials are indicated on the drawings for tile, grout, and other products requiring selection of colors, surface textures, patterns, and other appearance characteristics, verify specific product or material options with the Architect through submittals.
- B. Factory Blending: For tile exhibiting color variations within ranges selected during Sample submittals, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.

2.2 TILE PRODUCTS

- A. Ceramic Tile:
 - 1. Composition: Thin slabs of red or white clay, in the form of shale, gypsum or sand mixed with minerals and water, fired at average temperatures of averaging temperatures of 2,000 degrees Fahrenheit.
 - 2. Vitreous (High Density): Water absorption of tile between 0.5% and 3.0%, for use only at interior areas only occasionally exposed to minor amounts of moisture.
 - 3. Hardness and wear: suitable for residential use or light commercial only.
- B. Porcelain Tile:
 - 1. Composition: Slabs of clay mixed with feldspar and sand, fired at average temperatures of averaging temperatures of 2,300 degrees Fahrenheit.
 - 2. Impervious (Extremely dense): Water absorption of tile 0.5% or less, at all areas unless otherwise noted.
 - 3. Hardness and wear: suitable for all uses including exterior exposure.
- C. Tile Trim Units: Matching characteristics of adjoining tile and coordinated with sizes and coursing of adjoining flat tile where applicable.
 - 1. For outside edges and corners, use bullnose shapes.
 - 2. For inside corners and wall base, use coved shapes.
 - 3. Where shown on drawings, provide pencil trims, borders, chair-rails, and other shapes where indicated.

2.3 TERRAZZO TILE

- A. Where indicated on drawings at renovation projects: Provide Terrazzo Tile manufactured with a resin binding matrix and specified aggregates.

1. Hardness: 75 to 85 per ASTM D-2240, Shore D.
 2. Minimum Flexural Strength: 1,000 psi per ASTM C-293
 3. Minimum Compressive Strength: 8,000 psi per ASTM C-579.
 4. Chemical Resistance: No deleterious effects by contaminants after 7-day immersion at room temperature per ASTM D-1308.
 5. Flammability: Self-extinguishing, maximum extent of burning 0.25 inch per ASTM D-635.
 6. Absorption: Less than 5% average per ASTM C-140
- B. Basis of Design Product: Wausau Terrazzo Tiles “Micro Series”, color “Eclipse TZ16”, with polished finish, size 16”x16”x5/8”.
1. Do not substitute products without Architect’s full review and approval.

2.4 THRESHOLDS

- A. General: Fabricate to sizes and profiles indicated or required to provide transition between adjacent floor finishes.
1. Bevel edges at 1:2 slope, aligning lower edge of bevel with adjacent floor finish. Limit height of bevel to 1/4 inch or less, and finish bevel to match face of threshold.
- B. Aluminum Thresholds: Anodized aluminum profile with textured, sloped exposed surface, tapered leading edge, and integrated grout joint spacer.
1. Basis of Design products are by Schuler Systems.
 2. Transition from tile to concrete slab with Schuler Reno Ramp, 3-1/2” length.

2.5 WATERPROOFING AND CRACK-SUPPRESSION MEMBRANES

- A. Fabric-Reinforced, Fluid-Applied Product: System consisting of liquid-latex rubber and fabric reinforcement, designed for exterior applications and interior applications regularly subjected to water.
1. Product that complies with ANSI A118.10 and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.
 - a. Subject to compliance with requirements, available manufacturers and products that may be incorporated into the Work include the following:
 - 1) 9240 Waterproofing and Anti-Fracture Membrane by Custom Building Products.
 - 2) Laticrete 9235 Waterproof Membrane by Laticrete International, Inc.
 - 3) Mapelastic AquaDefense Premium by MAPEI Corporation.
 - 4) Hydro Guard 2000 by Merkrete, a division of Parex USA Company.
 - 5) Or an approved equal.
- B. Unreinforced, Fluid-Applied Product: Liquid-latex rubber in a consistency suitable for roller or trowel application and intended for use as waterproofing and crack isolation for interior tile applications only occasionally subjected to moderate moisture.
1. Product that complies with ANSI A118.12 and is recommended by the manufacturer for the application indicated.

- a. Subject to compliance with requirements, available manufacturers and products that may be incorporated into the Work include the following:
 - 1) RedGard Waterproofing and Crack Prevention Membrane by Custom Building Products.
 - 2) Hydro-Ban by Laticrete International, Inc.
 - 3) Mapelastic CI by MAPEI Corporation.
 - 4) Hydro Guard 1 by Merkrete, a division of Parex USA Company.
 - 5) Or an approved equal.

- C. Urethane Waterproofing and Tile-Setting Adhesive: One-part liquid-applied urethane in a consistency suitable for trowel application and intended for use as both waterproofing and tile-setting adhesive in a two-step process.

2.6 SETTING AND GROUTING MATERIALS

- A. Polymer-Modified Tile Grout: ANSI A118.7: Typical at all locations unless otherwise reviewed and approved by Architect.
 - 1. Polymer Type: Ethylene vinyl acetate, in dry, redispersible form, prepackaged with other dry ingredients.
 - 2. Polymer Type: Acrylic resin or styrene-butadiene rubber in liquid-latex form for addition to prepackaged dry-grout mix.
 - 3. Polymer Type: Either ethylene vinyl acetate, in dry, redispersible form, prepackaged with other dry ingredients, or acrylic resin or styrene-butadiene rubber in liquid-latex form for addition to prepackaged dry-grout mix.
 - 4. Subject to compliance with requirements, available manufacturers and products that may be incorporated into the Work include:
 - a. Polyblend Plus Grout by Custom Building Products
 - b. Permacolor Grout by Laticrete International, Inc.
 - c. Keracolor Grout by MAPEI Corporation
 - d. Or an approved equal.

- B. Sanded or Unsanded Cement Grout: ANSI A118.6, color as indicated.
 - 1. Unsanded grout mixture for joints 1/8 inch and narrower; use for terrazzo tile, and where specifically indicated for wall tile.
 - 2. Sanded grout mixture for joints 3/16 inch and wider; typical unless otherwise indicated for wall and floor tile.

- C. For wall applications, provide nonsagging mortar.

- D. Dry-Set Portland Cement Mortar for Thin Set applications: ANSI A118.1; Provide at locations which receive an uncoupling membrane.
 - 1. Subject to compliance with requirements, available manufacturers and products that may be incorporated into the Work include the following:
 - a. Uncoupling Mat Mortar by Custom Building Products
 - b. 272 Mortar by Laticrete International, Inc.
 - c. Keraset by MAPEI Corporation
 - d. Or an approved equal.

- E. Epoxy Mortar and Grout, ANSI A118.3: three-component system made with a resin, a hardener, and silica sand, water-cleanable, where recommended for use in clean/hygienic/sanitary applications, and high-traffic areas for stain and chemical resistance.
- F. Grout that will be exposed to view shall have color reviewed and approved by the Architect.

2.7 ELASTOMERIC SEALANTS

- A. General: Provide manufacturer's standard chemically curing, elastomeric sealants of base polymer and characteristics indicated that comply with applicable requirements in Division 07 Section "Joint Sealants."
- B. Colors: Provide colors of exposed sealants to match colors of grout in tile adjoining sealed joints, unless otherwise indicated.
- C. One-Part, Mildew-Resistant Silicone Sealant: ASTM C-920; Type S; Grade NS; Class 25; Uses NT, G, A, and, as applicable to nonporous joint substrates indicated, O; formulated with fungicide, intended for sealing interior ceramic tile joints and other nonporous substrates that are subject to in-service exposures of high humidity and extreme temperatures.
- D. Multipart, Pourable Urethane Sealant for Use T: ASTM C-920; Type M; Grade P; Class 25; Uses T, M, A, and, as applicable to joint substrates indicated, O.
- E. Chemical-Resistant Sealants: For chemical-resistant floors, provide chemical-resistant elastomeric sealant of type recommended and produced by chemical-resistant mortar and grout manufacturer for type of application indicated, with proven service record and compatibility with tile and other setting materials, and with chemical resistance equivalent to mortar/grout. Include primer and backer rod recommended by manufacturer.

2.8 TILE BACKING PANELS

- A. Cementitious Backer Units: ANSI A118.9.
 - 1. Thickness: 5/8 inch nominal min.
 - 2. Composition: Portland cement and sand with selected additives.
 - a. No formaldehyde, no gypsum, and no paper facing or abrasive aggregates.
 - 3. Application: At mortar-bed wall tile areas, and behind exterior tile and adhered stone veneers.
- B. Gypsum-based Backer Board: Gypsum-based panels manufactured with water- and mold-resistant additives, with waterproof fiberglass surface coatings on both sides.
 - 1. Thickness: 1/2" or 5/8" to match adjacent drywall panels, or 1/4" laminated/adhered over drywall or plywood backup panels.
 - 2. No paper facings, free of resins or solvents.
 - 3. Specifically designed to be used as backer for thin-set tile wall applications.
 - 4. Note: "green board" or similar paper-faced panels are not allowed.

2.9 MISCELLANEOUS MATERIALS

- A. Cleavage Membrane: No. 15 asphalt saturated felt conforming to ASTM D-226, duplex building paper conforming to Fed. Spec. UU-B-790, Type I, or 4 mil polyethylene sheeting conforming to ASTM D-2103.
- B. Metal Edge Strips: Angle or L-shape, height to match tile and setting-bed thickness, metallic aluminum or combination of metal and PVC or neoprene base, designed specifically for flooring and wall tile applications, exposed-edge material.
 - 1. Basis of Design products are by Schuler Systems.
 - 2. At outside corners, typically Schluter Rondec shapes.
 - 3. At inside corners, typically Schluter Dilex cove shapes.
- C. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.
- D. Grout Sealer: Manufacturer's recommended product for waterproofing grout joints that does not change color or appearance of grout.
 - 1. Aqua Mix Sealers Choice Gold, or Ultra-Solv, by Custom Building Products.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.
 - 1. Verify that substrates for setting tile are firm; dry; clean; free of oil, waxy films, and curing compounds; and within flatness tolerances required by referenced ANSI A108 Series of tile installation standards for installations indicated.
 - 2. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed before installing tile.
 - 3. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.

3.2 PREPARATION

- A. Remove coatings, including curing compounds, and other substances from substrates that may contain soap, wax, oil, or silicone, that are incompatible with tile-setting materials.
- B. Verify that concrete substrates for tile floors installed with adhesives or thin-set mortar that comply with flatness tolerances specified in referenced ANSI A108 Series of tile installation standards.
 - 1. Fill cracks, holes, and depressions with trowelable leveling and patching compound according to tile-setting material manufacturer's written instructions. Use product specifically recommended by tile-setting material manufacturer.
 - 2. Remove protrusions, bumps, and ridges by sanding or grinding.

- C. Blending: For tile exhibiting color variations within ranges selected during Sample submittals, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

3.3 INSTALLATION, GENERAL

- A. ANSI Tile Installation Standards: Comply with parts of ANSI A108 Series "Specifications for Installation of Ceramic Tile" that apply to types of setting and grouting materials and to methods indicated and applicable.
- B. TCA Installation Guidelines: TCA's "Handbook for Ceramic Tile Installation." Comply with TCA installation methods indicated in guidelines and tables.
- C. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions, unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
- D. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.
- E. Jointing Pattern: Lay tile in grid pattern, unless otherwise indicated. Align joints when adjoining tiles on floor, base, walls, and trim are same size. Lay out tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths, unless otherwise indicated.
- F. Expansion Joints: Locate expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.
 - 1. Locate joints in tile surfaces directly above joints in concrete substrates.
- G. For ceramic tile grouts (sand-portland cement; dry-set, commercial portland cement; and latex-portland cement grouts), comply with ANSI A108.10.
- H. At showers, tubs, and where indicated, install cementitious backer units and treat joints to comply with ANSI A108.11 and manufacturer's written instructions for type of application indicated.

3.4 WATERPROOFING AND CRACK-SUPPRESSION MEMBRANE INSTALLATION

- A. Install waterproofing to comply with ANSI A108.13 and waterproofing manufacturer's written instructions to produce waterproof membrane of uniform thickness bonded securely to substrate.
- B. Do not install tile over waterproofing until waterproofing has cured and been tested to determine that it is watertight.

3.5 FLOOR TILE INSTALLATION

- A. General: Install floor tile and setting-beds to comply with requirements recommended by TCA installation methods and ANSI A108 Series of tile installation standards.

3.6 Install tile on floors and walls with the following uniform joint widths: 1/8 inch or 3/16 inch as approved by Architect.

- A. Metal Edge Strips: Install at locations indicated on drawings.
- B. Grout Sealer: Apply grout sealer to grout joints according to grout-sealer manufacturer's written instructions. Immediately clean and remove excess sealer and sealer that has gotten on tile faces by wiping with soft cloth.

3.7 CLEANING AND PROTECTING

- A. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.
 - 1. Remove epoxy and latex-portland cement grout residue from tile as soon as possible.
 - 2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned.
 - 3. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.
 - 4. Trap and remove tile and grout materials to prevent it from clogging drains.
- B. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.
- C. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear.

END OF SECTION – 09 30 00 TILE

09 51 00 ACOUSTICAL CEILINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes acoustical tiles for ceilings and accessories:
 - 1. Acoustical ceiling panels.
 - 2. Grid suspension system.
 - 3. Wire hangers, fasteners, main runners, cross tees, and wall angle moldings.

1.2 SUBMITTALS

- A. Product Data: Cut sheets and installation data for each type of product indicated.
- B. Samples: Not required if providing the exact products and colors indicated on drawing finish schedules.
 - 1. If alternative products are proposed in lieu of basis-of-design products, provide samples of actual materials and textures for Architect review and approval.
 - a. Acoustical Tile: 4-inch-square samples of each type, color, pattern, and finish texture.
 - b. Concealed Suspension System Members: 8-inch long sample of each type.
 - c. Exposed Moldings and Trim: Set of 8-inch long samples of each type and color.
- C. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:
 - 1. Ceiling suspension system members.
 - 2. Method of attaching hangers to building structure.
 - 3. Layouts with dimensions and locations for cast-in-place anchors, clips, and other ceiling attachment devices whose installation is specified in other Sections.
 - 4. Ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.

1.3 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of acoustical ceiling tile and supporting suspension system through one source from a single manufacturer.
- B. Fire-Resistance Characteristics: Provide acoustical panel ceilings identical to those of assemblies tested for fire resistance per ASTM E-119 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. Surface Burning Characteristics
 - a. ASTM E-1264: Class A
 - b. ASTM E-84:
 - 1) Flame spread of 25 or less

2) Smoke developed of 50 or less

- C. Broad Spectrum Antimicrobial Fungicide and Bactericide Treatment: Provide acoustical panels treated with manufacturer's standard antimicrobial formulation that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria and showing no mold, mildew, or bacterial growth when tested according to ASTM D-3273.

1.4 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install acoustical tile ceilings until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
 - 1. Operate ventilation system for not less than 48 hours before beginning acoustical tile ceiling installation.
- B. Coordinate layout and installation of acoustical ceilings and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

1.5 WARRANTY

- A. Acoustical Panel: Submit a written warranty executed by the manufacturer, agreeing to repair or replace acoustical panels that fail within the warranty period. Failures include, but are not limited to:
 - 1. Acoustical Panels: Sagging and warping as a result of defects in materials or factory workmanship.
 - 2. Grid System: Rusting and manufacturer's defects.
- B. Warranty Periods, beginning on the date of Substantial Completion:
 - 1. Acoustical Ceiling Panels: Ten (10) years.
 - 2. Suspension Grids: Ten (10) years.
 - 3. Factory Finishes on visible grids and trims: Twenty (20) years.

1.6 EXTRA MATERIALS

- A. Furnish extra materials for the Owner as described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Acoustical Ceiling Units: Full-size tiles equal to 2 percent of quantity installed.
 - 2. Suspension System and Trim Components: Quantity of each concealed grid and exposed component equal to 2 percent of quantity installed.

PART 2 - PRODUCTS

2.1 ACOUSTICAL CEILING TILES

- A. Product: for standard perforated texture in areas without specific performance requirements:
 - 1. Size: 24" x 24" x 5/8"
 - 2. NRC: Standard, 0.55 min.
 - 3. LRC: 0.55 min.
 - 4. CAC: 0.33 min.
 - 5. Edge Profile: Angled Tegular
 - 6. Suspension Grid: 15/16" standard
 - 7. Color: White, unless otherwise indicated on plans.
 - 8. Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a. "Cortega" 704 by Armstrong World Industries
 - b. Substitutions only after Architect's full review and approval. Similar products that may be considered include:
 - 1) "Frost Basic" by USG Corp.
 - 2) "Baroque" by Certainteed
 - 3) Or approved equal.

- B. Product: for areas subject to water and humidity, smooth-textured, unperforated, water-repellent surface that meets guidelines for controlled environments and FSIS/USDA.
 - 1. Size: 24" x 24" x 5/8"
 - 2. LRC: High, 0.89 min.
 - 3. Surface Finish: Factory-applied latex or vinyl coating, washable.
 - 4. Edge Profile: Square Lay-in
 - 5. Suspension Grid: 15/16" standard
 - 6. Color: White
 - 7. Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a. "Clean Room VL Perforated" 869 by Armstrong World Industries
 - b. Substitutions only after Architect's full review and approval. Similar products that may be considered include:
 - 1) "Vinylshield" by Certainteed
 - 2) "Clean Room" by USG Corp.
 - 3) Or approved equal.

- C. Product: for suspended "cloud" accent ceiling features:
 - 1. Subject to compliance with requirements, products that may be incorporated into the Work include the following:
 - a. "Formations" Plank Cloud Kits by Armstrong World Industries.
 - b. Substitutions only after Architect's full review and approval.
 - 2. Size of cloud: as shown on drawings.
 - 3. Ceiling Panel: "Ultima Vector" "Fine Fissured" planks by Armstrong
 - 4. Edge Profile: Angled Tegular
 - 5. Suspension Grid: 15/16" standard
 - 6. Color: White, unless otherwise indicated on plans.

2.2 METAL SUSPENSION SYSTEMS, GENERAL

- A. Metal Suspension System Standard: Provide manufacturer's standard metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable requirements in ASTM C-635, with wall angles and moldings, transition trim, perimeter trim, curtain pockets, hold down clips, stabilizer bars, seismic clips, splices, and other components as required for architectural design and purpose indicated.
- B. Attachment Devices: Size for five times the design load indicated in ASTM C-635, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.
- C. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:
 - 1. Zinc-Coated, Carbon-Steel Wire: ASTM A-641, Class 1 zinc coating, soft temper.
 - 2. Stainless-Steel Wire: ASTM A-580, Type 304, nonmagnetic.
 - 3. Nickel-Copper-Alloy Wire: ASTM B-164, nickel-copper-alloy UNS No. N04400.
 - 4. Size: Select wire diameter so its stress at 3 times hanger design load (ASTM C-635, Table 1, "Direct Hung") will be less than yield stress of wire.
- D. Seismic Struts: Compression struts designed to accommodate lateral forces.
- E. Seismic Clips: Seismic clips designed and spaced to secure acoustical tiles in-place.
- F. Hold-Down Clips: Where necessary for stability, provide manufacturer's standard hold-down clips on all cross tees.

2.3 METAL SUSPENSION SYSTEM

- A. Basis-of-Design Product: Subject to compliance with requirements, provide
 - 1. Armstrong World Industry's "Prelude" 15/16 ML Exposed Tee (Basis of Design)
 - 2. USG's "Donn DX" 15/16 Exposed Tee
 - 3. Chicago Metallic by Rocfon
 - 4. Or an approved equal.
- B. Direct-Hung, Double-Web Suspension System: Main and cross runners roll formed from and capped with cold-rolled steel sheet, prepainted, electrolytically zinc coated, or hot-dip galvanized according to ASTM A 653/A 653M.
 - 1. Structural Classification: Intermediate-duty system.

2.4 METAL EDGE MOLDINGS AND TRIM

- A. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Use manufacturer's standard moldings for edges and penetrations that comply with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension system runners.
 - 1. Provide manufacturer's standard edge moldings that fit acoustical tile edge details and suspension systems indicated and that match width and configuration of exposed runners, unless otherwise indicated.
 - 2. For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit penetration exactly.

- B. Extruded-Aluminum Edge Moldings and Trim: Where indicated for “cloud” formations of suspended ceiling grids, provide manufacturer's exposed extruded-aluminum edge moldings and trims, including splice plates, corner pieces, and attachment and other clips, complying with seismic design requirements.
 - 1. “Axiom Classic” of “Axiom Vector” 6-inch trims and perimeters by Armstrong World Industries (Basis of Design).

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine ceiling areas and conditions, including structural framing and substrates to which acoustical tile ceilings attach or abut, with Installer present, for requirements in this and other Sections that affect ceiling installation, and anchorage requirements for installation tolerances and other conditions affecting performance of acoustical tile ceilings.
- B. Measure each ceiling area and establish layout of acoustical tiles to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width tiles at borders, and comply with layout shown on reflected ceiling plans.

3.2 INSTALLATION OF SUSPENDED ACOUSTICAL TILE CEILINGS

- A. General: Install acoustical tile ceilings to comply with ASTM C-636 and seismic design requirements indicated, per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."
- B. Suspend ceiling hangers from building's structural members and as follows:
 - 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
 - 2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 - 3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
 - 4. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
 - 5. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for both structure to which hangers are attached and type of hanger involved. Install hangers in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.
 - 6. Do not support ceilings directly from metal forms or roof deck. Fasten hangers to cast-in-place hanger inserts, postinstalled mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.

7. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
 8. Do not attach hangers to steel deck tabs.
 9. Do not attach hangers to steel roof deck. Attach hangers to structural members.
 10. Space hangers not more than 48 inches o.c. along each member supported directly from hangers, unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.
 11. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.
- C. Install edge moldings and trim of type indicated at perimeter of acoustical tile ceiling area and where necessary to conceal edges of acoustical tiles.
1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed up against walls.
 2. Do not use exposed fasteners, including pop rivets, on moldings and trim.
- D. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
- E. Arrange directionally patterned acoustical tiles in pattern as indicated on plans.
- F. Batt Insulation for Ceiling Sound Attenuation: Install minimum 3-inch-thick, unfaced glass fiber blanket insulation over suspended ceilings at partitions in a width that extends insulation at least 48 inches on either side of partition.
- G. Sealant: Provide acoustical sealant caulk applied to perimeter of ceiling grid abutting walls; clear, no color, or paintable white.

END OF SECTION – 09 51 00 ACOUSTICAL CEILINGS

09 65 13 RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Resilient base.
 - 2. Resilient moulding accessories.
 - 3. Resilient stair treads and accessories.

1.2 SUBMITTALS

- A. Product Data: Cut sheets and installation data for each type of product indicated.
- B. Samples: Not required if providing the exact products and colors indicated on drawing finish schedules.
 - 1. If alternative products are proposed in lieu of basis-of-design products, provide samples of actual materials with colors for Architect review and approval.
- C. Maintenance Data: For each type of resilient material to include in maintenance manuals.

1.3 DELIVERY, STORAGE, AND HANDLING

- A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer.
 - 1. Store flooring, adhesives and accessories in the conditioned spaces where they will be installed for at least 48 hours before beginning installation.
 - 2. Store roll materials as directed by manufacturer to avoid damage.
- B. Comply with CRI 104, Section 7.2, "Site Conditions; Temperature and Humidity" and Section 7.12, "Ventilation."

1.4 PROJECT CONDITIONS

- A. Maintain ambient temperatures and humidity within range recommended by manufacturer in spaces to receive resilient products during the following minimum time periods:
 - 1. 48 hours before installation.
 - 2. During installation.
 - 3. After installation and until Substantial Completion.
- B. Install resilient products after other finishing operations, including painting, have been completed.

1.5 EXTRA MATERIALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Furnish not less than 2 percent of each type, color, pattern, and size of resilient product installed, but not less than 10 linear feet.

PART 2 - PRODUCTS

2.1 RESILIENT BASE

- A. Resilient Base Standard: ASTM F-1861.
 - 1. Material Requirement: Type TS (rubber, vulcanized thermoset) preferred basis-of-design, or Type TP (rubber, thermoplastic)
 - 2. Manufacturing Method: Group I (solid, homogeneous)
 - 3. Style: Cove (base with toe)
- B. Resilient Base, General:
 - 1. Minimum Thickness: 0.125 inch (1/8") min.
 - 2. Lengths: Coils in manufacturer's standard length.
 - 3. Color and Finish: As selected by Architect from manufacturer's full range.
- C. Standard Flat Coved Wall Base:
 - 1. Height: 4 inches min.
 - 2. Subject to requirements, products include:
 - a. "Wallflowers" by Flexco Corp. (Basis of Design)
 - b. Substitutions only after Architect's full review and approval. Similar products that may be considered include:
 - 1) "BurkeBase Type TS" by Mannington Commercial
 - 2) "Pinnacle" rubber base by Roppe Corp.
 - 3) "Traditional Duracove" by Tarkett USA
 - 4) Or approved equal.

2.2 RESILIENT STAIR ACCESSORIES

- A. Resilient Stair Treads Standard: ASTM F-2169.
 - 1. Material Requirement: Type TS (rubber, vulcanized thermoset) or Type TP (rubber, thermoplastic).
- B. Characteristics:
 - 1. Size: Lengths and depths to fit each stair tread and riser in one piece.
 - 2. Surface Design: Class 2, raised design pattern of round disks.
 - 3. Colors and Patterns: Solid color, as selected by Architect.
 - 4. Abrasive Nosing Strip: none, not required.
 - 5. Risers: none, not required.

- C. Subject to compliance with requirements, available manufacturers and products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Johnsonite Rubber by Tarkett USA
 - 2. Substitutions only after Architect's full review and approval. Similar products that may be considered include:
 - a. Distinct Designs Heavy Duty by Flexco Corp.
 - b. Burke Collection by Mannington Commercial
 - c. Or an approved equal.

2.3 RESILIENT MOLDING ACCESSORIES

- A. Provide Resilient Molding Accessories as indicated on Drawings and where necessary for finished edges of project conditions:
 - 1. Cap for cove carpet
 - 2. Cap for cove resilient floor covering
 - 3. Carpet bar for tackless installations
 - 4. Carpet edge for glue-down applications
 - 5. Nosing for carpet
 - 6. Nosing for resilient floor covering
 - 7. Reducer strip for resilient floor covering
 - 8. Joiner for tile and carpet
 - 9. Transition strips
- B. Material for accessories: Rubber to match adjacent products.
- C. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.
 - 1. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.

3.2 RESILIENT BASE INSTALLATION

- A. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.

- B. Install resilient base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned. Do not stretch resilient base during installation.
- C. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
- D. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.
- E. Preformed Corners: Install preformed corners before installing straight pieces; use factory-formed outside corners wherever possible.
 - 1. Job-Formed Corners: only when factory-formed corners are not available:
 - a. Outside Corners: Use straight pieces of maximum lengths possible. Form without producing discoloration (whitening) at bends. Cut stress relief grooves in back of base to neatly fold material.
 - b. Inside Corners: Use straight pieces of maximum lengths possible; angle-cut vertical folding groove and notch cove toe to butt neatly without overlapping.

3.3 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protection of resilient products.
- B. Immediately after completing resilient product installation:
 - 1. Remove adhesive and other blemishes from exposed surfaces without scratching.
 - 2. Damp-mop surfaces to remove marks and soil.
- C. Protect resilient products from scratches, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

END OF SECTION – 09 65 13 RESILIENT BASE AND ACCESSORIES

09 65 19 RESILIENT TILE FLOORING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Solid vinyl floor tiles and planks.
 - 2. Vinyl composition floor tile.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated, including coefficient of friction data and installation instructions.
- B. Shop Drawings: Include floor tile layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
 - 1. Show details of special patterns.
- C. Samples: Not required if providing the exact products and colors indicated on drawing finish schedules.
 - 1. If alternative products are proposed in lieu of basis-of-design products, provide samples of actual materials with colors for Architect review and approval.
- D. Maintenance Data: For each type of floor tile to include in maintenance manuals.
- E. Resilient Flooring Warranty: Copy of manufacturer's standard product warranty terms.

1.3 PROJECT CONDITIONS

- A. Store flooring, adhesives and accessories in the conditioned spaces where they will be installed for at least 48 hours before beginning installation, with controlled air and humidity levels within plus or minus 5 degrees of final occupancy conditions.

1.4 WARRANTY

- A. Special Warranty for Vinyl Plank products: Manufacturer agrees to repair or replace components of LVP/LVT installation that fail in materials or workmanship within specified warranty period. The warranty shall cover delaminating and loss of original pattern and color due to fading or wear, when the flooring is subject to normal residential use.
 - 1. Warranty Period for Commercial Use: 7 Years from the date of Substantial Completion.

1.5 EXTRA MATERIALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Furnish materials equal to a minimum of 2 percent of amount installed, for each type, composition, color, pattern, and size of item installed.

PART 2 - PRODUCTS**2.1 SOLID VINYL FLOOR TILE**

- A. General: Consisting of a tough, clear, rigid vinyl wear layer protecting a high-resolution print layer on a solid vinyl backing. The wear surface is embossed with different textures, protected by a UV-cured polyurethane finish. Resistant to cleaning agents and light.
- B. Tile Standard: ASTM F 1700, Class III, Type B, printed film vinyl tile , embossed surface.
 - 1. Edge Treatment: Square or Microbeveled.
 - 2. Sizes: Plank or Tile, as selected by Architect from manufacturer's full range.
- C. Commercial-Grade Luxury Vinyl Tile (LVT) for Glue-Down Installation:
 - 1. Tile total thickness: 3.0 mm (minimum)
 - 2. Wear layer thickness: 20 mil (minimum)
 - 3. Limited Commercial Warranty: 20 years
- D. Commercial-Grade Luxury Vinyl Tile (LVT) for Floating or Loose-Lay Installation:
 - 1. Tile total thickness: 5.0 mm (minimum)
 - 2. Wear layer thickness: 20 mil (minimum)
 - 3. Limited Commercial Warranty: 10 years
- E. Products: See Drawings for specific manufacturer and color information. Do not substitute without Architect's approval after full review. Utilize substitution request form for consideration.
 - 1. Basis of Design Product: "Reforestation C0188" 9.25" x 59" glue-down LVT by the Mohawk Group, a division of Mohawk Industries.

2.2 VINYL COMPOSITION FLOOR TILE

- A. VCT, General: Consisting of vinyl fillers, pigments, and the binder shall consist of one or more resins of poly(vinyl chloride) or vinyl chloride copolymers or both compounded with suitable plasticizers.
- B. Tile Standard: ASTM F-1066 either Class 1 solid-color tile or Class 2 through-pattern.
 - 1. Wearing Surface: Smooth.
 - 2. Size: 12 by 12 inches
- C. Product: Subject to compliance with requirements, provide the following:
 - 1. "Excelon" by Armstrong World Industries (Basis of Design)
 - 2. Do not substitute products without Architect's full review and approval. Similar products that may be considered include:

- a. “Alternatives” by the Congoleum Corporation
- b. “IQ Granite SD” by Tarkett USA
- c. Or an approved equal.

2.3 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.
- B. Adhesives: Type recommended by manufacturer to suit floor tile and substrate conditions indicated.
 - 1. Use adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- C. Floor Polish for VCT: Provide protective liquid floor polish products where recommended by manufacturer. Verify appropriate recommended types.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.
 - 1. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using methods recommended by manufacturer. Do not use solvents. Remove ink pen markings.
- B. Concrete Substrates: Prepare according to ASTM F-710.
 - 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 - 2. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
 - 3. Moisture Testing: Perform tests recommended by manufacturer to verify substrate acceptability. Proceed with installation only after substrates pass testing.
 - 4. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.
- C. For glue-down applications, verify with flooring and/or adhesive manufacturer whether a primer will be required on porous subfloors.

3.2 RESILIENT FLOOR TILE INSTALLATION

- A. Comply with manufacturer's written instructions for installing floor tile.
- B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.

- C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.
- D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.
- E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings, to terminate edge centered under door leaf when door is closed.
- F. Install floor tiles on covers for data and electrical outlets, building expansion-joint covers, and similar items in finished floor areas. Maintain overall continuity of color and pattern between pieces of tile installed on covers and adjoining tiles. Tightly adhere tile edges to substrates that abut covers and to cover perimeters.
- G. For glue-down flooring: Adhere floor to flooring substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.
 - 1. Apply adhesive to recommended thickness and texture, and allow adhesive to set to required optimum tack for adhesion of flooring. Do not wet glue.

3.3 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protection of floor tile.
- B. Perform the following operations immediately after completing floor tile installation:
 - 1. Remove adhesive and other blemishes from exposed surfaces.
 - 2. Sweep and vacuum surfaces thoroughly.
 - 3. Damp-mop surfaces to remove marks and soil.
- C. Protect floor tile products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- D. Joint Sealant: Apply clear sealant to resilient flooring at perimeter and around columns, at door frames, and at other joints and penetrations.
- E. Cover floor tile until Substantial Completion.

END OF SECTION – 09 65 19 RESILIENT TILE FLOORING

09 67 00 FLUID-APPLIED FLOORING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes floor surface preparation and application of high-performance, slip-resistant floor finish coating systems.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated. Include manufacturer's product data sheets on each individual component product to be used to comprise the entire flooring system, including substrate primers and optional additives.
 - 1. Label and reference each product to each coating system and locations of application areas.
- B. Samples: Not required. Field mockup will establish color, clarity, and sheen requirements.
- C. Manufacturer's technical guides, installation instructions, application recommendations, and maintenance and cleaning information.
- D. Warranty documents: Copies of Manufacturer's and Installer's project-specific warranty terms.

1.3 QUALITY ASSURANCE

- A. Provide coordinating products from same manufacturer to form the total coating system. Manufacturer shall certify that materials for use within each coating system are compatible with one another and substrates indicated, under conditions of service and application intended.
- B. Manufacturer Qualifications and Field Technical Service: Manufacturer must be able to provide technically trained field representatives on site during application to oversee installation methods, and shall be available to perform field problem solving issues with the installer.
- C. The Installer shall have at least 5 years experience in installation of the flooring system and be approved by the flooring system manufacturer in all phases of surface preparation and application of the product system to be installed.
 - 1. Submit evidence from the flooring system manufacturer that the Installer is authorized to apply the indicated system as required to obtain project-specific warranty.
- D. Conduct a pre-installation conference with the architect or owner's representative, flooring manufacturer's representative, flooring installer, and concrete trades, to review requirements

for substrate conditions, installation schedule, application procedures and sequence of steps, quality control, curing, inspection, and acceptance criteria.

- E. Contractor shall provide a supervisor at the work site who will be consistently present during all phases of the flooring installation, including sub-surface preparation, protection of adjacent work, and coating application operations.
- F. Mockups: Include the application of benchmark samples of each floor coating system, to verify selections made under sample submittals and to demonstrate field-applied aesthetic effects and set quality standards for materials and execution.
 - 1. Architect or Owner will select one surface or room of a minimum of 10'x10' for mockup application of each type of coating and substrate.
 - 2. Mockup area(s) may become part of the permanent work upon approval.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. All materials are to be delivered to the job site in the manufacturer's original packaging. The product code and other identification marks should be clearly marked and visible on each container.
 - 1. Verify that "kits" are complete for the coating system requirements, including any primers, slurries, mix-components, broadcast materials, and top coats; and verify that quantities of each required product are correct BEFORE starting installation.
- B. Store materials not in use in tightly covered containers in dry, well-ventilated areas with ambient temperatures continuously maintained within acceptable ranges required by the materials manufacturer.
 - 1. Maintain containers in clean condition, free of foreign materials and residue.
 - 2. Remove rags and waste from storage areas daily.
- C. Material Safety Data Sheets are to be kept on site and made readily available for all personnel.

1.5 PROJECT CONDITIONS

- A. Apply coatings only when air and substrate temperatures, and air humidity and substrate moisture levels are within acceptable ranges as required by the flooring system manufacturer.
 - 1. Measure floor substrate or concrete slab moisture content prior to starting work.
- B. Verify the existence and condition of vapor barriers, drains, and any other items or substances that may impact the procedure of the work.
- C. Maintain proper lighting and visibility throughout the work environment; the lighting should be at least as bright as the final lighting level of the space.
- D. Store and dispose of any waste in accordance with regulations of local authorities.

1.6 WARRANTY

- A. Manufacturer's Warranty: Manufacturer warrants flooring system materials to be free of defects.
 - 1. Manufacturer's Warranty Term: One (1) years from the date of Substantial Completion.
- B. Workmanship Warranty: The installing contractor shall provide an executed single source warranty in which Installer shall agree to repair, at his own expense, any defects in the floor coating system caused by improper substrate preparation or improper workmanship in the floor coating system installation.
 - 1. Workmanship Warranty Term: One (1) year from the date of Substantial Completion.
 - 2. The installer shall not be held responsible for floor coating failure due to circumstances beyond his control, including moisture from below the concrete slab, and concrete slab or building wall cracking or settling.

PART 2 - PRODUCTS

2.1 LIQUID-APPLIED FLOORING SYSTEMS, GENERAL

- A. Materials and Components: All materials to be used to create the floor coating shall be produced by the same flooring system manufacturer, or be specifically approved for use in the system by the manufacturer, and may include:
 - 1. Shallow fill and patching products.
 - 2. Deep fill and thicker sloping products that may include cement and/or grout.
 - 3. Primer coating, specific to the type of substrate, to form vapor barrier and ensure adhesion.
 - 4. Main coating mix kit(s), which may be used for more than one coat, including:
 - a. Catalyst
 - b. Resin
 - c. Pigment
 - 5. Top coat or sealer if required by manufacturer.
- B. Seamless radiused cove base at floors-to-walls shall be included for all systems.
 - 1. Cove base height: 4 inches, unless otherwise noted on drawings.
- C. Floor Coating System Properties, General for all types:
 - 1. Hardness, Shore D, ASTM D-2240: > 65 min. (above 75 preferred)
 - 2. Coefficient of Friction (Static, wet or dry): 0.6 minimum (0.8 preferred)
 - 3. Water Absorption (ASTM C-413 or sim.): less than 0.10%
 - 4. Zero VOC's, or provide evidence of VOC compliance for project location.

2.2 EPOXY FLOOR COATING

- A. Liquid Epoxy Coating System: Heavy-duty chemical-resistant floor coating designed for industrial applications, consisting of a two-component catalyzed polyamide epoxy coating.

1. Finish: Manufacturer's standard gloss.
2. Color: standard or custom tinted solid color, selected by Architect.
3. Total System Thickness: approx. 5 mil.

B. Products that may be incorporated into the Work include:

1. "Armorseal 1000 HS" by Sherwin Williams
2. Do not substitute products without Architect's full review and approval.

2.3 POLYURETHANE FLOOR COATING

A. Liquid Polyurethane Coating System: Heavy-duty chemical-resistant floor coating designed for industrial applications, consisting of a two-component low-odor urethane formula.

1. Concrete slab surfaces shall be mechanically prepared by lightly grinding the surface with 60-80 grit diamond grinding equipment, to open the pores of the concrete, remove any existing surface films, and achieve a uniform substrate.
2. Total System Thickness: minimum of 8 mils.
3. Basis of Design is Clear, no color, showing the grain of the concrete substrate.
 - a. Finish: medium or satin gloss,
 - b. Smooth, no texture, no grit.

B. Products that may be incorporated into the Work include:

1. "Resufloor" Grind and Seal system by Sherwin Williams, including minimum two coats:
 - a. "Resufloor Glaze" as first coat, comprised of a two-component mixed 100% solids epoxy resin and hardener.
 - b. "Resutile AT" as top wear coat, comprised of a two-component mixed polyurethane resin and hardener.
2. Do not substitute products without Architect's full review and approval.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.

1. Measure the existing moisture content of substrates to confirm tolerances within floor coating manufacturer's recommendations. Measure all substrate materials to be in contact with floor coating, including, but not limited to, concrete, masonry, wood, gypsum board, and metals.
2. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
3. Measure air humidity and temperature, and verify maintenance of acceptable ventilation throughout the Work.

4. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.
5. Proceeding with coating application indicates contractor's verification of and satisfaction with surfaces and conditions.

3.2 PREPARATION

- A. Comply with floor coating system manufacturer's written instructions and recommendations applicable to substrates affected.
 1. Do not coat surfaces if moisture content, alkalinity of surfaces, or other parameters cannot be corrected to within those permitted in manufacturer's written instructions.
- B. Remove cover plates, machined surfaces, and similar items already in place that are not to be coated. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and coating, or discuss options for protection of items with the floor coating manufacturer and owner.
 1. After completing coating operations, reinstall items that were removed, using workers skilled in the trades involved.
- C. Mechanical floor surface preparation may be recommended or required by the flooring system manufacturer to achieve optimal substrate texture and condition and may include, but is not limited to:
 1. Shot-Blasting - steel media is re-captured and all dust and debris is contained.
 2. Mechanical abrasion - using diamond grinders, needle guns, bush hammers, or other suitable equipment
 3. Saw-cutting, chiseling, or chipping - to prepare joints, cracks, and keyways to a minimum 1/2 inch depth and 1/2 inch width
 4. Removal of spalled, loose, or delaminated substrate materials.
- D. Clean substrates of substances that could impair bond of coatings, including dirt, oil, grease, and incompatible paints and encapsulants.
 1. Remove incompatible primers or existing coatings if required, and prepare substrate with compatible primers as required to produce coating systems indicated.
 2. Surfaces shall be free of oil, grease, curing compounds, loose particles, moss, algae growth, laitance, friable matter, dirt, and bituminous products.
 3. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk.
 4. Masonry Substrates: Remove efflorescence and chalk.
 5. Steel Substrates: Remove rust and loose mill scale.
 6. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied coatings.
 7. Aluminum Substrates: Remove surface oxidation.
 8. Wood Substrates:
 - a. Scrape and clean small, dry, seasoned knots, and apply a thin coat of knot sealer before applying primer. Fill holes and imperfections in the finish surfaces with putty or plastic wood filler.
 - b. Sand surfaces that will be exposed to view and remove all dust.

- c. Prime edges, ends, faces, undersides, and back sides of wood.
- 9. Substrates shall be dry and moisture removed as per floor coating recommendations prior to proceeding with installation.
- E. Use patching and fill material to fill holes and depressions in substrates according to manufacturer's written instructions.
- F. Treat control joints and other nonmoving substrate cracks to prevent cracks from reflecting through resinous flooring according to manufacturer's written instructions.

3.3 APPLICATION

- A. Apply all components of floor coating system according to manufacturer's written step-by-step instructions. Follow all recommended methods and details, including:
 - 1. Mixing and blending of components
 - 2. Pouring and spreading batches
 - 3. Troweling, raking, and rolling to required thickness
 - 4. Broadcasting finish aggregate in the appropriate amount per square foot, within the required time for optimal setting and curing
- B. Ensure application equipment is clean and free of previously used materials.
- C. Floor-to-Wall Cove Base:
 - 1. Provide seamless coved base integral with and made of the same materials as the floor coating, up to 6-inches high at base of walls.
 - 2. Smoothly profile the floor-to-wall intersection, minimum 1/2" radius, maximum 1-1/2" radius. Use an appropriate tool to ensure that radius shape and size is uniform and matching at all corners.
 - 3. Provide a permanent termination strip along the top edge of the wall base. Obtain Owner's and Designer's approval of the shape and material of termination strip to be used, to be selected from the floor coating manufacturer's approved products.
 - 4. Cove base is to receive the same texture and finish coating as the entire floor system.
- D. Do not dilute liquids. Materials are to be premixed for use according to manufacturer's instructions. Apply products by pouring, pumping or spraying per manufacturer's instructions, using equipment recommended by manufacturer.
- E. Mockup Areas: Contractor shall apply flooring materials to a small area to establish physical and visual effects of application and absorption level to establish coverage rates. Coverage will be dependent upon surface texture and porosity.
- F. Transition from floor coating system to adjacent flooring:
 - 1. For transition to sealed or polished concrete slabs: saw-cut slab for recessed keyed joint; width and depth of recess per flooring manufacturer's recommendations to allow for a smooth gradually-sloped transition with top finishes level.
- G. Cure flooring material in compliance with manufacturer's directions, taking care to prevent contamination during the time required for the flooring system to completely cure. Restrict foot traffic for the recommended time.

3.4 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. Clean and repair extraneous splatter, spills, adhesives, tape, scuffs, and any other accidental marring resulting from performance of the Work. Do not scratch or damage adjacent finished surfaces.
- C. Disposal of waste generated during surface preparation and during floor coating installation is the responsibility of the Contractor.
 - 1. Comply with hauling and disposal regulations of authorities having jurisdiction.
- D. At the completion of the project, all areas within and contiguous to the Work, including all exterior and interior surfaces and items, as well as all areas having been used for ingress and egress of materials and personnel or storage of materials, shall be turned over to the Owner in a "polished" condition, free of dust. "Broom-clean", as typically used in the construction industry, is not sufficient.

END OF SECTION – 09 67 00 FLUID-APPLIED FLOORING

09 68 00 CARPETING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes modular commercial carpet.

1.2 REFERENCES

- A. ASTM E-648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source
- B. ASTM F-710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring
- C. NFPA 253 - Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source
- D. CRI 104 - Carpet Installation Standard for Commercial Carpet

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated, including installation recommendations for each type of substrate:
 - 1. Carpet: Include manufacturer's written data on physical characteristics, durability, backing materials, and fade resistance.
- B. Samples: Not required if providing the exact products and colors indicated on drawing finish schedules.
 - 1. If alternative products are proposed in lieu of basis-of-design products, provide samples of actual materials with colors for Architect review and approval.
 - a. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.
 - b. Carpet: 24-inch-square Sample.
 - c. Exposed Edge, Transition, and other Accessory Stripping: 12-inch-long Samples.
- C. Maintenance Instructions: Submit manufacturer's instructions for maintenance of installed products, including methods and frequency recommended for maintaining optimum condition under anticipated traffic and use conditions. Include precautions against materials and methods that may be detrimental to finishes and performance.
- D. Warranties: Copy of manufacturer's standard warranty terms for carpet, backing, cushion, and installation.

1.4 PERFORMANCE CHARACTERISTICS

- A. Fire-Test-Response Characteristics: Provide products with the critical radiant flux classification, as determined by testing identical products per ASTM E-648 or NFPA 253 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. In Group A, B, E, M, R, and S occupancies, minimum Class II, 0.22 watts/sq.cm. or greater.

1.5 PROJECT CONDITIONS

- A. Comply with CRI 104, Section 7.2, "Site Conditions; Temperature and Humidity" and Section 7.12, "Ventilation."
- B. Comply with CRI 104, Section 5, "Storage and Handling."
- C. Environmental Limitations: Do not install carpet and carpet cushion until wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

1.6 WARRANTY

- A. Warranty for Carpet Tiles: Manufacturer agrees to repair or replace components of carpet installation that fail in materials or workmanship within specified warranty period.
 - 1. Warranty does not include deterioration or failure of carpet due to unusual traffic, failure of substrate, vandalism, or abuse.
 - 2. Failures include, but are not limited to, more than 10 percent loss of face fiber, edge raveling, snags, runs, loss of tuft bind strength, excess static discharge, and delamination.
 - 3. Warranty Period: **10** years from date of Substantial Completion.

1.7 EXTRA MATERIALS

- A. Furnish extra materials described below, that match products installed from the same production run, and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Carpet Tile: Full-size units equal to 5 percent of amount installed for each type indicated, but not less than 10 sq. yd.

PART 2 - PRODUCTS

2.1 MODULAR CARPET

- A. Modular carpet general characteristics:
 - 1. Construction: Tufted patterned cut/loop pile
 - 2. Dye Method: 100% Solution dyed
 - 3. Fiber: Type 6,6 Nylon, with manufacturer's soil-resistance treatment.
 - 4. Backing: manufacturer's standard synthetic non-woven for adhesive installation.
 - 5. Average Pile Yarn Density: 5,000 ounces per cubic yard minimum.
 - 6. Pile Height: 0.11 inches (2.8 mm) minimum

- 7. Average Weight: 14 oz/sq.yd. minimum.
- 8. Antimicrobial Treatment: Manufacturer's standard.

- B. Product: Basis of Design is style "Textural Effects Thematic Thread GT423" by Mohawk.
 - 1. See Drawings for specific selection and color information. Do not substitute without Architect's approval after full review.

2.2 INSTALLATION ACCESSORIES

- A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet manufacturer.

- B. Adhesives: Water-resistant, mildew-resistant, nonstaining type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet and is recommended or provided by carpet and carpet cushion manufacturers.
 - 1. Tabs and tapes are not allowed. Use full spread adhesive.

- C. Transition Strips: PVC, viny, rubber, or metal of least height and profile required to protect edge of carpet and smoothly transition to adjacent flooring.
 - 1. Maximize lengths to minimize running joints.
 - 2. Glue-down type with manufacturer's recommended adhesive.
 - 3. Wheel-friendly, with slopes and edges meeting ADA requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet performance.

- B. Examine carpet products for type, color, pattern, and potential defects.

- C. Concrete Subfloors: Verify that concrete slabs comply with ASTM F-710 and the following:
 - 1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by carpet or cushion manufacturer.
 - 2. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.

3.2 INSTALLATION

- A. Comply with CRI 104 and carpet and carpet cushion manufacturers' written installation instructions for full adhesive spread installation.
 - 1. Direct-Glue-Down Installation: Comply with CRI 104, Section 9, "Direct Glue-Down Installation."

- B. Comply with carpet manufacturer's written recommendations and Shop Drawings for seam locations and direction of carpet; maintain uniformity of carpet direction and lay of pile. At doorways, center seams under the door in closed position.
- C. Do not bridge building expansion joints with carpet.
- D. Cut and fit carpet to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet manufacturer.
- E. Extend carpet into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.

3.3 CLEANING AND PROTECTING

- A. Perform the following operations immediately after installing carpet:
 - 1. Remove excess adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet manufacturer.
 - 2. Remove yarns that protrude from carpet surface.
 - 3. Vacuum carpet using commercial machine with face-beater element.
- B. Protect installed carpet to comply with CRI 104, Section 16, "Protection of Indoor Installations."
- C. Protect carpet against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Carpet that is stained or blemished by construction workers shall be replaced by the Contractor at no additional cost to the Owner.

END OF SECTION – 09 68 00 CARPETING

09 77 10 FIBERGLASS REINFORCED PANELS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes: fiberglass reinforced plastic (FRP) wall paneling.

1.2 SUBMITTALS

- A. Product Data: Submit manufacturer's product data sheets for specified products, including:
 - 1. Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.
 - 2. Manufacturer's installation instructions.
- B. Shop Drawings: Submit shop drawings showing layout, profiles and product components, including anchorage, accessories, finish colors, patterns and textures. Indicate location and dimension of joints, seams, and fastener attachment.
- C. Samples: Not required if providing the exact products and colors indicated on drawing finish schedules.
 - 1. If alternative products are proposed in lieu of basis-of-design products, provide samples of actual materials with colors for Architect review and approval.
- D. Closeout Submittals: Maintenance data for installed products in accordance with Division 01. Include manufacturer's recommendations for maintaining installed products and precautions against cleaning materials and methods detrimental to finishes and performance.

1.3 PROJECT CONDITIONS

- A. Environmental Requirements:
 - 1. Installation shall not begin until building is enclosed, permanent heating and cooling equipment is in operation, and residual moisture from concrete, plaster, or terrazzo work has dissipated.
 - 2. During installation, and for not less than 48 hours before, maintain an ambient temperature and relative humidity within limits required by type of adhesive used and recommendation of adhesive manufacturer.
 - 3. Provide ventilation to disperse fumes during application of adhesive as recommended by adhesive manufacturer.
 - 4. Do not exceed 95 deg. F when using temporary heat sources.
- B. Field Measurements: Verify actual measurements/openings by field measurements before fabrication; show recorded measurements on shop drawings.

1.4 WARRANTY

- A. Manufacturer's Warranty: Submit manufacturer's standard warranty document and terms.
 - 1. Warranty Period: 10 years.

PART 2 - PRODUCTS

2.1 FIBERGLASS REINFORCED PLASTIC (FRP) PANELS

- A. Subject to requirements, provide one of the following:
 - 1. "Glasbord" by Crane Composites
 - 2. Marlite Standard FRP Panels, by Marlite.
 - 3. "FiberLite" by Nudo Products, Inc.
 - 4. Or an approved equal.
- B. Wall Panels:
 - 1. Fire-Rated where required by plans. Underwriters Laboratories, Inc. (UL) classified, Class I (A) Interior Finish Material.
 - a. Class A flamespread of less than 25, smoke developed less than 450 per ASTM E84 latest version.
 - 2. Color: As selected by Architect from manufacturer's full range.
 - 3. Surface Finish: Molded pebble texture, unless otherwise indicated on plans.
 - 4. Size: 4 feet x 8 feet, unless otherwise indicated on plans.
 - a. Embossed nominal thickness: not less than 0.09 inch
 - 5. Performance Properties: Provide products with the following properties:
 - a. Barcol Hardness (scratch resistance) per ASTM D2583.
 - 1) 35 for embossed 0.09 inch (2.3 mm)
 - 2) 55 for embossed 0.12 inch (3.05 mm)
 - b. Panels will exhibit no more than a 0.038% weight loss after a 25 cycle Taber Abrasion Test using CS-17 abrasive wheels with 1000 g weight.
 - c. Gardner Impact Strength of 40 in-lb (4.5 J) showing no visible damage on front side per ASTM D5420.
 - d. Meets USDA/FSIS requirements.

2.2 ACCESSORIES

- A. Trim Accessories: Manufacturer's standard one- or two-piece vinyl extrusions designed to retain and cover edges of panels. Provide division bars, inside corners, outside corners, and caps as needed to conceal edges. Color to match panels.
- B. Adhesive: Provide panel adhesive as recommended by panel manufacturer.
- C. Exposed Fasteners: Nylon drive rivets, only in areas where there are large fluctuations in temperature and/or humidity, where the substrate is unusually uneven, and in all low temperature or cold storage applications. Refer to Manufacturer's installation guides for rivet pattern and installation instructions.
- D. Concealed Mounting Splines: Continuous, H-shaped aluminum extrusions designed to fit into grooves routed in edges of factory-laminated panels and to be fastened to substrate.

- E. Sealants: Single-component, mildew-resistant, neutral-curing silicone sealant recommended by plastic paneling manufacturer and complying with requirements in Division 07 Section "Joint Sealants."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Site Verification of Conditions: Verify that substrate conditions, which have been previously installed by other trades, are acceptable for product installation in accordance with manufacturer's instructions.
 - 1. Examine backup surfaces to determine that corners are plumb and straight, surfaces are smooth, uniform, clean and free from foreign matter, nails are countersunk and joints and cracks are filled flush and smooth with the adjoining surface.
 - 2. Do not begin installation until backup surfaces are in satisfactory condition.

3.2 INSTALLATION

- A. Fiberglass Reinforced Panel (FRP) Installation:
 - 1. Cut and drill panels with carbide tipped saw blades or drill bits, or cut with snips.
 - 2. Install panels with manufacturer's recommended gap for panel field and corner joints.
 - 3. Pre-drill fastener holes in panels with 1/8 inch (3.2 mm) oversize.
 - 4. For trowel type and application of adhesive, follow adhesive manufacturer's recommendations.
 - 5. Use products acceptable to panel manufacturer and install FRP system in accordance with panel manufacturer's printed instructions.

3.3 CLEANING

- A. Cleaning: Remove temporary coverings and protection of adjacent work areas. Clean installed products in accordance with manufacturer's instructions.
 - 1. Remove any adhesive or excessive sealant from panel face using solvent or cleaner recommended by panel manufacturer.
 - 2. Repair or replace products that have been installed and are damaged prior to Substantial Completion.
- B. Protect installed product and finish surfaces from damage during the remainder of construction.

END OF SECTION – 09 77 10 FIBERGLASS REINFORCED PANELS

09 91 00 PAINTING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes surface preparation and the application of paint systems on various interior and exterior substrates.
- B. Paint all exposed surfaces whether or not colors are designated in any "schedule", except where natural finish of material is specifically noted as not to be painted. Where items or surfaces are not specifically mentioned, paint these same as adjacent similar materials or areas. Refer any questions about finish or color to the Architect.

1.2 REFERENCES

- A. MPI: The Master Painters Institute (MPI-#): Established paint categories and standards.
- B. GS-11: Green Seal Standard for Paints, Coatings, Stains, and Sealers, Edition 4.0
- C. ANSI: American National Standards Institute: Performance Standards.
- D. ASTM: American Society for Testing Materials: Testing Methods.
- E. OTC: Ozone Transmission Commission: Established levels of Volatile Organic Compounds.
- F. SCAQMD-1168: South Coast Air Quality Management District Rule #1168
- G. EPA 40 CFR Part 59: National Volatile Organic Compound Emission Standards for Architectural Coatings: Limits, in grams VOC per liter, for various coating categories.

1.3 DEFINITIONS

- A. MPI: The Master Painters Institute.
- B. Standard coating terms defined in ASTM D16 apply to this section.
- C. Paint gloss shall be defined as the sheen rating of applied paint, in accordance with the following MPI values:

Gloss Level	Description	Units @ 60 degrees	Units @ 85 degrees
G1	Matte or Flat finish	0 to 5	10 max.
G2	Velvet finish	0 to 10	10 to 35
G3	Eggshell finish	10 to 25	10 to 35
G4	Satin finish	20 to 35	35 min.

G5	Semi-Gloss finish	35 to 70	
G6	Gloss finish	70 to 85	
G7	High-Gloss finish	> 85	

1.4 SUBMITTALS

- A. Product List: Reference to clarify paint systems indicated, and locations of application areas, and matching designations indicated on Drawings and in schedules.
- B. Product Data: For each type of product indicated, including block fillers and primers.
 - 1. Material List: Provide an inclusive list of required coating materials. Indicate each material and cross-reference specific coating, finish system, and application. Identify each material by manufacturer’s catalog number and coating material proposed for use.
 - 2. Manufacturer’s Information: Provide manufacturer’s technical information, including label analysis and instructions for handling, storing and applying each coating material proposed for use.
 - 3. Certification by the manufacturer that products supplied comply with local regulations controlling use of volatile organic compounds (VOC’s).
- C. Samples: Not required if providing the exact products and colors indicated on drawing finish schedules.
 - 1. For custom colors or mixed colors to match another material, provide samples of actual final coating to be provided with colors for Architect review and approval.
 - a. Submit Samples on rigid backing, 8 inches square or larger.
 - b. Step or cascade coats on Samples to show each coat required for the complete system. Label each coat of each Sample.
 - c. Label each Sample for location and application substrate.
- D. Submittals required when painting over existing surfaces:
 - 1. Prior to paint application, submit to the Designer in writing test results verifying the compatibility of the paint scheduled to be applied to the existing surface.
 - 2. If test results indicate that the existing surfaces are not compatible with the newly scheduled paint system, submit to the Designer in writing a substitute paint system recommended by the paint manufacturer for that existing surface.

1.5 QUALITY ASSURANCE

- A. Master Painters Institute Standards:
 - 1. Products: Complying with MPI standards indicated and listed in "MPI Approved Products List."
 - 2. Preparation and Workmanship: Comply with requirements in "MPI Architectural Painting Specification Manual" for products and paint systems indicated.
- B. Installer Qualifications: All products listed in this section are to be applied by a Painting Contractor with a minimum of five years demonstrated experience in surface preparation and field application of the same type and scope as specified.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with controlled temperatures and humidity continuously maintained as recommended by product manufacturers.
 - 1. Maintain containers in clean condition, free of foreign materials and residue.
- B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local AHJs.
 - 1. Remove rags and waste from storage areas daily.
- C. Disposal:
 - 1. Never pour leftover coating down any sink or drain.
 - 2. Do not incinerate or burn containers.
 - 3. For specific disposal or recycling options, contact the local waste management agency.

1.7 PROJECT CONDITIONS

- A. Environmental conditions (weather, temperature, humidity, and ventilation) must be within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.

1.8 EXTRA MATERIALS

- A. Furnish extra materials described below that are from same production run (batch mix) as materials applied and that are packaged for storage and identified with labels describing contents.
 - 1. Quantity: Furnish an additional **5** percent, but not less than 1 gal. of each type and color applied.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with requirements, provide systems by one of the following:
 - 1. Sherwin-Williams
 - 2. Benjamin-Moore
 - 3. PPG Paints
 - 4. Or Approved Equal.
- B. In general and with the exception of those manufacturers named for isolated items, numbers and descriptive names used are those of Sherwin Williams Paint Company and are for the purpose of convenience, identification, and establishing a standard quality for the materials required. Any of the mentioned manufacturers shall be acceptable provided a submittal of finished physical sample, full description, and formulation of products, and the surfaces that are to be covered are submitted.

2.2 PAINT, GENERAL

A. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another and with substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by the manufacturer for use in paint system and on substrate indicated.

B. Colors: **As indicated on drawings or as selected by Architect from manufacturer's full range.**

C. VOC Content: Provide products that comply with EPA 40 CFR Part 59 National VOC Emission Standards for Architectural Coatings, especially Subpart D for VOC content limits.

D. Interior finish materials other than those applied to floors shall be Class A, B, or C as tested and classified in accordance with ASTM 84E for flamespread and smoke development.

E. Mixing and Tinting:

1. Except where specifically noted in this section, all paint shall be ready-mixed and pre-tinted. Agitate and stir all paint prior to and during application to ensure uniform color, gloss, and consistency.
2. Do not reduce, thin, or dilute coatings or add materials to coatings unless such procedure is specifically described in manufacturer's product instructions.
3. Thinner addition shall not exceed manufacturer's printed recommendations and shall be of the correct type for the product. Do not use kerosene or other organic solvents to thin water-based paints.

2.3 EXTERIOR PAINTING

A. Exterior Paint and Coatings: Preferred Systems:

1. Exterior steel surfaces:
 - a. Bare steel: 1 coat SW Macropoxy 646 Fast Cure Epoxy B58W610 Series.
 - b. Painted steel: 1 coat SW Macropoxy 646 Fast Cure Epoxy B58W610 Series.
 - c. Finish coat: 1 coat SW High Solids Polyurethane B65-300 Series.
2. Galvanized steel:
 - a. Clean with Xylene solvent. Be sure solvent is evaporated.
 - b. Pretreatment – Porter 5 Galvaprep.
 - c. Primer: 1 coat SW DTM Acrylic Primer/Finish B66W1
 - d. Finish: 2 coats SW Industrial Enamel B54 Series.

B. Exterior Paint and Coating Systems for other substrates per MPI Approved Products List:

1. Asphalt Surfaces:
 - a. For traffic marking of drive and parking areas
 - b. Waterborne Acrylic-Alkyd
 - c. MPI #32 – Traffic Marking Paint, Solvent Based
 - d. MPI #70 – Traffic Marking Paint, High-Build Acrylic

2. Concrete, CMU, and Brick Vertical Surfaces:
 - a. Including walls and overhead horizontal soffits
 - b. MPI #3 – Water-based Alkali-Resistant Primer
 - c. MPI #4 – Water-based Latex Block Filler
 - d. MPI #15 or MPI # 214 – Exterior Latex Intermediate and Top Coat
3. Concrete Horizontal Surfaces:
 - a. Including floors and stairs
 - b. MPI # 116 – Epoxy Block Filler
 - c. MPI #82 – Epoxy Slip-Resistant Deck Coating
4. Cementitious Composition Board Surfaces:
 - a. MPI #3 – Water-based Alkali-Resistant Primer
 - b. MPI #214 or MPI #10 – Water-based Exterior Acrylic Latex
 - c. MPI #40 – Water-based, High-build, High-solids Exterior Acrylic Latex
5. Structural Steel, Galvanized Metal and Steel Fabrications:
 - a. Exposed columns, beams, joists, railings, stairs, etc.
 - b. Including doors, frames, railings, misc. steel, pipes, overhead decking, ducts, etc.
 - c. MPI #25 – Cleaner, Etching for Galvanized Metal
 - d. MPI # 19 – Zinc-rich Inorganic Primer
 - e. MPI #134 – Anti-Corrosive Water-Based Acrylic Primer for Metal
 - f. MPI #79 – Anti-Corrosive Solvent-Based Alkyd Primer for Metal
 - g. MPI #9 or MPI #94 – Alkyd Exterior Rust-Inhibitive Enamel
 - h. MPI # 72 – Two-Component Polyurethane
 - i. MPI #161, #163, or #164 – Water-based Light Industrial Coating
 - j. MPI #167, #168, or #169 – Water-based Alkyd Urethane Enamel
6. Steel - High Heat:
 - a. Including boilers, furnaces, heat exchangers, breeching, pipes, flues, stacks, etc.
 - b. MPI #21 – Heat Resistant Enamel
7. Aluminum:
 - a. Including sills and frames, flashing, posts and railings, conduit, etc.
 - b. MPI # 95 – Alkyd-based Aluminum Primer
 - c. MPI #134 – Anti-Corrosive Water-Based Acrylic Primer for Metal
 - d. MPI #1 – Alkyd-based Aluminum Paint
 - e. MPI #161, #163, or #164 – Water-based Light Industrial Coating
 - f. MPI #167, #168, or #169 – Water-based Alkyd Urethane Enamel
8. Stucco and EIFS:
 - a. MPI #3 – Water-based Alkali-resistant Primer
 - b. MPI #10 – Water-based Exterior Acrylic Latex

2.4 INTERIOR PAINTING

A. Interior Paint and Coatings: Preferred Systems:

1. All exposed metal surfaces not otherwise provided for below.
 - a. 1 coat SW High Solids Alkyd Metal Primer B50WZ3
 - b. 2 coats SW Pro-Mar 200 Int. Waterbased Acrylic-Alkyd Eggshell B33W8200 Series.
2. Concrete block- Enamel (Semi Gloss):

- a. 1 coat SW KEM CATI-COAT HS EPOXY FILLER/SEALER.
 - b. 2 coats SW Pro-Mar 200 Int. Waterbased Acrylic-Alkyd Eggshell B33W8200 Series.
3. Concrete block- Heavy Duty Enamel (Gloss):
 - a. 1 coat SW SW KEM CATI-COAT HS EPOXY FILLER/SEALER
 - b. 2 coats SW Industrial Enamel B54 Series.
 4. Wet Area Concrete block/Concrete Panel - Heavy Duty Acrylic (Semi-Gloss):
 - a. 1 coat SW SW KEM CATI-COAT HS EPOXY FILLER/SEALER
 - b. 2 coats SPRAYLASTIC EXTERIOR SEMI-GLOSS WATERBORNE DRYFALL.
 5. Gypsum wallboard ceilings - Latex (Flat):
 - a. 1 coat SW Prep-Rite 200 Primer B28W200
 - b. 2 coats SW Pro-Mar 200 Flat B30W251.
 6. Gypsum wallboard- Latex (Eggshell):
 - a. 1 coat SW Prep-Rite 200 Primer B28W200
 - b. 2 coats SW Pro-Mar 200 Eggshell B20W2251
- B. Interior Paint and Coating Systems for other substrates per MPI Approved Products List:
1. Concrete, CMU, and Brick Vertical Surfaces:
 - a. Including walls and overhead horizontal soffits
 - 1) MPI #3 – Water-based Alkali-Resistant Primer
 - 2) MPI #4 – Water-based Latex Block Filler
 - 3) MPI #44 or MPI #52 – Interior Latex Intermediate and Top Coat
 - b. For high-moisture areas:
 - 1) MPI #116 – Two-Component High-Solids Epoxy Block Filler
 - 2) MPI #98 – Two-Component High-Build Epoxy Coating
 2. Concrete Horizontal Surfaces:
 - a. Including floors and stairs
 - b. MPI #116 – Two-Component High-Solids Epoxy Block Filler
 - c. MPI #108 – Epoxy High-build, High-solids, Low-gloss coating
 - d. For Concrete Stains: MPI #58 – Penetrating semi-transparent stain
 - e. For Concrete Sealer: MPI #99 – Water-based Acrylic stain-resistant sealer
 3. Structural Steel and Ferrous Metal Fabrications:
 - a. Exposed columns, beams, joists, railings, stairs, doors, frames etc.
 - 1) MPI #107 – Water-based Rust-Inhibitive Primer
 - 2) MPI #54 or MPI #114 – Water-based Interior Latex
 - b. For high-moisture areas:
 - 1) MPI #101 – Anti-corrosive Epoxy Primer for Metal
 - 2) MPI #77 or MPI #98 – Two-component Epoxy Coating
 4. Steel - High Heat:
 - a. Including boilers, furnaces, heat exchangers, breeching, pipes, flues, stacks, etc.
 - b. MPI #21 – Heat Resistant Enamel
 5. Galvanized Metal:
 - a. Including doors, frames, railings, misc. steel, pipes, overhead decking, ducts, etc.
 - b. MPI #25 – Cleaner, Etching for Galvanized Metal
 - c. MPI #134 – Water-based Primer for Galvanized Metal
 - d. MPI #153 or MPI #154 – Water-based Light Industrial Coating

6. Aluminum:
 - a. Including sills and frames, posts and railings, conduit, etc.
 - b. MPI #107 – Water-based Rust-Inhibitive Primer
 - c. MPI #168 or MPI #169 – Water-based Alkyd-Acrylic Enamel
7. Dimension Lumber and Engineered Wood:
 - a. Including exposed wood columns, beams, exposed joists, plywood, etc.
 - b. MPI #39 – Water-based Latex Primer for Interior Wood
 - c. MPI #43 or MPI #54 – Water-based Latex Interior Enamel
 - d. MPI #155 – Water-based Latex Dry-Fall
8. Stained Dressed Lumber, Wood Paneling, and Trims:
 - a. Including doors, door and window frames, casings, mouldings, etc.
 - b. MPI #90 – Solvent-based Semi-Transparent Pigmented Stain
 - c. MPI #56 or MPI #57 – Solvent-based Oil-modified Polyurethane Varnish
9. Stained Casework and Paneling:
 - a. Including interior millwork, casework and wall panels.
 - b. MPI #90 – Solvent-based Semi-Transparent Pigmented Stain
 - c. MPI #128, #129, or #130 – Water-Based Clear Varnish
10. Stained Wood Floors and Stairs / Steps:
 - a. MPI #90 – Solvent-based Semi-Transparent Pigmented Stain
 - b. MPI #56 or MPI #57 – Solvent-based Oil-modified Polyurethane Varnish
 - c. MPI #31 – Solvent-based Moisture-Curing Polyurethane Clear Coat
 - d. MPI #78 – Aliphatic Two-Component Polyurethane Clear Coat
11. Painted Dressed Lumber and Trims:
 - a. Including frames, casings, mouldings, etc. in public areas, high-use areas, or where moisture may be present:
 - 1) MPI #45 or MPI #46 – Solvent-based, Alkyd type Primer-Sealer for Interior Wood
 - 2) MPI #47 or MPI #48 – Solvent-based, Alkyd type Interior Enamel
 - b. Including frames, casings, mouldings, etc. in average-use dry areas:
 - 1) MPI #39 – Water-based Latex Primer for Interior Wood
 - 2) MPI #139, #140 or #141 – High-Performance Interior Latex
 - 3) MPI #144, #145, or #146 – Institutional Low Odor/VOC Interior Latex
12. Painted Casework, Wall Paneling, and Doors:
 - a. Including interior millwork and casework and wall panels.
 - b. MPI #72 – Solvent-based, two-component polyurethane pigmented gloss coating
 - c. MPI #45 or MPI #46 – Solvent-based, Alkyd type Primer-Sealer for Interior Wood
 - d. MPI #47 or MPI #48 – Solvent-based, Alkyd type Interior Enamel
13. Glue Laminated Beams and Columns:
 - a. MPI #78 – Aliphatic Two-Component Polyurethane Clear Coat
14. Fiberglass and Plastic:
 - a. Including panels, trims, vinyl siding and windows including related trims, etc.
 - b. MPI #3 – Water-based Alkali-resistant Primer
 - c. MPI #10 or MPI #214 – Water-based Exterior Acrylic Latex
15. Spray Textured Ceilings and Surfaces:
 - a. MPI #118 – Water-based Latex Dry-Fall
 - b. MPI #133 – Water-based Latex Dry-Fall for Galvanized Steel

16. Plaster and Gypsum Board (Drywall):
 - a. MPI #50 – Water-based Latex Primer-Sealer
 - b. MPI #44 or MPI #52 – Water-based Acrylic-Latex Interior
 - c. For high-moisture areas:
 - 1) MPI #115 or MPI #215 – Water-based Epoxy-modified Latex

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work. Report in writing to the Designer any conditions that may potentially affect proper application. Do not commence until such conditions have been corrected.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 1. Concrete: 12 percent.
 2. Masonry (Clay and CMU): 12 percent.
 3. Wood: 15 percent.
 4. Gypsum Board: 12 percent.
 5. Plaster: 12 percent.
- C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- D. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.
 1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.
- B. Remove plates, machined surfaces, and similar items already in place that are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
 2. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
- C. Clean substrates of substances that could impair bond of paints, including dirt, oil, grease, and incompatible paints and encapsulants.
 1. Remove incompatible primers and reprime substrate with compatible primers as required to produce paint systems indicated.

- D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
- E. Clay Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content of surfaces or alkalinity of mortar joints to be painted exceed that permitted in manufacturer's written instructions.
- F. Concrete Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
- G. Steel Substrates: Remove rust and loose mill scale. Clean using methods recommended in writing by paint manufacturer.
- H. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.
- I. Aluminum Substrates: Remove surface oxidation.
- J. Wood Substrates:
 - 1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
 - 2. Sand surfaces that will be exposed to view, and dust off.
 - 3. Prime edges, ends, faces, undersides, and backsides of wood.
 - 4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.
- K. Gypsum Board Substrates: Do not begin paint application until finishing compound is dry and sanded smooth.
- L. Plaster Substrates: Do not begin paint application until plaster is fully cured and dry.
- M. Spray-Textured Ceiling Substrates: Do not begin paint application until surfaces are dry.

3.3 PAINT APPLICATION

- A. Apply paints according to manufacturer's written instructions.
 - 1. Use applicators and techniques suited for paint and substrate indicated.
 - 2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces.
 - 3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
- B. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- C. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

3.4 MECHANICAL AND ELECTRICAL EQUIPMENT

- A. Coordinate with the requirements of Divisions 21 thru 28 and engineering drawings.
- B. Remove grilles, covers, and access panels and paint separately.
- C. Finish paint primed equipment to the color selected.
- D. Prime and paint exposed pipes, conduits, boxes, ducts, hangers brackets, collars, and supports, except where items are plated or covered with a pre-finished coating, with color and texture to match adjacent surfaces.
- E. Do not paint over identification plates or labels; replace identification markings on mechanical or electrical equipment when painted over or splattered.
- F. Paint interior surfaces of air ducts, convector and baseboard heating cabinets that are visible through grilles and louvers with one coat of flat black paint to the limit of sight line.
- G. Paint exposed conduit and electrical equipment occurring in finished areas. Color and texture to match adjacent surfaces.
- H. Paint both sides and edges of plywood backerboards for electrical equipment before installing backerboards and mounting equipment on them.

3.5 LABELING RATING WALLS

- A. Stencil paint on both sides of all smoke- or fire-rated partitions with permanent 2" high letters.
 - 1. Color: Bright red.
 - 2. Identify the rating of the partition in a concealed location approximately 8" above the finished ceiling every 25 feet on both sides of the partition, or at least once in each space.
 - 3. Identify walls as applicable:
 - a. 1 HOUR FIRE
 - b. 2 HOUR FIRE
 - c. NON-RATED SMOKE TIGHT
 - d. Or other identifying language as appropriate.
 - 4. Identification shall be approved by the authority having jurisdiction.

3.6 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean splattered surfaces. Remove splattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

END OF SECTION – 09 91 00 PAINTING

09 96 63 TEXTURED EXTERIOR WALL COATING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes a high-build acrylic aggregate textured coating designed to be used on exterior cast-in-place and tilt-up concrete panels.

1.2 SUBMITTALS

- A. Product Data: For each product indicated. Include manufacturer's product data sheets, MSDS sheets, and application instructions.
- B. Samples: Not required if providing the exact products and colors indicated on drawings and finish schedules.
 - 1. If alternative products are proposed in lieu of basis-of-design products, provide samples of actual materials with colors for Architect review and approval.
 - a. Submit Samples on rigid backing, 8 inches minimum square.
 - b. Label each Sample for location and application area.
- C. Copies of product manufacturer's standard warranty terms for products and systems.

1.3 QUALITY ASSURANCE

- A. The Installer shall have at least 5 years experience in installation of the textured coating system, and shall be an approved applicator by the coating manufacturer, having completed special manufacturer's training required for warranty requirements.
- B. A pre-installation conference shall be held to review the installation schedule, application procedures, quality control, inspection, and acceptance criteria.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. All materials are to be delivered to the job site in the manufacturer's original packaging. The product code and other identification marks should be clearly marked and visible on each container.
- B. Store materials not in use in tightly covered containers in dry, well-ventilated areas with ambient temperatures continuously maintained within acceptable ranges required by the materials manufacturer.
 - 1. Maintain containers in clean condition, free of foreign materials and residue.
 - 2. Remove rags and waste from storage areas daily.
- C. Material Safety Data Sheets are to be kept on site and made readily available for all personnel.

1.5 PROJECT CONDITIONS

- A. Apply coatings only when air and substrate temperatures, and air humidity and substrate moisture levels are within acceptable ranges as required by the coating system manufacturer.
- B. Measure substrate or concrete slab moisture content prior to starting work.
- C. Verify the existence and condition of vapor barriers, penetrations, and any other items or substances that may impact the procedure of the work.
- D. Precipitation: Do not apply primer and coating materials during precipitation and when precipitation is imminent or anticipated.
- E. Ultraviolet Light: Do not allow primer to be exposed to ultraviolet light for more than four weeks prior to application of coating. If exposure exceeds the four week limit, apply additional coat of primer.
- F. Do not apply coating in areas with airborne dust or where dust can be generated during application.
- G. Roof and parapet top caps shall be installed and sealed against water penetration prior to coating.

1.6 INSTALLATION WARRANTY

- A. The Contractor shall provide a form to the Owner agreeing to repair, at his own expense, any defects in the exterior textured coating system for a period of **one** year (starting from the date of Substantial Completion) caused by improper substrate preparation or improper workmanship in the coating system installation, as determined by the coating manufacturer.
 - 1. The installer shall not be held responsible for coating failures due to circumstances beyond his control, including excessive moisture, and concrete slab or building wall cracking or settling.

PART 2 - PRODUCTS

2.1 EXTERIOR TEXTURED ACRYLIC CONCRETE COATING

- A. General: An acrylic-based, solvent-based, aggregate-filled coating used to produce a textured finish on properly prepared exterior concrete surfaces, designed to adhere to damp or highly alkaline substrates.
 - 1. Texture: "Medium" sand/aggregate.
 - 2. Color: as selected by Architect, custom color match where required.
 - 3. Manufacturers: Subject to compliance with requirements, provide:
 - a. "Con-Flex UltraCrete" by Sherwin Williams (Basis of Design)
 - b. Substitution after Architect's full review and approval. Similar products that may be considered include:

- 1) "Tex-Cote XL 70 Solvent" by Tex-Cote LLC, a division of Tnemec.
- 2) Or an approved equal.

2.2 ACCESSORY PRODUCTS

- A. Patching Compounds: as recommended by coating manufacturer for filling cracks in concrete prior to textured coating application.
- B. Bonding Agents and Primers: as recommended by coating manufacturer for the substrate conditions indicated.
- C. Use spray equipment recommended by coating manufacturer.

PART 3 - EXECUTION

3.1 SURFACE PREPARATION

- A. Prior to coating application, all surfaces must be prepared in accordance with the coating manufacturer's recommendations.
 1. Verify that bond breakers have been removed so that liquids will penetrate concrete.
 2. Verify that any curing compound is compatible or has been removed so that coating system will adhere.
 3. Verify all fins and projections have been removed. Verify all visible cracks and holes have been patched or repaired with manufacturer's recommended products.
 4. Test that the pH of all concrete surfaces to be coated are within manufacturer's acceptable levels; different primers may be required depending on pH measurements, verify if pH is greater than 9.
- B. The result of this preparation shall render a surface clean, meaning having complete exposure of sound concrete material without any deposits of contaminants, foreign matter or loose material, which could affect the bond or long-term durability of the surface and the textured coating.

3.2 INSTALLATION

- A. Installation, General: Apply primer coat where recommended by manufacturer. Spray finished textured coating system coats with approved equipment, with coverage rates and thicknesses as required.
 1. Do not apply coating on surfaces below grade; stop coating above contact with soil or pavement.
- B. Notify coating manufacturer's representative of coating schedule and completion dates, and engage manufacturer to conduct a final inspection of the textured system application upon completion. Correct any deficiencies at no additional cost to the Owner.

3.3 CLEANING AND PROTECTION

- A. Protect work of other trades, whether to be coated or not, against damage by coating and finishing work.
- B. Upon completion of the coating work, clean window glass, metal panels and trims, and other surfaces that may have been splattered by coating. Correct any damage by cleaning, repairing or replacing, and recoating, as acceptable to the Architect and Owner.

END OF SECTION – 09 96 63 TEXTURED EXTERIOR WALL COATING

10 14 00 SIGNAGE

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the Contractor provided signage, including:
 - 1. Plaques and signage as required by the ADA-ABA Accessibility Guidelines.
 - 2. Address Identification as required by the local Authorities Having Jurisdiction.
 - 3. Signage identifying electrical, mechanical, fire, and emergency-related spaces and room numbers.
 - 4. Signage identifying all other individual room numbers as directed by Owner.
 - 5. Signage identifying truck dock or loading door numbers.

- B. The Owner will contract separately for procurement and installation of additional custom signage. The Contractor shall coordinate with the Owner's supplier, so that the Contractor will provide blocking, supports, and finished surfaces as needed for all signage.

1.2 SUBMITTALS

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

- B. Shop Drawings: Show fabrication and installation details for signs.
 - 1. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
 - 2. Provide message list, typestyles, graphic elements, including tactile characters and Braille, and layout for each and every sign.

- C. Sign Schedule: For all signage to be provided by Contractor in the project.

- D. Samples: Provide physical samples of each color, type, and thickness of interior and exterior signage material to be provided, approx. 4"x4" each.

1.3 PROJECT CONDITIONS

- A. Field Measurements: Verify signage locations by field measurements before fabrication and indicate measurements on Shop Drawings.

1.4 COORDINATION

- A. Coordinate placement of anchorage devices with templates for installing signs, and types of anchorage required and appropriate for the mounting substrate.

- B. Address Identification: Basis-of-Design characters be a minimum of 6 inches high. Verify location of mounting with Architect and Owner.

- C. See Drawings for dock signage sizes and locations.

PART 2 - PRODUCTS

2.1 INTERIOR SIGNAGE

- A. Interior signage shall be molded construction approximately 1/8" thick (1/4" thick for slot signs), of solid melamine plastic laminate, with face color contrasting from core color.
 - 1. Tactile characters/symbols shall be raised 1/32" from sign plate face.
 - 2. Room numbers shall be 1" tall minimum.
 - 3. Lettering shall be 3/4" tall minimum.
 - 4. Letter Font: Helvetica Medium, upper and lower case.
 - 5. Grade 2 braille shall be below copy.
 - 6. Edges to be straight, with square corners.
 - 7. Matte, non-glare finish.
 - 8. Mounting: Vinyl foam adhesive tape.
- B. Manufacturers: Subject to compliance with requirements, available manufacturers and products that may be incorporated into the Work include the following:
 - 1. ASI Sign Systems Inc.
 - 2. Best Signs
 - 3. Mohawk Sign Systems Inc.
 - 4. Or an approved equal.
- C. Interior signage required may include, but is not limited to:
 - 1. Identifying signs for permanent function rooms or spaces, such as toilets, elevators, custodial closets, and mechanical and electrical rooms.
 - 2. Stair enclosures shall have signs identifying the space as a stair, identifying the current floor, and identifying on which level exiting occurs.
 - 3. All exterior doors, doors to stairwells, and doors out of assembly rooms require tactile signs (Grade 2 Braille) if the door has an exit sign above it. Tactile exit signs shall be located on the latch side of a single door. Either side is acceptable for double doors.
 - 4. Accessibility, such as toilet facilities, wayfinding to accessible exits, entrances or paths that are not accessible, and areas of refuge.
 - 5. Fire protection features, such as fire department connections, sprinkler standpipes, fire doors, fire hose cabinets, hazardous materials, locations of shut-offs for equipment, and emergency use of elevators.
- D. All room number and room name or other copy to be verified with the Owner and shown on shop drawings.

2.2 EXTERIOR SIGNAGE

- A. Exterior signage shall be Aluminum Sheet and Plate: ASTM B-209, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with at least the strength and durability properties of Alloy 5005-H32.
 - 1. Baked-enamel finishes designed for exterior exposure.
- B. Verify location for address numbers on the building with the Owner. Adhesive numbers on glass may be used on storefront entrances with transom or side panels. Otherwise, raised brushed aluminum numbers at least 6” high, contrasting and clearly visible against the background.
- C. Provide signage at parking as required at accessible locations.
- D. When not all entrances are accessible, provide wayfinding signage as required to indicate directions to accessible entrances.

2.3 DIMENSIONAL LETTER SIGNAGE

- A. Fabricated Exterior Characters: Precision cut letters or numbers cut from solid plate metal.
 - 1. Letter Font:
 - a. At “Old Dominion” words: Memphis Lt Std, Extra Bold
 - b. At “Freight Line” words and address numbers: Memphis Lt Std, Medium
 - 2. See Drawings for letter sizes, typically unless otherwise shown:
 - a. Text Line 1: “OLD DOMINION” in all caps, 8-1/2” high, mounted center-justified.
 - b. Text Line 2: “FREIGH LINE” in all caps, 7” high, mounted center justified.
 - c. Text Line 3: the address numbers, 7” high, mounted right justified.
 - 3. Edges shall have crisp square corners, face plane surfaces flat.
 - 4. Material: Basis of Design is Aluminum, anodized black finish.
 - 5. Mounting: Standoff pins that hold the characters approximately 1 inch off of the concrete wall.
- B. See Drawings for additional information on mounting to cast-concrete monument sign wall base,

2.4 ACCESSORIES

- A. Anchors and Inserts: Provide nonferrous-metal or hot-dip galvanized anchors and inserts where required for corrosion resistance. Use toothed steel or lead expansion-bolt devices for drilled-in-place anchors. Furnish inserts, as required, to be set into concrete or masonry work.
 - 1. Use concealed fasteners wherever possible. Do not use prominent mechanical fasteners on the face of the signage due to potential injury or confusion to the visually impaired.

- B. Adhesives: Pressure sensitive adhesive or high grade industrial silicone adhesive as recommended by the adhesive manufacturer for the substrates shown.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Interior Wall Signs: Install signs on walls adjacent to latch side of door where applicable, 60 inches maximum height measured from the floor to the top of the sign, or per ADA regulations.
 - 1. Contractor and signage installer to confirm acceptable mounting heights and locations with local AHJ inspector; different jurisdictions may interpret mounting height requirements for braille and visible signage differently.
- B. Install signs in accordance with manufacturer's instructions, using mounting methods recommended by manufacturer for the sign materials supplied and appropriate to the substrates.

END OF SECTION – 10 14 00 SIGNAGE

10 21 13 TOILET COMPARTMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes toilet enclosures and urinal screens, overhead braced and/or floor and ceiling anchored.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
 - 1. Show locations of cutouts for compartment-mounted toilet accessories.
 - 2. Show locations of centerlines of toilet fixtures.
 - 3. Show locations of floor drains.
 - 4. Show ceiling-mounted items, and overhead support or bracing locations.
- C. Samples: Of each type of color and finish required for units, approx. 4-inch-square Samples of same thickness and material to be provided for the Work.

1.3 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of walls, columns, ceilings, plumbing rough-ins, and other construction contiguous with toilet compartments by field measurements before fabrication and indicate measurements on Shop Drawings.

1.4 WARRANTY

- A. The Toilet Partition manufacturer shall guarantee all Toilet Partitions by written certification against any defects in design, materials and workmanship.
 - 1. Length of Warranty in Years indicated below for different types of toilet compartments.

PART 2 - PRODUCTS

2.1 SOLID-POLYMER UNITS

- A. Door, Panel, and Pilaster Construction: Solid, high-density polyethylene (HDPE) or polypropylene (PP) panel material, not less than 1 inch thick, seamless, with eased edges, and with homogenous color and pattern throughout thickness of material.

- B. Subject to compliance with requirements, available manufacturers and products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. “Color-Thru Phenolic” by ASI Global Partitions (Basis of Design)
 - 2. Do not substitute products without Architect’s full review and approval. Possible products that may be considered may include:
 - a. Phenolic Privacy Partitions by Bradley, a Watts brand.
 - b. Hiny Hiders by Scranton Products
 - c. Solid Plastic by Hadrian, Inc.
 - d. Solid Plastic by Metpar Corp.
 - e. Or an approved equal.
- C. Manufacturer’s Warranty for Solid-Plastic/HDPE/Polymer Units: 15 Years

2.2 METAL UNITS

- A. Stainless-Steel Units: Facing sheets and closures fabricated from ASTM A-666, Type 302 or 304, stainless-steel sheet, leveled to stretcher-leveled flatness.
 - 1. Finish: Exposed surfaces are protected from damage by application of strippable, temporary protective covering before shipment.
 - a. Embossed texture, or smooth #4 brushed finish, as selected by Owner.
 - 2. Subject to compliance with requirements, available manufacturers and products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Stainless Steel by Hadrian, Inc.
 - b. Stainless Steel by ASI Global Partitions
 - c. Stainless Steel by Bradley Corp.
 - d. Stainless Steel by Metpar Corp.
 - e. Or an approved equal.
 - 3. Manufacturer’s Warranty for Stainless Steel Units: 5 Years
- B. Door, Panel, and Pilaster Construction: Seamless, metal facing sheets are pressure laminated to core material. Units have continuous, interlocking molding strip or lapped and formed edge closures. Exposed surfaces are free of pitting, seam marks, roller marks, stains, discolorations, telegraphing of core material, or other imperfections. Corners are sealed by welding or clips. Exposed welds are ground smooth.
 - 1. Grab-Bar Reinforcement: Provide concealed internal reinforcement for grab bars mounted on unit panels.

2.3 ACCESSORIES

- A. Pilaster Shoes and Sleeves (Caps): Stainless steel sheet ASTM A-666, Type 302 or 304, not less than 0.031 inch nominal thickness and 4 inches high min., with shoe bottom enclosed and integral to compartment structure. Secure to floor with manufacturer's recommended anchors.
 - 1. Finish: satin brushed.

- B. Overhead Bracing: Manufacturer's standard continuous, extruded-aluminum head rail with antigrip profile and stainless steel brackets.
- C. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel or chrome-plated steel or brass, finished to match hardware, with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications.
 - 1. For concealed anchors, use hot-dip galvanized or other rust-resistant, protective-coated steel.
 - 2. Urinal Screen Post: 1-3/4-inch square aluminum tube with satin finish, with stainless steel shoe.
- D. Hardware and Accessories: Heavy-duty operating hardware and accessories of stainless steel.
 - 1. Operable door hardware shall be mounted at 34" minimum and 48" maximum above the floor to comply with ADA reach ranges.
- E. Doors: Unless otherwise indicated on drawings, provide typical 24-inch-wide in-swinging doors for standard toilet compartments and minimum 34-inch-wide out-swinging doors with a minimum 32-inch-wide clear opening for compartments indicated to be accessible to people with disabilities.
 - 1. Hinges: Self-closing, continuous wrap-around piano-type hinges that can be adjusted to hold doors open at any angle up to 90 degrees.
 - a. Stall doors shall be self-closing. Provide spring- or self-closing hinges. Adjust tension so that doors do not slam shut.
 - 2. Latch and Keeper: Manufacturer's standard surface-mounted latch unit designed for emergency access and with combination door strike and keeper, thru-bolted to partitions.
 - 3. Coat Hook: See Section for Toilet Accessories.
 - 4. Door Bumper: Manufacturer's standard rubber-tipped bumper at out-swinging doors.
 - a. Doors 32" wide or less are provided with a combination coat hook/bumper.
 - b. Doors 34" wide or 36" wide are provided with an individual coat hook, door bumper and door pull.
 - 5. Door Pull: Manufacturer's standard unit on pull-side of doors. Provide units on both sides of doors at compartments indicated to be accessible to people with disabilities.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, level, and plumb, and to resist lateral impact. Secure units in position with manufacturer's recommended anchoring devices. Hang doors and adjust so tops of doors are level with tops of pilasters when doors are in closed position.
 - 1. Maximum Clearances:
 - a. Pilasters and Panels: 1/2 inch .
 - b. Panels and Walls: 1 inch.

2. Stirrup Brackets: Secure panels to walls and to pilasters with not less than three brackets attached at midpoint and near top and bottom of panel.
 - a. Align brackets at pilasters with brackets at walls.

- B. Overhead-Braced Units: Secure continuous head rail to each pilaster with not less than two fasteners. Hang doors to align tops of doors with tops of panels and adjust so tops of doors are parallel with overhead brace when doors are in closed position.

- C. Floor-Anchored Units: Set pilasters with anchors penetrating not less than 2 inches into structural floor, unless otherwise indicated in manufacturer's written instructions.

- D. Hardware Adjustment: Adjust and lubricate hardware according to manufacturer's written instructions for proper operation. Unless otherwise noted, set hinges on in-swinging doors to hold doors open approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors to return doors to fully closed position.

END OF SECTION – 10 21 13 TOILET COMPARTMENTS

10 22 13 WIRE MESH PARTITIONS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes steel industrial wire-mesh fabricated and modular partition and cage systems.
- B. Related Sections include:
 - 1. Division 03 Sections for concrete slabs, dock platforms, and curbs.
 - 2. Division 05 Sections for structural steel and metal fabrications for angles and channels.
 - 3. Division 08 Sections for door hardware coordination.

1.2 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide partitions capable of withstanding the effects of gravity loads and the following dynamic loads:
 - 1. Uniform load of 50 lbs/ft. applied in any direction.
 - 2. Concentrated load of 200 lbs/ft. applied in any direction.
- B. Delegated Design: Manufacturer shall provide supports, connections, fasteners, and anchorages that will withstand seismic forces applicable to the project location.

1.3 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, accessories, dimensions of individual components and profiles, and finishes.
 - 1. Include door hardware submittals and keying schedule for cylinder locks.
- B. Shop Drawings: Show fabrication and installation details. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Field Measurements: Where partitions must fit around other work, indicate field measurements of important elements on Shop Drawings.
- C. Maintenance Data: Including parts lists for maintenance manuals.
- D. Warranties: Copy of manufacturer's standard warranty.

1.4 QUALITY ASSURANCE

- A. Provide complete partition systems and gates, with all components provided by a single manufacturer, including all panels, posts, mesh, fittings and hardware.

- B. Comply with industry standards and guidelines, including but not limited to those published by the American Institute of Steel Construction (AISC).
- C. Welding: Qualify procedures and personnel according to the AWS published specifications for Steel, Cast Iron, Structural Welding, Stud Welding, Soldering, Sheet Metal, Piping and Tubing, Nickel, and Electrodes.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and handle wire mesh partition components in a manner to avoid damage. Comply with manufacturer's written instructions for storage.
 - 1. Do not stack materials that may bend or dent.
 - 2. Do not store where exposed to weather or moisture; protect from condensation.
 - 3. Provide secure lockup of any door hardware, cylinders, and keys.
- B. Coordinate installation of anchorages for wire partition bases. Furnish setting drawings, templates, and directions for installing anchors, including concrete inserts and anchor bolts that are to be embedded in permanent construction.
- C. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1.6 WARRANTY

- A. Warranty: Manufacturer agrees to repair or replace components of wire mesh partitions that fail in materials or manufacturing workmanship within specified warranty period.
 - 1. Warranty for Wire Mesh Partition Systems: One (1) Year.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. See Division 05 Section for Metal Fabrications, for quality standards for steel or aluminum tubes, shapes, anchors, welding, and finishes.

2.2 WIRE MESH PARTITION PANELS

- A. Steel industrial fencing system consisting of wire mesh modular partition panels, tubular steel posts, and U-shaped clamping strips, designed for security applications.
 - 1. Finish: Factory powder-coated, color Black.
- B. Available manufacturers offering products that may be incorporated into the Work include the following:
 - 1. Wirecrafters
 - 2. SpaceGuard Products
 - 3. Acorn Wire and Iron Works

4. Southwest Solutions
 5. Security Caging by International Vault Caging
 6. Or an approved equal.
- C. Wire Mesh Panels: Steel angle frames welded at all corners, with wire mesh welded to all sides of frame angles.
1. Height of Panels: 8 feet, unless otherwise noted on drawings.
 2. Woven wire: Steel, zinc coated (galvanized) per ASTM A641-Class 1.
 - a. Thickness of each wire: 10 gauge minimum.
 - b. Weave: Lockcrimp, approx. 1-1/2"x1-1/2" square pattern.
 - c. Finish: Factory powder-coated color to match frames.
- D. Frames: Rolled steel angles, 1-1/4 inch x 1-1/4 inch legs by 1/8 inch thick, with slotted holes punched approximately every 12 inches.
- E. Stiffener Bars: 1/4-inch x 3/4-inch thick hot rolled flat stock, center located and welded to wire mesh and horizontal frames on panels greater than 60 inches in length, or at intervals recommended by the manufacturer's engineering for project requirements.
- F. Posts: Square tube steel, 2 inch x 2 inch, 14 gauge thickness, with holes drilled on all four sides to accept hardware to connect panels and doors.
- G. Floor Base Plates: 2-inch x 7-inch (min.) x 1/4-inch thick steel flat base plates welded to the base of each post, and punched to accept a minimum of two bolt anchors.
- H. Ceiling Panels: Not required.
- I. Doors: Constructed with same materials as panels. Provide with all necessary mounting and locking hardware to install and operate.
1. For all doors (swing and slide) include a 3-sided steel plate panel, welded and punched to accommodate cylinder lock lever-set mortise installation.
 - a. Coordinate with Division 08 Door Hardware section; verify lock operation with Owner, basis is storeroom type, key in outside lever, inside always opens.
 - b. Provide steel channel at strike-side post to secure latchbolt.
 2. Hinge Doors: 3'-0" wide x 7'-0" tall.
 - a. Hinges: Three butt hinges welded to steel plates, drilled with holes to be bolted to door frame. Hinges can be installed either way to reverse door swing.
 3. Sliding Doors: 8 feet tall to match full height of panels; width 6 feet (72"), or as shown on Drawings.
 - a. Track/Hangers: At least two 4-wheel ball-bearing trolleys per gate panel, rolling in a galvanized steel box track at top header bolted to posts. Add bottom of door security plate to prevent lift out when in locked position.
 - b. Provide sliding door panel as one single panel, with intermediate stiffener frame components as required.
- J. Openings or service windows: Not required.

- K. Panel fasteners: Provided by panel manufacturer, including all screws and clips for attaching all panel components to each other, and bolts to anchor panels to wall structures and floor slabs.

PART 3 - EXECUTION**3.1 PREPARATION**

- A. Examine areas and conditions where partitions will be installed for compliance with requirements for substrate tolerances and other conditions affecting installation.
- B. Coordinate size and location of partition systems that will be attached to concrete, masonry, steel, or other permanent construction, and furnish anchoring devices with templates, diagrams, and instructions for installation.
- C. Do not install bent, bowed, or otherwise damaged panels. Replace damaged components.
- D. Metal Corrosion Protection: When components are in contact with dissimilar metals, surfaces shall be kept from direct contact by painting the dissimilar metal with a heavy coat of a proper primer.

3.2 INSTALLATION, GENERAL

- A. Anchor wire partition panels with fastener types as recommended by partition manufacturer.
- B. Drill holes in concrete and set anchors with structural epoxy where required.
- C. Repair or replace any damaged components, and touch up damaged finish coatings before Substantial Completion.
- D. Install doors according to manufacturer's written instructions, level, plumb, and secure for full opening without interference.
 - 1. Attach hardware using tamper-resistant or concealed means.
 - 2. Adjust hardware for smooth operation and lubricate where necessary.
 - 3. Confirm that latches and locks engage accurately and securely without forcing or binding.
- E. Contractor to provide additional overhead or lateral steel bracing members if required to secure panels to other permanent construction.

END OF SECTION – 10 22 13 WIRE MESH PARTITIONS

10 22 34 ACCORDION FOLDING FIRE PARTITIONS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes Horizontal-sliding accordion-folding fire control partitions.

1.2 QUALITY ASSURANCE

- A. Installation shall be performed by factory trained and certified installers with experience installing electrically operated accordion folding fire doors.
- B. Fire doors shall be listed by Underwriters Laboratories for ratings as indicated, when tested in accordance with the requirements of UL 10B and NFPA 252.
- C. Automatic closing system shall be listed by Underwriters Laboratories in accordance with the requirements of UL 864 and UL 294, and in compliance with NFPA 80.
- D. Fire doors used for smoke and draft control shall bear the “S” mark on the fire door UL label and shall have an air leakage of less than 3 CFM/ft² at 0.1 inch of water column pressure when tested in accordance with UL 1784.

1.3 SUBMITTALS

- A. Product Data: Provide manufacturer’s technical literature, include UL listing data.
- B. Shop Drawings: Indicate construction and installation details and dimensions, including layout, electrical requirements, required stack depth, height of header above finished floor, and requirements for anchorage and support of each door.
- C. Operation and Maintenance Data: Operating procedures, troubleshooting and repair methods, and wiring diagrams.

1.4 COORDINATION

- A. Coordinate with the following:
 - 1. Electrical and Fire Alarm systems.
 - 2. Floor and ceiling finish.
 - 3. Assure accurate installation of headers, jambs, and trim.
 - 4. Permanent power shall be in-place and ready for final connection when fire and access control doors are installed.

1.5 WARRANTY

- A. Materials and installation shall be warranted against defects in workmanship for a period of two (2) years from the date of substantial completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Horizontal-sliding, accordion-folding, fire partitions:
 - 1. “FireGuard” as manufactured by Won-Door Corporation.
 - 2. Do not substitute products without Architect’s full review and approval. Similar products that may be considered include:
 - a. AC8000 Series by McKeon
 - b. Or an approved equal.

2.2 ACCORDION FOLDING FIRE PARTITIONS

- A. Provide electrically powered automatically-closing fire rated horizontal partitions.
- B. Fire Rating: Fire doors shall be listed by Underwriters Laboratory as special purpose fire doors having a fire protection rating in accordance with the requirements of UL 10B and NFPA 252.
 - 1. Fire rating as indicated on Drawings: verify 60 min, 90 min, 120 min, or 180 min.
- C. Closing and Opening Operation: Automatic Closing System, listed to UL864 and UL294 including motor operator and releasing devices shall be a microprocessor-based system and shall commence closing upon activation by fire signal, access control signal, low battery voltage or optional low AC voltage.
 - 1. Obstruction Detection: Contact with an obstruction shall cause the door to stop, reverse enough to remove pressure on the leading edge, pause, and then re-close when in an alarm condition.
 - 2. Constant pressure to the leading edge while not under motor power shall prevent motor operation and allow the door to be opened manually.
- D. Exit Device Operation: Provide an exit device on one or both sides of door.
 - 1. In emergency mode, a slight pressure on the exit device will cause the door to open fully, pause for 3 seconds, and then automatically close.
 - 2. The open distance shall be field programmable, up to the entire opening width.
 - 3. The pause before re-close shall be field programmable up to 30 seconds.
 - 4. The exit device shall have the ability when not in the emergency (fire) mode to be used to open the door and move it back into the storage pocket.

2.3 COMPONENTS

- A. Door Construction: Two parallel accordion-type partition sheets that deploy in tandem, independently suspended with no floor tracks.

1. Panels: 24 gauge steel, V-grooved; modular in design; capable of in-place repair.
 2. Perimeter Seals: shall consist of continuous extruded sweeps attached to the top and bottom of the fire door to form a smoke and draft seal.
 3. Hanging Weight: 5.5 pounds per sq. ft. when extended across opening.
 4. Finish: All steel panels shall have factory-applied protective paint coatings.
 5. Color: Manufacturer's standard.
- B. Suspension System: Two parallel aluminum tracks attached to overhead structural support.
1. Track: 1/8" extruded aluminum shapes by manufacturer.
 2. Panel Hangers: Ball bearing roller system.
- C. The header shall be provided as an integrated part of the door assembly by the partition manufacturer and shall include track, threaded rods and mechanical attachment hardware.
- D. Power source: 120 – 240 volt AC input. System operation voltage shall be dual sourced from DC power supply and backup battery.
- E. Automatic Closing System shall be listed to UL-864 and UL-294 including capability to send and receive signals from the Fire Control Panel and/or Access Control System, and shall consist of the following:
1. Microprocessor based Electronic Control box with the ability to:
 - a. Monitor dual power sources continually for peak performance including:
 - 1) Detect a missing battery, bad battery, or low battery condition.
 - 2) Detect if the charging circuit is bad.
 - 3) Detect fuse failures.
 - 4) Detect high or low AC conditions.
 - b. Monitor the health of the drive train.
 - c. Monitor inputs including faults associated with door block, exit device, patron hardware, and key switches.
 - d. Run a "watch dog" monitoring circuit which will force a software restart in the event the software hangs, including tracking the number of resets that occur for diagnostic purposes.
 - e. Withstand aberrant voltages up to 120 volts AC on the fire alarm input circuit without damage including the ability to indicate that the alarm circuit has not been wired as a dry contact, "no voltage" circuit when errant voltages are applied to the circuit.
 - f. Indicate faults or supervised information both locally and at a remote location.
 2. Motor Operator Assembly including a DC gear-motor, drive sprocket, clutch, and position sensors. The motor shall drive the door by means of a chain. Standard motor drive speed will be 9" per second.
 3. Leading Edge shall be pressure sensitive such that contact with an obstruction shall cause the door to stop, pause for a minimum of 3 seconds, then re-close when in alarm mode.
 4. Provide infrared obstruction detection, to sound an audible alarm if an obstruction is detected in the path of the closing door.
- F. Options: verify with Architect and Owner:
1. Key switch to limit access

2. Backlit hardware and reflective signage to increase visibility
3. Air pressure resistance, if required by HVAC engineer.

2.4 RELATED CONSTRUCTION

- A. Track Support Construction: Provide supports attached to structure and mounting surfaces for track, including drilling/placement of anchorage points into concrete or steel structural decks, welding/punching/drilling steel members, and provide threaded hanger rods of size recommended for panel weight.
- B. Pocket Construction: Provide rated pocket for storage of accordion door when folded closed; comply with door manufacturer's instructions and recommendations. Typically drywall rated assemblies.
- C. Soffit: Construct finished soffit at the header of the folding partition top track, following manufacturer's recommended details for the type of suspension track required, and to conceal suspension hanger rods. Typically drywall rated assemblies, as required to maintain the fire rating separation indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that adjacent construction is suitable for installation of door. Verify that electrical utilities have been installed and are accessible. Verify clear opening dimensions, level, and plumb. Notify Architect of any unacceptable conditions or varying dimensions.

3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions, shop drawings and NFPA 80.
 1. Assure access to and proper clearance for motor operators.
- B. Install fire partitions plumb and parallel with the finished floor.
- C. Installation shall be performed by factory trained and certified installers with experience installing electrically operated accordion folding fire partitions.

3.3 ADJUSTING AND CLEANING

- A. Adjust partition installation to provide uniform clearances and smooth, non-binding operation.
- B. Test that all operations are functional and meet the requirements of local codes.
 1. After testing the fire alarm system, automatic-closing fire doors shall be re-set to the starting position.

END OF SECTION – 10 22 34 ACCORDION FOLDING FIRE PARTITIONS

10 28 13 TOILET ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes washroom accessories, which may be owner-furnished, contractor installed (OFCI) or contractor-furnished, contractor-installed (CFCI); verify each item for the specific project.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated to installed on the project, whether by Contractor or by Owner, for coordination of blocking and rough-ins. Include the following:
 - 1. Installation details and product dimensions.
 - 2. Anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
 - 3. Material and finish descriptions.
 - 4. Manufacturer's warranty.
- B. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.
 - 1. Identify locations using room designations indicated on Drawings.
 - 2. Identify products using designations indicated on Drawings.
- C. Maintenance Data: For toilet and bath accessories to include in maintenance manuals.

1.3 COORDINATION

- A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper preparation, installation, adjustment, operation, cleaning, and servicing of accessories.
- B. Deliver inserts and anchoring devices that are to be set into concrete or masonry as required to prevent delaying the Work.

1.4 WARRANTY

- A. Manufacturer's Warranty for Washroom Accessories: Manufacturer's standard 1 year warranty for materials.

PART 2 - PRODUCTS

2.1 COMMERCIAL WASHROOM ACCESSORIES

- A. Refer to “Equipment & Accessories” Schedule on drawings for project-specific notes about owner-furnished, contractor installed items.
 - 1. Exposed finishes for all accessories typically brushed stainless steel.
- B. Contractor Furnished, Contractor Installed items, unless otherwise noted, typically include:
 - 1. Mirror: Bobrick B-165 channel framed, 18" x 36" size or 24" x 36" size. See drawings for locations.
 - 2. Grab Bars: 1-1/2" outside diameter stainless steel with brushed satin finish. Provide mounting with concealed fasteners. See drawings for sizes and locations.
 - 3. Paper-Towel Dispenser: Bobrick B-3940 series convertible combination paper towel dispenser and waste receptacle. See drawings for options on dispenser type (manual or automatic) and size of interchangeable receptacle bin.
 - a. Keys: Provide universal (keyed-alike) keys for internal access to accessories for servicing and resupplying. Provide minimum of four (4) keys for each keyed unit to Owner's representative.
 - 4. Feminine Products Disposal: Bobrick B-270 surface-mounted sanitary napkin disposal.
 - 5. Mop and Broom Holder: Bobrick B-223, x24" long.
 - 6. Robe Hook: Bobrick B-76717, brushed satin stainless steel single hook.
- C. Owner-Furnished, Contractor Installed items, unless otherwise noted, typically include:
 - 1. Toilet paper dispensers. Mount 18" minimum to dispenser opening from finished floor per ADA requirements.
 - 2. Soap Dispensers and hand sanitizer dispensers.
 - 3. Toilet Seat Cover dispensers.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.
- B. Grab Bars: Install to withstand a downward load of at least 250 lbf, when tested according to method in ASTM F-446.
- C. Adjust accessories for smooth operation. Clean before Substantial Completion.

END OF SECTION – 10 28 13 TOILET ACCESSORIES

10 44 13 FIRE EXTINGUISHERS AND CABINETS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes fire protection cabinets to hold portable fire extinguishers.
- B. Portable, hand-carried fire extinguishers are typically owner-furnished, contractor installed into the cabinets; verify that size of cabinet is correct for owner-provided extinguishers.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated. Include cut sheets, construction details, material descriptions, dimensions of individual components and profiles, and finishes for fire protection cabinets.
- B. Shop Drawings: For fire protection cabinets. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Include rough-in dimensions, details showing mounting methods, relationships of box and trim to surrounding construction, door hardware, cabinet type, trim style, and panel style.
- C. Maintenance Data: For fire protection cabinets to include in maintenance manuals.

1.3 QUALITY ASSURANCE

- A. Fire-Rated, Fire Protection Cabinets: Listed and labeled to comply with requirements in ASTM E-814 for fire-resistance rating of walls where they are installed.
- B. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."
 - 1. Listed and labeled by Underwriter's Laboratory (UL) or Factory Mutual (FM) for type, rating, and classification.

1.4 COORDINATION

- A. Coordinate size of fire protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.
- B. Coordinate sizes, locations, and trims of fire protection cabinets with wall depths.
 - 1. Not less than 6 inch minimum cabinet interior depth.

PART 2 - PRODUCTS

2.1 FIRE EXTINGUISHER CABINETS

- A. Products: Subject to compliance with requirements, provide one of the following
 - 1. “Architectural Series” by Larsen’s Manufacturing Co.
 - 2. “Elite” or “Murano” series by Safety One Industries
 - 3. Or approved equal.
- B. Cabinet Fire Rating: 1-hour fire rated minimum; 2-hour rated where required by wall construction rating.
 - 1. Construct fire-rated cabinets with double walls fabricated from cold-rolled steel sheet lined with minimum 5/8-inch-thick, fire-barrier material. Provide factory-drilled mounting holes.
- C. Recessed Cabinet: Cabinet box fully recessed in walls of sufficient depth to suit perimeter trim. Use at all locations possible, typical unless otherwise noted.
 - 1. Exposed Flat Trim: One-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend).
- D. Semi-Recessed Cabinet: Cabinet box partially recessed in walls; with one-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend). Provide where walls are of insufficient depth for recessed cabinets but are of sufficient depth to accommodate semi-recessed cabinet installation.
 - 1. Rolled-Edge Trim: 1-1/2-inch to 3-1/2-inch backbend depth, as required to meet wall depth. (Greater than 3-1/2” projection from surface of wall is not allowed.)
 - 2. Obtain Architect’s approval for specific locations.
- E. Surface-Mounted Cabinet: Cabinet box fully exposed and mounted directly on wall with no trim. Provide where walls cannot accommodate semi-recessed cabinet installation. Obtain Architect’s approval for specific locations.
- F. Cabinet Material: 16 gauge cold rolled steel with 22 gauge cold rolled steel tubs.
 - 1. Manufacturer's standard baked-enamel white paint for interior of cabinet and door.
- G. Door and Trim Material and exterior finish:
 - 1. 304 Stainless Steel with brushed satin stainless #4 finish.
- H. Door Style: Vertical narrow view panel with frame.
 - 1. Door Glazing: Clear acrylic sheet.
- I. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.

1. Lock: Keyed lock with cam-action latch, with emergency break-away capability, that allows door to be opened during emergency by pulling sharply on door handle without breaking the viewing panel.
 - a. Coordinate keying with Owner, all cabinets keyed alike, or coordinated with Division 08 for Door Hardware if required.
2. Handle: Fixed D-shaped pull, brushed stainless steel.
3. Hinge: Continuous hinge, of same material and finish as trim, permitting door to open 180 degrees.

J. Accessories:

1. Mounting Bracket: Manufacturer's standard steel, designed to secure fire extinguisher to fire protection cabinet, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.
2. Wall-mount brackets: Where fire extinguishers are not mounted inside cabinets, provide universal wall-mount forked or pin-hook type bracket.
3. Identify fire protection cabinet with the words **FIRE EXTINGUISHER**
 - a. Location: Applied to cabinet door
 - b. Application Process: Engraved, etched, decals, or pressure-sensitive vinyl letters.
 - c. Lettering Color: Red

2.2 PORTABLE FIRE EXTINGUISHERS

- A. Multi-Purpose Dry Chemical, typical 10 lb, ABC type, UL rating 4A:80B:C, provided by Owner, installed into cabinets by Contractor.
- B. Owner as a national account with Cintas Managed Solutions to supply all Fire Extinguishers; coordinate with Owner for delivery and installation.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine walls and partitions for suitable framing depth, height, and blocking where recessed and semi-recessed cabinets will be installed.
- B. Examine fire extinguishers for proper charging and tagging. Replace damaged, defective, or undercharged fire extinguishers.

3.2 INSTALLATION

- A. General: Install fire extinguishers in locations indicated and in compliance with requirements of authorities having jurisdiction.
- B. Fire Protection Cabinets: Fasten cabinets to structure, square and plumb.

1. Unless otherwise indicated, always provide recessed fire protection cabinets wherever possible.
2. If wall thickness is not adequate for recessed cabinets, provide semi-recessed fire protection cabinets.
3. Provide surface-mounted cabinets only in locations approved by architect, to verify protrusion from wall (typically 4” protrusion is maximum allowable for ADA clearance, unless specifically approved otherwise.)

3.3 ADJUSTING AND CLEANING

- A. Remove temporary protective coverings and strippable films, if any, as fire protection cabinets are installed unless otherwise indicated in manufacturer's written installation instructions. Clean interior and exterior surfaces as recommended by manufacturer.
- B. Adjust fire protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.
- C. Touch up marred finishes, or replace fire protection cabinets that cannot be restored to factory-finished appearance.

END OF SECTION – 10 44 13 FIRE EXTINGUISHERS AND CABINETS

10 51 13 METAL LOCKERS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes metal employee lockers.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of metal locker and bench.
- B. Shop Drawings: Prepared specifically for this project. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Show locker trim and accessories.
 - 2. Include locker identification system and numbering sequence.
- C. Samples: Not required if providing the exact products and colors indicated on drawing finish schedules.
 - 1. If alternative products are proposed in lieu of basis-of-design products, provide samples of actual materials with colors for Architect review and approval.
- D. Maintenance Data: For adjusting, repairing, and replacing locker doors and latching mechanisms to include in maintenance manuals.
- E. Warranty: Copy of manufacturer's warranty.

1.3 COORDINATION

- A. Regulatory Requirements: Where lockers and benches are indicated to comply with accessibility requirements, comply with the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities" and ICC/ANSI A117.1.
- B. Coordinate sizes and locations of concrete or wood bases or pedestals for lockers.
- C. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of work specified in other Sections to ensure that metal lockers can be supported and installed as intended.

1.4 WARRANTY

- A. Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal lockers that fail in materials or workmanship, excluding finish, within specified warranty period.
- B. Warranty Period for Metal Lockers: Two (2) years

PART 2 - PRODUCTS

2.1 METAL LOCKERS

- A. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include:
 - 1. "Ventilated Gym Lockers" by Lyon Storage Solutions (Basis of Design)
 - 2. Or an approved equal.
- B. Construction: "Knock-down" steel body, assembled on site by riveting or bolting body components together.
 - 1. Unit Width: 12"
 - 2. Unit Height: 78" (not including legs, base, or cap)
 - 3. Unit Depth: 18"
 - 4. Configuration: Double-Tier (two lockers per unit)
 - 5. Doors: 16-gauge one-piece steel sheet, ventilated with perforated sections of metal "diamond mesh" design.
 - 6. Body: 24-gauge sheet steel, minimum thickness, with reinforced frames and edges.
- C. Finish: Baked enamel or powder coat, color as selected by Architect.
- D. Hinges: Welded to door and attached to door frame with no fewer than two factory-installed rivets per hinge that are completely concealed and tamper resistant when door is closed; fabricated to swing 180 degrees.
- E. Top and Bottom Cross Members: Provide support for front edge of lockers, top and bottom.
- F. Base: No legs, provide base trim angle in color finish matching lockers. Provide anchorage to concrete base.
- G. Tops: Continuously sloped hood.
- H. Accessories for each locker, with rust-resistant finish:
 - 1. 1 double-prong ceiling hook and 3 single-prong wall hooks inside each unit.
 - 2. 1 steel rod hanging bar.
- I. Closures and Fillers: Provide closure strips, front expansion fillers, and corner fillers to fill spaces between lockers where required for proper fit.
 - 1. End finishing panels: matching locker steel, finish, and color, with no exposed fasteners.

- J. Handle: Finger-lift latch control designed for use with padlocks; positive automatic latching, chromium plated; pry and vandal resistant.
 - 1. Lyon “Tamper-Guard Handles” as basis of design.
- K. Identification Plates: Manufacturer's standard, etched, embossed, or stamped aluminum, with numbers and letters at least 3/8 inch high.
 - 1. Verify numbering for each locker with Owner.

2.2 BENCHES

- A. Provide bench units with overall assembly height of between 17 inches and less than 19 inches from finished floor to top surface of bench.
- B. Product: Lenox Pedestal Bench, by Bradley Corp.
- C. Bench Tops: Manufacturer's standard one-piece units, with rounded corners and edges.
 - 1. Surface: High Density Polyethylene (HDPE) with homogeneous color and a matte finish texture.
 - 2. Typical Size: Minimum 9-1/2 inches wide by 1-1/2 inches thick. Length as indicated on drawings.
 - 3. Where accessible benches are indicated: Minimum 20 inches wide (or wider) by 1-1/2 inches thick by 42 inches long (coordinate length where indicated on drawings.)
- D. Fixed Pedestals: Manufacturer's standard aluminum tube supports, with welded flanges at top and base with predrilled fastener holes for attaching bench top and anchoring to floor, complete with non-corrosive fasteners appropriate for the substrate indicated.
 - 1. Color: Anodized Black.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Examine walls, floors, and support bases, with Installer present, for compliance with requirements for installation tolerances and dimensions.
- B. Install level, plumb, and true; shim as required, using concealed shims.
- C. Anchor locker runs at ends and at intervals recommended by manufacturer, but not more than 36 inches o.c. Using concealed fasteners, install anchors through backup reinforcing plates, channels, or blocking as required to prevent metal distortion.
- D. Equipment and Accessories: Fit exposed connections of trim, fillers, and closures accurately together to form tight, hairline joints, with concealed fasteners and splice plates.
 - 1. Identification Plates: Identify lockers with identification as directed by Owner.
 - a. Attach plates to each locker door, near top, centered, with at least two aluminum rivets.

2. Attach hooks with at least two fasteners.
3. Attach recess trim to recessed metal lockers with concealed clips.
4. Attach sloping-top units to metal lockers, with closures at exposed ends.

END OF SECTION – 10 51 13 METAL LOCKERS

10 55 23 MAILBOXES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes curbside post-mounted package mailboxes.

1.2 REFERENCES

- A. United States Postal Service (USPS) Standards.

1.3 SUBMITTALS

- A. Product Data: Including construction details and dimensions, anchoring and mounting requirements, and requirements for work of other trades for mounting mailboxes.
- B. Shop Drawings: Prepared specifically for this project to show dimensions of mailboxes and interface details with other work.

1.4 WARRANTY

- A. Manufacturer's standard warranty to repair or replace components of postal specialties that fail in materials or workmanship within five (5) years from date of purchase.

PART 2 - PRODUCTS

2.1 PACKAGE MAILBOX

- A. Provide and install post-mounted mailbox designed for receiving mail and small packages within a secured locked enclosure.
 - 1. Dimensions: Approx. 21" deep x 16" high x 12" wide, as minimums.
 - 2. Material: 12- and 14-gauge galvanized welded steel body, stainless steel hardware.
 - 3. Powder-coated finish, color black.
 - 4. Locking access door with 3 keys.
 - 5. Include base plate and mounting post.
- B. Manufacturers: Subject to compliance with requirements, provide the following:
 - 1. "Package Master" by Mail Boss
 - 2. Or an approved equal, after full review and approval by Architect.

- C. Coordinate construction of a poured-in-place concrete base. Refer to mailbox manufacturer's instructions for post extension if required, depth of concrete base, and height of mailbox mounting.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that framed openings in wall are correctly located, aligned, and sized for mailboxes, with correct blocking and substrates as required for attachment anchors and supports.

3.2 INSTALLATION

- A. Install mailboxes in accordance with shop drawings and manufacturer's printed installation instructions.
- B. Align, plumb, and level; anchor in accordance with manufacturer's requirements. Verify that all hinges swing freely and that doors open and close without scratching or sticking.
- C. Lubricate locks in accordance with manufacturer's instructions, and protect locks and finishes from damage by subsequent activities.

END OF SECTION – 10 55 23 MAILBOXES

10 57 23 COATED WIRE SHELVING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes adjustable wall-mounted vinyl-coated wire shelving.

1.2 SUBMITTALS

- A. Product data: Manufacturer's product data with application recommendations and installation instructions for proprietary items and all accessories.
- B. Shop Drawings: Project specific plans and details, showing placement locations, spacing, dimensions, and maximum tolerances. Show dimensions to fastener locations and relationship to adjacent construction.

1.3 QUALITY ASSURANCE

- A. Provide all coated wire shelving and accessories from a single source manufacturer as an integrated system.

1.4 WARRANTY

- A. Manufacturer's standard limited warranty against manufacturing defects, outlining terms, conditions, and exclusions from coverage.

PART 2 - PRODUCTS

2.1 COATED WIRE SHELVING SYSTEMS

- A. Acceptable Manufacturer: ClosetMaid, LLC, Basis of Design.
- B. Materials:
 - 1. Steel Wire: Basic cold drawn, Grade C-1006; average tensile strength over 100,000 psi (690 MPa); coated.
 - a. Standard shelf deck wire spacing of 1 inch.
 - 2. Wire Coating: Heavy-duty polyvinyl chloride (PVC) formula with manufacturer's proprietary resin, plasticizers, stabilizers, pigments, and other additives.
 - a. Vinyl-coating shall bridge intersections of welded cross wires to provide a continuous protective coating.
 - b. The elasticity of the protective coating shall be sufficient to prevent chipping and cracking of the protective finish.
 - c. Color: White.

3. Hanging Tracks, Standards, and Brackets: High-strength steel with epoxy color coating.
- C. Shelving System Characteristics:
1. Provide Heavy-Duty Shelving and heavy-duty adjustable system supports to hold 100 pounds per linear foot.
 2. Provide adjustable system mounting hardware as required for the shelving configuration shown on drawings, including shoe shelf supports and wall clips.
 3. See drawings for widths of shelves, and verify with Owner on shop drawings.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Examine substrates and verify conditions for blocking, studs, and other structural supports. Verify locations of framing and anchoring locations for fasteners.
- B. Notify Architect of any unsatisfactory substrate preparation, or possible deviation from shop drawings, in writing before proceeding with installation.

3.2 INSTALLATION

- A. Install shelving plumb and level at heights indicated in accordance with shop drawings and manufacturer's printed installation instructions.

END OF SECTION – 10 57 23 COATED WIRE SHELVING

10 73 16 PREFABRICATED CANOPIES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes extruded aluminum wall-supported canopies.

1.2 SUBMITTALS

- A. Product Data: Submit manufacturer's product information, specifications, and installation instructions for the aluminum canopy.
- B. Shop Drawings: Show shop and erection details, including cuts, connections, and welds.
 - 1. Overall canopy layout dimensions
 - 2. Cut section details, including elevations and connection details
 - 3. Flashing and drainage details for aluminum canopy
 - 4. Canopy wall anchorage details, including support structures by other trades.
- C. Samples: Submit 4-inch square samples of actual factory-coated aluminum material in the custom color indicated by Architect.
- D. Certification: Provide design calculations bearing the seal of a Registered Professional Engineer certifying that the proposed canopy design and layout meets or exceeds all applicable loadings (ex: wind load, rain live load, dead load, snow load) for the job location (city & state) in accordance with the IBC and ASCE 7, and as noted on the Structural drawings.

1.3 QUALITY ASSURANCE

- A. Professional Engineer Qualifications: A professional engineer who is legally authorized to practice in the jurisdiction where the project is located, and who is experienced in providing engineering services for installing metal canopies similar to those indicated for this project

1.4 FIELD CONDITIONS

- A. Field Measurements: The Contractor shall verify location and elevation of footings relative to finished grade, columns, wall structural elements, and other construction contiguous with pre-engineered metal canopies by field measurements before fabrication and indicate measurements on shop drawings.
- B. Contractor is responsible to coordinate structure, blocking, and anchor locations with heights and elevations for any interferences with or attachments to abutting structures.

1.5 WARRANTY

- A. Warrant canopy frame materials, finishes, and workmanship against defects for a period of one (1) year from date of Substantial Completion of the Work.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include the following:
 - 1. AVAdek, Inc. (Basis of Design)
 - 2. Do not substitute products without Architect's full review and approval. Possible products that may be considered may include:
 - a. Mapes Canopies
 - b. Peachtree Awnings & Canopies
 - c. Mitchell Metals
 - d. Architectural Fabrication Inc.
 - e. Or an approved equal.

2.2 WALL-MOUNTED CANTILEVER CANOPY WITH HANGER RODS

- A. Canopy Characteristics:
 - 1. Decking shall be a rigid extruded roll-locked design that is self-flashing and utilizes interlocking sections that form a flat soffit of flush aluminum panels.
 - 2. Integral concealed gutter welded and sealed, with drainage outlet; see drawings for drainage design intent. Water will either drain out to the front of the canopy with no downspout, or will drain towards the rear of the canopy at the wall with discharge into one or more aluminum downspouts.
 - 3. Fascia shall be aluminum extrusion of size indicated on architect's drawings, on the three exposed sides of the canopy. Minimum fascia size shall be 12 inches high at 0.080" thick.
 - 4. Hanger Rods: Tubes of structural aluminum, or zinc plated steel. Provide compression spacers at airspace between veneer and structure of type and thickness recommended by canopy engineer for the specific application.
 - 5. Hardware and Fasteners: Nuts, bolts, washers, clevis pins, screws, anchors and pipe spacers to be non-corrosive, zinc plated or galvanized steel, or stainless steel, as required to suit application and per pre-engineered canopy load requirements.
- B. Canopy Finishes: Comply with NAAMM Metal Finishes Manual for recommendations for applying and designating finishes.
 - 1. Prime and paint are not acceptable.
 - 2. Color coating: Shop-applied, two-coat spray coating system, 70% Kynar 500 FSF resin-based fluoropolymer coating system, or approved equal, to comply with AAMA 2605.
 - a. Color will be a custom color to match Architect's selection; factory-applied to all exposed canopy components.

PART 3 - EXECUTION**3.1 PREPARATION**

- A. Verification of Conditions: Examine areas and conditions under which the work is to be installed, and notify the Contractor in writing, with a copy to the Owner and the Architect, of any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected
 - 1. Examine supporting foundations for compliance with manufacturer's requirements, including installation tolerances and other conditions affecting performance of supporting members.
 - 2. Check installed anchor bolts for accuracy. Verify that bearing surfaces are ready to receive the work.
 - 3. Verify the rough-in of required mechanical and electrical services prior to placement of the structure.
 - 4. If preparation is the responsibility of another installer, notify the Architect of unsatisfactory preparation before proceeding.
 - 5. Beginning of the work shall indicate acceptance of the areas and conditions as satisfactory by the Installer.

3.2 INSTALLATION

- A. Canopies are to be installed according to approved shop drawings and manufacturer's requirements. The entire structure shall be installed straight, true, and plumb according to standard construction procedures.
- B. Canopies shall be installed with positive and negative slope of 1/8" per foot to allow water drainage from top of canopy to draining holes or downspouts and eliminate ponding.
- C. All exposed fasteners are to be painted to match the canopy color.
- D. After installation, restore marred or damaged surfaces to original condition using same paint or coating as factory-applied finishes, for results acceptable to the Owner. Replace damaged parts that cannot be satisfactorily repaired.

END OF SECTION – 10 73 16 PREFABRICATED CANOPIES

11 13 00 LOADING DOCK EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Edge of Dock levelers with bumpers.
 - 2. Extruded rubber bumpers.
 - 3. Dock seals.

- B. Related Sections include the following:
 - 1. Division 03 Sections for Cast-in-Place Concrete for concrete slabs, dock platforms, and foundation walls.
 - 2. Division 05 Sections for structural steel and metal fabrications for angles and channels at loading dock platform edges.
 - 3. Division 08 Sections for overhead doors.
 - 4. Division 26 Sections for electrical wiring and connections for loading dock equipment.

1.2 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, rated capacities, operating characteristics, furnished specialties, accessories, dimensions of individual components and profiles, and finishes.

- B. Shop Drawings: Show fabrication and installation details. Include plans, elevations, sections, details, and attachments to other work.
 - 1. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 - 2. Wiring Diagrams: Power, signal, and control wiring.

- C. Product Test Reports: Based on evaluation of tests performed by manufacturer and supervised and verified by a qualified independent professional engineer, indicate compliance of dock levelers with requirements for determining rated capacity, which is based on comprehensive testing within the last two years of current products.

- D. Maintenance Data: For loading dock equipment to include in maintenance manuals.

- E. Warranties: Copies of manufacturer's standard warranties.

1.3 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.

1. Maintenance Proximity: Not more than two hours' normal travel time from Installer's place of business to Project site.
- B. Source Limitations: Obtain each type of loading dock equipment through one source from a single manufacturer.
- C. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination" to coordinate trades affected by the installation of loading dock equipment.

1.4 COORDINATION

- A. Coordinate installation of anchorages for loading dock equipment. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- B. Electrical Requirements: Coordinate wiring requirements and current characteristics of loading dock equipment with building electrical system. See Division 26 Sections.

1.5 WARRANTY

- A. Special Warranty for Dock Levelers: Manufacturer's standard form in which manufacturer agrees to repair or replace dock-leveler components that fail in materials or workmanship within specified warranty period.
 1. Failures include, but are not limited to, the following:
 - a. Structural failures including cracked or broken structural support members and load-bearing welds.
 - b. Deck plate failures including cracked plate or permanent deformation in excess of 1/4 inch between deck supports.
 - c. Hydraulic system failures including failure of hydraulic seals and cylinders.
 - d. Faulty operation of operators, control system, or hardware.
 2. Warranty Period for Structural Assembly: **2** years minimum from date of Substantial Completion.
 3. Warranty Period for Hydraulic System: **1** year minimum from date of Substantial Completion.
 4. Warranty shall be for unlimited usage of the leveler for the specified rated capacity over the term of the warranty.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Steel Plates, Shapes, and Bars: ASTM A-36.

- B. Rolled-Steel Floor Plate: ASTM A-786, rolled from steel plate complying with ASTM A-572, Grade 55.
- C. Steel Tubing: ASTM A-500, cold formed.
- D. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

2.2 EDGE-OF-DOCK LEVELERS

- A. General: Surface-mounted, hinged-lip-type, edge-of-dock levelers designed for permanent installation on the vertical face of loading dock platform edge.
 - 1. Rated Capacity: 20,000 lbs.
 - 2. Lip Length: Standard 15 inches.
 - 3. Deck Width: 66 inches.
 - 4. Minimum working range: 3" above or below dock.
- B. Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include:
 - 1. Dock Leveler Manufacturing (DLM), a division of Systems LLC
 - 2. RHE-300 by Rite-Hite
 - 3. Pioneer Dock Equipment
 - 4. NOVA Technology International, LLC
 - 5. EDML series by Pentalift Equipment Corporation
 - 6. Or an approved equal.
- C. Integral Dock Bumpers: Fabricated from one-piece, 4-inch thick, heavy molded-rubber.
 - 1. Type A Shore durometer hardness of 80, plus or minus 5, when tested according to ASTM D-2240.
 - 2. Mounted on formed-steel frame with internal steel reinforcement. Two bumpers for each edge-of-dock leveler, attached with expansion bolts.
 - 3. Size: approx. 12"x13" rectangular, 4" thick min. Manufacturer's standard designed to fit into edge-of-dock steel frames.
 - 4. Bumper Projection: 15 inches minimum.
- D. Mechanical Operating System: Spring-operated raising and walk-down lowering of unloaded ramp. Equip units with a torsion-spring counterbalancing mechanism controlled by a hold-down device.
 - 1. Lever Handle: Self-storing lever handle for raising unloaded ramp with minimal lifting force by pulling lever back to extend lip and pushing lever forward to lower ramp and lip.
 - 2. Removable Lifting Handle: For raising unloaded ramp by lifting action.
- E. Hydraulic Operating System: Electric-powered hydraulic raising and hydraulic lowering of ramp, controlled from a remotely located push-button station. Equip leveler with a packaged unit including a unitized, totally enclosed, nonventilated electric motor, pump, manifold reservoir, and valve assembly of proper size, type, and operation for capacity of leveler

indicated. Provide a hydraulic velocity fuse connected to main hydraulic cylinder to limit loaded ramp's free fall to not more than 3 inches (76 mm.)

1. Remote-Control Station: Single-button station of the constant-pressure type, enclosed in NEMA ICS 6, Type 12 box. Ramp and lip raise to vertical position and extend to truck bed by depressing and holding button.

2.3 LIGHT COMMUNICATION SYSTEMS

- A. General: Provide communication system consisting of signal-light sets, caution signs, and controls for each location indicated.
- B. Signal-Light Sets: Red and green illuminated signal-light sets, with lens approximately 4 inches in diameter, designed to indicate status to both dock attendant and truck driver. Equip system with steel control panel located at interior of dock that includes illuminated lights indicating status of exterior signal lights. Provide signal-light set and control panel at each location indicated for light communication system. Enclose exterior signal-light sets in steel or plastic housing with sunshade.
 1. Automatic Operation: System is activated automatically by limit switch, photoelectric sensor, or magnetic switch mounted on overhead door track.
 2. Provide on-off switch located on system control panel.
- C. Caution Signs: Surface mounted; with black text on yellow background, and with sign copy as follows:
 1. Exterior Sign Copy in Forward and Reverse Text: "CAUTION, MOVE ON GREEN ONLY."
 2. Interior Sign Copy: "CAUTION, ENTER ON GREEN ONLY."
 3. Provide one sign at each truck restraint location.

2.4 DOCK SHELTERS AND SEALS

- A. General: Dock seals consisting of fabric-covered foam pads designed to compress 4 to 5 inches under pressure of truck body to form an airtight seal at jambs and head of loading dock openings.
 1. Pressure-Treated Wood Support Frame: Factory painted, with steel mounting hardware.
 2. Pad Depth from exterior wall: 21 inches.
 3. Cover Fabric: Premium vinyl-coated nylon or polyester with minimum weight of 40 oz./sq. yd.
 - a. Color selected from manufacturer's standard range.
 4. Guide Strips: 3- or 4- inch wide x full height, coated, nylon guide strips on jamb pads, in contrasting color.
 5. Adjustable weighted drop head curtain: min. 24" high, height adjustable at least 12" with pull ropes.
 6. Pleated Protectors on face of jamb pads at top corners of columns to head, of overlapping layers of coated fabric attached to base fabric.

7. Bottom 24” of each side pad column shall be separate pieces, able to be removed and re-attached.
 8. Column width: 18 inches at outer face; trapezoid shape to seal truck width to wider door opening.
 9. Double lock-stitching at all seams with UV-stable thread.
- B. Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include:
1. Fairborn USA, Inc.
 2. NOVA Technology International, LLC
 3. Rite-Hite
 4. Pioneer Dock Equipment
 5. Or an approved equal.
- C. Anchorage Devices: Hot-dip galvanized steel or stainless steel anchor bolts, nuts, washers, bolts, sleeves or other anchorage devices as required to fasten dock seals securely in place and to suit installation type indicated.

2.5 EXTRUDED RUBBER BUMPERS

- A. Extruded-Rubber Wall-Guard Bumpers: Fabricated in “D”-shapes, from ASTM D-2000, extruded synthetic rubber ,with Type A Shore durometer hardness of 75 or better, when tested according to ASTM D-2240.
1. Furnish units with predrilled anchor holes.
 2. Furnish with concealed, flat, steel mounting bar on back face.
 3. Size: 4”x4” minimum, or as indicated on drawings.
 4. Length: Pre-cut lengths as indicated on drawings. Use longest lengths available to minimize the number of individual units. Attach multiple units end to end where required to make up longer lengths.
- B. Product: Basis of Design: ACE Hose and Rubber Company: Extruded Black Rubber Dock Bumper – 4in. x 4-3/8in. D-4
1. Manufacturer’s offering similar products that may be considered include:
 - a. Cisco-Eagle
 - b. FS Industries
 - c. Chase Doors
 - d. Or an approved equal.
- C. Anchorage Devices: Hot-dip galvanized steel or stainless steel anchor bolts, nuts, washers, bolts, sleeves, cast-in-place plates, and other anchorage devices as required to fasten bumpers securely in place and to suit installation type indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of loading dock equipment.
- B. Examine roughing-in for electrical systems for loading dock equipment to verify actual locations of connections before equipment installation.
- C. Examine walls and floors of pits for suitable conditions where recessed loading dock equipment is to be installed. Pits shall be plumb and square and properly sloped for drainage from back to front of loading dock.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Coordinate size and location of loading dock equipment indicated to be attached to or recessed into concrete or masonry, and furnish forming materials, anchoring devices with templates, diagrams, and instructions for their installation.
- B. Clean recessed pits of debris before installing equipment.

3.3 INSTALLATION

- A. General: Install loading dock equipment, including motors, pumps, control stations, wiring, safety devices and accessories as required for a complete installation.
 - 1. Rough-in electrical connections according to requirements specified in Division 26.
- B. Dock Bumpers: Attach dock bumpers to face of loading dock in a manner that complies with requirements indicated for spacing, arrangement, and position relative to top of platform and anchorage.
 - 1. Bolted Attachment: Attach dock bumpers to preset anchor bolts embedded in concrete or to cast-in-place inserts or threaded studs welded to embedded-steel plates or angles. If preset anchor bolts, cast-in-place inserts, or threaded studs welded to embedded-steel plates or angles are not provided, attach dock bumpers by drilling and anchoring with expansion anchors and bolts.
- C. Dock Levelers: Attach dock levelers to loading dock platform in a manner that complies with requirements indicated for arrangement and position relative to top of platform.
 - 1. Weld anchor holes in contact with continuous embedded loading dock edge channel. Weld or bolt bumper blocks to loading dock face.
- D. Dock Shelters: Attach dock shelters securely to building structure in proper relation to openings, dock bumpers, and dock levelers to ensure an effective seal of dock-shelter curtains with sides and top of truck body when trucks are positioned against dock bumpers.

3.4 ADJUSTING AND CLEANING

- A. Adjust loading dock equipment for proper, safe, efficient operation. Test dock levelers and lifts for travel within operating range indicated.

- B. Restore marred, abraded surfaces to their original condition. Touch up painted finishes.

3.5 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain loading dock equipment.

END OF SECTION – 11 13 00 LOADING DOCK EQUIPMENT

12 21 00 WINDOW BLINDS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes manual window roller shades.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated. Include styles, material descriptions, construction details, dimensions of individual components and profiles, features, finishes, operating instructions, and maintenance and cleaning recommendations.
- B. Shop Drawings: Show location and extent of roller shades. Include elevations, sections, details, and dimensions not shown in Product Data. Show installation details, mountings, attachments to other work, operational clearances, and relationship to adjoining work.
- C. Samples: For the following products:
 - 1. Shade Material: Not less than 8-inch-square section of each type of fabric. Show pattern repeats. Mark top, room-side, and back-side of material.
 - 2. Provide physical samples of any other accessories involving color selection, such as fascia or headbox.
- D. Maintenance Data: For roller shades to include in maintenance manuals. Include the following:
 - 1. Precautions about cleaning materials and methods that could be detrimental to fabrics, finishes, and performance.
 - 2. Shade operator moving parts and hardware.

1.3 QUALITY ASSURANCE

- A. Source Limitations: Obtain roller shades through one source from a single manufacturer.
- B. Fire-Test-Response Characteristics: Provide roller shade band materials with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
 - 1. Flame-Resistance Ratings: Passes NFPA 701, Standard Methods of Fire Tests for Flame Propagation of Textiles and Films. Certified as flame-retardant.
- C. Product Standard: Provide roller shades complying with WCMA A 100.1, Standards for Safety of Window Covering Products, newest edition.

1.4 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install roller shades until construction and wet and dirty finish work in spaces, including painting, is complete and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- B. Field Measurements: Where roller shades are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Allow clearances for operable glazed units' operation hardware throughout the entire operating range. Notify Architect of discrepancies. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

PART 2 - PRODUCTS

2.1 ROLLER SHADES, MANUAL

- A. Products: Subject to compliance with requirements, provide one of the following:
 - 1. "FlexShade NEXD" by Draper Inc., preferred Basis of Design.
 - 2. Manufacturer's offering similar products that may be considered include:
 - a. SWFcontract or Graber, by Springs Window Fashions
 - b. Marietta Drapery & Windowcoverings
 - c. MechoShade Systems, Inc.
 - d. Hunter Douglas Architectural
 - e. Insolroll, Inc.
 - f. Or approved equal.
- B. Configuration: Single solar shade cloth, recess-mounted with fascia.
- C. Shade cloth Material: Light-filtering fabric.
 - 1. Size: Fit to windows as indicated on drawings. Verify existing and new actual openings.
 - 2. Basis of Design: Pfifer "Sheerweave" Basic, color "P05 White/Platinum".
 - a. Basic 1% open at interior shade locations
 - b. Basic 3% open at exterior window shade locations.
 - c. Substitution requests may be considered after Architect's and Owner's full review and approval.
- D. Rollers: Electrogalvanized or epoxy primed steel or extruded-aluminum tube of diameter and wall thickness required to support and fit internal components of operating system and the weight and width of shade band material without sagging; designed to be easily removable from support brackets.
- E. Mounting Brackets: Fascia end caps, fabricated from steel finished to match fascia or headbox.
- F. Fascia: L-shaped, formed-steel sheet or extruded aluminum; long edges returned or rolled; continuous panel concealing front and bottom of shade roller, brackets, and operating hardware and operators, removable design for access.

- G. Top/Back Cover: L-shaped; material and finish to match fascia; combining with fascia and end caps to form a six-sided headbox enclosure sized to fit shade roller and operating hardware inside.
- H. Pocket-Style Headbox: U-shaped, formed-steel sheet or extruded aluminum; long edges returned or rolled; with a bottom cover consisting of slot opening of minimum dimension to allow lowering and raising of shade and a removable or an openable, continuous metal access panel concealing shade roller, brackets, and operating hardware and operators within.
- I. Bottom Bar: Steel or extruded aluminum. Provide concealed, by pocket of shade material, internal-type bottom bar with concealed weight bar as required for smooth, properly balanced shade operation.
- J. Finish for exposed metal hardware: Black as basis of design; clear anodized silver aluminum where specifically approved by Architect.
- K. Manual Operation:
 - 1. Cordless Spring Lift-Assist Mechanisms: Typical basis of design unless otherwise noted: Manufacturer's standard for balancing roller-shade weight and lifting heavy roller shades.
 - 2. Chain-and-Clutch Operating Mechanisms (where specifically allowed by Architect): Continuous-loop stainless-steel bead chain and clutch comprised of multi-banded steel springs that stops shade movement when bead chain is released; permanently adjusted and lubricated.

2.2 ROLLER SHADE FABRICATION

- A. Fabricate units to completely fill existing 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.
- C. Concealed Components: Noncorrodible or corrosion-resistant-coated materials.
 - 1. Lifting Mechanism: Provide permanently lubricated moving parts.
- D. Installation Fasteners: No fewer than two fasteners per bracket, fabricated from metal noncorrosive to shade hardware and adjoining construction; type designed for securing to supporting substrate; and supporting shades and accessories under conditions of normal use.
- E. Color-Coated Finish: For metal components exposed to view, apply manufacturer's standard baked finish complying with manufacturer's written instructions for surface preparation including pretreatment, application, baking, and minimum dry film thickness.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, operational clearances, accurate locations of connections to building electrical system, and other conditions affecting performance.
 - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 ROLLER SHADE INSTALLATION

- A. Install roller shades level, plumb, and aligned with adjacent units according to manufacturer's written instructions. Allow clearances for window operation hardware.
- B. Connections: Coordinate any motorized operators with building electrical systems, including line voltage and low voltage requirements per the roller shade manufacturer.

3.3 ADJUSTING

- A. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.

3.4 CLEANING AND PROTECTION

- A. Clean roller shade surfaces after installation, according to manufacturer's written instructions.
- B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that roller shades are without damage or deterioration at time of Substantial Completion.
- C. Replace damaged roller shades that cannot be repaired, in a manner approved by Architect, before time of Substantial Completion.

END OF SECTION – 12 21 00 WINDOW BLINDS

13 34 19 PRE-ENGINEERED METAL BUILDING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes: A complete pre-engineered, componentized building system involving the design, fabrication, delivery and installation of structural steel framing, metal roof and wall panels, insulation, and other integrated products and accessories.

- 1. Minimum components included in delegated pre-engineered building system design:
 - a. Structural-steel framing.
 - b. Metal roof panels.
 - c. Metal wall panels.
 - d. Thermal insulation.
 - e. Anchors and accessories.

- B. The General Contractor shall be solely responsible for the coordination of the Pre-Engineered Metal Building (PEMB) design with the structural drawings and foundation design. This includes, but is not limited to, coordinating column locations, base plate and anchor bolt requirements, reactions, connection details, and elevation clearances.

- C. Related Sections Include:

- 1. Division 03 Sections for Cast-In-Place Concrete for footings and slabs
- 2. Division 04 Sections for Unit Masonry and CMU
- 3. Division 05 Sections for Structural Steel
- 4. Division 07 Sections for Thermal and Roof Insulation
- 5. Division 07 Sections for exterior panel veneer materials
- 6. Division 08 Sections for doors, overhead doors, door hardware, and windows

1.3 REFERENCES

- A. Metal Building Manufacturers Association (MBMA):

- 1. Metal Building Systems Manual
- 2. Guide for Inspecting Metal Building Systems
- 3. Energy Design Guide for Metal Building Systems
- 4. Seismic Design Guide for Metal Building Systems
- 5. Metal Roofing Systems Design Manual
- 6. Fire Resistance Design Guide for Metal Building Systems

- B. ASTM International:

1. ASTM A-36 – Specification for Carbon Structural Steel
2. ASTM A-242 - Standard Specification for High-Strength Low-Alloy Structural Steel
3. ASTM A-992 - Standard Specification for Steel for Structural Shapes For Use in Building Framing

C. American Institute of Steel Construction (AISC):

1. ANSI/AISC 360 - Specification for Structural Steel Buildings

D. American Iron and Steel Institute (AISI):

1. Cold-Formed Steel Design Manual, including AISI S100 - North American Specification for the Design of Cold-Formed Steel Structural Members.

E. International Accreditation Service (IAS):

1. AC472 - Accredited Inspection Program for Manufacturer of Metal Building Systems
2. AC473 - Accreditation Criteria for Inspection Programs for Manufacturers of Cold-Formed Steel Structural and Nonstructural Components Not Requiring Welding
3. AC478 - Accreditation for Metal Building Assemblers

1.4 SUBMITTALS

A. Product Data: For each type of metal building system component. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes. Provide complete and fully descriptive manufacturer's literature which shall include, but not be limited to, the names of materials and components and their proper method of assemblage for this particular project.

1. Structural-steel-framing system.
2. Anchor bolts.
3. Metal roof panels and roof vents.
4. Metal wall panels.
5. Wall liner panels.
6. Insulation and vapor retarder facings.
7. Flashing, trim, and drainage.
8. Doors and windows.
9. Accessories.

B. Material and Product Test Repots for:

1. Structural Steel physical properties
2. Bolts, nuts, washers, and tension control physical and mechanical properties
3. Shop primers and nonshrink grout
4. Insulation and vapor-retarder facings, including thermal properties, fire-test-response characteristics, and water-vapor transmission.

C. Shop Drawings shall also include:

1. Structural-Framing and Erection Drawings: Show complete fabrication of primary and secondary framing; include provisions for openings. Indicate welds and bolted connections, distinguishing between shop and field applications. Include transverse cross-sections.

2. Metal Roof and Wall Panel Layout Drawings: Show layouts of metal panels including methods of support. Include details of edge conditions, joints, panel profiles, corners, anchorages, trim, flashings, closures, and special details. Distinguish between factory- and field-assembled work; show locations of exposed fasteners.
 - a. Show roof-mounted items including roof hatches, equipment supports, pipe supports and penetrations, lighting fixtures, and items mounted on roof curbs.
 - b. Show wall-mounted items including doors, windows, louvers, and lighting fixtures.
3. Accessory Drawings, including details of:
 - a. Flashing and trim.
 - b. Gutters.
 - c. Downspouts.
 - d. Roof ventilators.
 - e. Louvers.
- D. Samples: Color chips for each type of product with factory-applied color finishes.
- E. Door Schedule: For doors and frames. Use same designations indicated on Drawings. Include details of reinforcement.
 1. Coordinate door hardware and keying schedules with items shown on drawings and with owner requirements.
- F. Delegated-Design Submittal: For metal building systems to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 1. See Structural Drawings for wind and other design loading requirements.
 2. The building manufacturer shall not alter the column line layout shown on the structural or architectural drawings without prior approval from the Architect. Shop drawings submitted with unapproved changes to the building layout or dimensions will be rejected.
- G. Qualifications Data for:
 1. Professional Engineer designing metal building system
 2. Manufacturers of metal building system components
 3. Erector of metal building system
 4. Testing agencies that will provide inspections and reports on metal building systems.
- H. Warranties: Copies of warranties for all products provided with metal building systems.

1.5 PERFORMANCE REQUIREMENTS

- A. Delegated Design: The metal building Manufacturer shall provide engineering design calculations and structural framing design, sealed by a registered Professional Engineer licensed in the jurisdiction where the project is located.
 1. The Manufacturer's structural design data shall include the magnitude and locations of design loads and support conditions, the type and size of all structural members, and material properties of major structural elements.

- B. Structural Performance: Provide complete metal building systems capable of withstanding design loads under the project conditions indicated.
 - 1. Design Loads: As indicated on Structural drawing sheets.
 - a. Refer to geotechnical reports and civil drawing sheets for site design information.
 - 2. Comply with applicable building code requirements for design loads, and in accordance with the latest edition of the MBMA “Metal Building Systems Manual.”

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications:
 - 1. Manufacturer shall be a member of MBMA.
 - 2. Manufacturer shall be accredited under the International Accreditation Service (IAS) AC472 and AC473.
- B. Erector Qualifications: An experienced erector who specializes in erecting and installing work similar in material, design, and extent to that indicated for this Project and who is acceptable to manufacturer.
 - 1. Erector shall be accredited under the International Accreditation Service (IAS) AC478 Accredited Metal Building Assembler.
- C. Source Limitations: Obtain metal building system components, including primary and secondary framing and metal panel assemblies, from single source from single manufacturer.
- D. Welding Qualifications: Qualify procedures and personnel according to WS D1.1, Structural Welding Code - Steel, and AWS D1.3, Structural Welding Code - Sheet Steel.
- E. Preinstallation Conference: Review methods and procedures related to metal building systems installation, including, but not limited to:
 - 1. Condition of foundations and other preparatory work performed by other trades.
 - 2. Delivery and staging of materials, work space required, and protection of materials on site.
 - 3. Construction Schedule.
 - 4. Required tests and inspections.
 - 5. Weather conditions and forecasts.
 - 6. Structural limitations of purlins and rafters during and after roofing.
 - 7. Flashings, special details for metal wall and roof panels, drainage, penetrations, and other construction that will affect waterproofing and weather-tightness of building.
 - 8. Temporary protection requirements for metal building components during and after installation.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Unload, store, and erect metal building components in a manner to prevent bending, warping, twisting, and surface damage.
- B. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, with positive slope for

drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.

- C. Protect insulation from sunlight, ignition, and moisture to the greatest extent possible during installation and before concealment.

1.8 FIELD CONDITIONS

- A. Weather Limitations: Proceed with installation only when weather conditions permit metal panels to be installed according to manufacturers' written instructions and warranty requirements.
- B. Field Measurements: Comply with dimensions on approved anchor-bolt plans, establishing foundation dimensions and proceeding with structural framing. Coordinate construction to ensure that actual building dimensions, locations of structural members, and openings correspond to established dimensions.

1.9 WARRANTY

- A. Metal Building Warranty: Warrant pre-engineered metal building against material and manufacturing defects and weather intrusion for a period of two (2) years from Substantial Completion.
 - 1. Provide a 2 (two) year workmanship guarantee against failures caused by faulty erection.
- B. Warranties for metal roof and wall panels, doors, and other products integrated into metal building systems shall be warranted as indicated in other Sections for those types of products.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with requirements, available manufacturers and products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Bigbee Steel Buildings, Inc.
 - 2. Kirby Metal Building Systems, LLC
 - 3. Butler Manufacturing, a division of BlueScope Buildings North America, Inc.
 - 4. Or an approved equal.
- B. See other Division 07 Sections for Thermal Insulation, Sheet Metal Flashing and Trim, Metal Roof Panels, Metal Wall Panels and Roof Accessories, that must be coordinated with pre-engineered metal building, and/or may be supplied by metal building manufacturer.

2.2 METAL BUILDING SYSTEM

- A. General: Provide a complete, integrated set of metal building system manufacturer's standard mutually dependent components and assemblies that form a metal building system capable of withstanding structural and other loads, thermally induced movement, and exposure to weather without failure or infiltration of water into building interior.
 - 1. See Drawings for primary frame shapes, spans, and spacing modules.
 - 2. All framing members shall carry an easily visible identifying mark to aid in the erection and inspection of the building.
- B. Primary Framing: Manufacturer's standard primary-framing system, designed to withstand required loads and specified requirements. Primary framing includes transverse and lean-to frames; rafter, rake, and canopy beams; sidewall, intermediate, end-wall, and corner columns; and wind bracing.
- C. Secondary Framing: Manufacturer's standard secondary framing, including purlins, girts, eave struts, flange bracing, base members, gable angles, clips, headers, jambs, and other miscellaneous structural members. Unless otherwise indicated, fabricate framing from either cold-formed, structural-steel sheet or roll-formed, metallic-coated steel sheet, shop-primed.
- D. Canopy Framing: Manufacturer's standard structural-framing system, designed to withstand required loads; fabricated from shop-welded structural-steel shapes and steel plates. Provide frames with attachment plates and splice members, factory drilled for field-bolted assembly.
- E. Framed openings shall be furnished by the building manufacturer to accommodate man doors at all locations and overhead doors at expandable end walls. Doors to be supplied under other Sections. Framed openings shall consist of structural framing to provide an opening in a wall, along with necessary trim and flashing around this opening and provide a finished appearance.
 - 1. Openings for overhead doors at dock area side walls shall be furnished by the building manufacturer to accommodate overhead doors supplied under other Sections. Overhead door openings at dock area side walls shall consist of a continuous structural header with jambs extending from floor to the structural header.
 - 2. Jambs to be 12-gauge (min.) cold form sections that are 24" to 30" wide with 8-1/2" legs returning to inside of building and then turning an additional 2-1/2" towards each other for attachment of overhead door tracks.
 - 3. Size of opening shall be determined by the size of the door specified. Structural framing (jambs and header) shall consist of cold-formed, open "C" sections or hot-rolled channel sections (prime painted) depending on structural requirements. Necessary clips and fasteners, for making connections for all members, shall be provided. Trim around opening shall accommodate wall panel configuration.
 - 4. Color-coated trims to entirely cover shop-primed structural jambs and header shall be included.

2.3 METAL BUILDING INSULATION

- A. Vinyl-Faced Blanket Insulation: Inorganic glass fiber blanket insulation bonded to a polyethylene or polypropylene vapor retarder liner facing on both sides.
 - 1. Color of vinyl facing: White.

2. ASTM C-665, Type II, Class A, Category 1 (blankets with a nonreflective vapor-retarder membrane covering one principal face and functioning as a vapor retarder).
 3. Surface Burning Characteristics: Flame Spread Index less than 25 and Smoke Developed Index less than 50 when tested in accordance with ASTM E-84, NFPA 255 and UL 723.
 4. Products: Do not substitute without Architect's approval after full review:
 - a. "Simple Saver System" by Thermal Design, Inc.
 - b. Also provides through-fall protection and protection from falling objects per OSHA and 29 CFR-1926.759 - .761.
- B. Where glass-fiber blanket insulation is indicated by the following thicknesses, provide blankets in roll form with the following minimum thermal resistances:
1. 3-1/2 inches thick with a thermal resistance of R-11
 2. 4 inches thick with a thermal resistance of R-13
 3. 6 inches thick with a thermal resistance of R-19
 4. 8 inches thick with a thermal resistance of R-25
 5. 9 inches thick with a thermal resistance of R-30
- C. Accessories for Metal Building Insulation:
1. Galvanized steel support straps or bands.
 - a. Primed and painted to match vinyl facing color.
 2. Closed-cell vinyl foam thermal break tape
 3. Double-sided vapor barrier seam tape
 4. Non-corrosive steel fasteners with rubber sealing washers
 5. Wire insulation spindles and hangers
 6. Thermal Spacer Blocks for insulation at steel framing, extruded or expanded polystyrene.
 7. Thickness: 3/8 inch to 1 inch
 8. Minimum width: 3 inches.
 9. Sealants for sealing vapor retarder seams and penetrations as recommended by vinyl-faced insulation manufacturer.

2.4 ROOF RIDGE VENTILATORS

- A. Ridge ventilators shall be gravity type with operable dampers, and shall be furnished with bird screens. Ventilators shall have skirts suitable for mounting direction on ribbed panels and end caps that are adaptable, with slight field modification, for use on buildings with roof slopes 1/4:12 minimum up to 6:12 maximum.
- B. Single units shall be 10'-0" long and shall have a 9 inch throat opening. Each ventilator shall have end caps at both ends which allow the vent to be used, without modifications, as a single unit or in continuous runs.
- C. Ventilator shall be made of 26-gauge lock forming quality, G-90 galvanized or Galvalume steel substrate with color coated white finish. Bird screens shall be 1/2" mesh, 19-gauge galvanized hardware cloth. Ventilators shall be shop assembled and all connections shall be riveted and sealed to prevent leaking.

- D. Dampers shall be controlled from the floor by chains connected to the ventilator pull bar. Dampers are spring loaded to remain in the open position and are closed by manually pulling and locking the chain. Dampers have a positive wind-lock in any position to prevent damper flutter.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with erector present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Before erection proceeds, Contractor shall engage a qualified surveyor to survey elevations and locations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments to receive structural framing, with erector present, for compliance with requirements and metal building system manufacturer's tolerances.
- C. Proceed with erection only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Provide temporary shores, guys, braces, and other supports during erection to keep structural framing secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads, as well as loads due to erection equipment and erection operations.

3.3 ERECTION OF STRUCTURAL FRAMING

- A. Erect metal building system according to manufacturer's written erection instructions and erection drawings. Set structural framing accurately in locations and to elevations indicated.
- B. Do not field cut, drill, or alter structural members without written approval from metal building system manufacturer's professional engineer.
- C. Align and adjust structural framing before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with framing. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
- D. Primary Framing and End Walls: Erect framing level, plumb, rigid, secure, and true to line. Level baseplates to a true even plane with full bearing to supporting structures. Use grout to obtain uniform bearing and to maintain a level base-line elevation.
- E. Framing for Openings: Provide shapes of proper design and size to reinforce openings and to carry loads and vibrations imposed, including equipment furnished under mechanical and electrical work. Securely attach to structural framing.

3.4 METAL BUILDING WALL AND ROOF INSTALLATION

- A. Metal Wall Panel Installation: Install metal wall panels in orientation, sizes, and locations indicated on Drawings. Install panels perpendicular to girts, extending full height of building, unless otherwise indicated. Anchor metal wall panels and other components of the Work securely in place, with provisions for thermal and structural movement.
- B. Metal Roof Panel Installation: Fasten metal roof panels to supports with concealed clips at each seam joint, at location and spacing and with fasteners recommended by manufacturer.
- C. Thermal Insulation: Install insulation concurrently with metal panel installation, in thickness indicated to cover entire surface, according to manufacturer's written instructions.
- D. Metal Protection: Where dissimilar metals contact each other or potentially corrosive substrates, protect against galvanic action by painting contact surfaces with corrosion-resistant coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by the metal product manufacturer.
- E. Install doors, windows, and frames plumb, rigid, properly aligned, and securely fastened in place according to manufacturers' written instructions. Coordinate installation with wall flashings and other components.
- F. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
- G. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of metal panel envelope assemblies.

3.5 FIELD QUALITY CONTROL

- A. Special Inspector: Owner may engage a qualified special inspector to perform tests and inspections and to submit reports. Special inspector will verify that the metal building manufacturer maintains detailed fabrication and quality-control procedures and will review the adequacy of those procedures to perform this Work.
- B. If fabrication is performed by a manufacturer registered and approved by the authorities having jurisdiction to perform this Work without special inspections, submit certificates of compliance to the AHJ, certifying that Work was performed according to Contract requirements.

3.6 ADJUSTING, CLEANING, AND PROTECTION

- A. Doors and windows: After completing installation, test and adjust to operate easily, free of warp, twist, or distortion. Adjust and check each operating item of hardware to ensure proper operation and function of every unit. Replace units that cannot be adjusted to operate as intended.
- B. Repair damaged galvanized coatings on galvanized items with galvanized repair paint according to manufacturer's written instructions.

**DIVISION 13 – SPECIAL
CONSTRUCTION**

13 34 19 PRE-ENGINEERED METAL BUILDING Continued

- C. Metal Panels: Remove temporary protective coverings and strippable films, if any, as metal panels are installed. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition for the duration of construction.

END OF SECTION – 13 34 19 PRE-ENGINEERED METAL BUILDING

13 34 23 FABRICATED STRUCTURES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes

1.2 PERFORMANCE REQUIREMENTS

- A. List

1.3 SUBMITTALS

- A. Product data: Manufacturer's product data with application recommendations and installation instructions for proprietary items and all accessories.
- B. Shop Drawings: Project specific plans and details, showing placement locations, spacing, dimensions, and maximum tolerances.

1.4 QUALITY ASSURANCE

- A. Pre-installation meeting:

1.5 WARRANTY

PART 2 - PRODUCTS

2.1 PRODUCT (1)

- A. General:

2.2 PRODUCT (2)

- A. General:

2.3 PRODUCT (3)

- A. General:

PART 3 - EXECUTION

3.1 PREPARATION

A. Examine substrates

3.2 INSTALLATION

A. Installation, General:

END OF SECTION – 13 34 23 FABRICATED STRUCTURES

14 21 00 ELECTRIC TRACTION ELEVATORS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes electric traction passenger and service elevators.
- B. Related Sections include the following:
 - 1. Division 03 Sections for Cast-in-Place Concrete for setting sleeves, inserts, and anchoring devices in concrete.
 - 2. Division 04 Sections for Unit Masonry and CMU for setting sleeves, inserts, and anchoring devices in masonry and for grouting elevator entrance frames installed in masonry walls.
 - 3. Division 05 Sections for Structural Steel Framing including:
 - a. Attachment plates, angle brackets, and other preparation of structural steel for fastening guide-rail brackets.
 - b. Divider beams.
 - c. Hoist beams.
 - d. Structural-steel shapes for subsills that are part of steel frame.
 - 4. Division 05 Sections for Metal Fabrications including:
 - a. Attachment plates and angle brackets for supporting guide-rail brackets.
 - b. Machine beams.
 - c. Weld plates.
 - d. Structural-steel shapes for subsills.
 - e. Pit ladders.
 - f. Cants and bevels in hoistways made from steel sheet.
 - 5. Division 09 Sections for finish flooring in elevator cars.
 - 6. Division 09 Sections for Gypsum Board and shaft wall framing at hoistway walls.
 - 7. Division 21 for fire suppression systems in elevator shaft.
 - 8. Division 22 for pit sump pump and piping.
 - 9. Division 23 Sections for ventilation in elevator lobbies and shafts.
 - 10. Division 26 Sections for electrical service to elevators including lighting, disconnect switches, transfer switches, and emergency power supply.
 - 11. Division 27 for telephone and communication service to elevators.
 - 12. Division 28 for security access system equipment.
 - 13. Division 28 Sections for Fire Detection and Alarm for smoke detectors in elevator lobbies to initiate emergency recall operation and heat detectors in shafts and machine rooms to disconnect power from elevator equipment before sprinkler activation and for connection to elevator controllers.

- C. General contractor shall provide the following in accordance with the requirements of the adopted Building Code and ANSI A17.1 Elevator Code. State or local requirements must be used if more stringent.
1. Hoist beam at the top of the elevator shaft.
 2. Wall inserts, anchors, bearing plates, brackets, supports and bracing.
 3. Fill and grout around all entrance frames at masonry construction.
 4. Fire rated assemblies for shaft enclosure and associated equipment/machine room spaces.
 5. Provide framing so that the wall fire resistance rating is maintained, where drywall construction is used.
 6. Verify and coordinate minimum wall thickness required to accommodate elevator controller panel in hoistway wall.
 7. Forming, cutting, patching and recesses to accommodate hall button boxes, signal fixtures, etc.
 8. Where pit access is by means of the lowest hoistway entrance, a vertical ladder of non-combustible material extending 48" minimum above sill of access door or handgrips.
 9. Plumbing systems shall not be in an elevator shaft or elevator equipment room, with the exception of floor drains, sumps and sump pumps shall be permitted at the base of the shaft, if they are indirectly connected to the plumbing system.
 10. Provide and install finished flooring in elevator cab.
 11. Finished floors and entrance walls may not be constructed until after sills and elevator door frames are in place. Consult elevator contractor for rough opening size required for installation.
- D. General contractor shall provide the following in accordance with the requirements of the adopted Building Code and National Electric Code. State or local requirements must be used if more stringent.
1. Locate a light fixture (200 lx / 19 fc) and convenience outlet in pit with switch located adjacent to the access door.
 2. Provide light fixture, and convenience outlet in the hoistway near the landing where the elevator controller is located. Final location must be coordinated with elevator supplier and local fire marshal.
 3. For signal systems and power operated door: provide ground and branch wiring circuits.
 4. For car light and fan: provide a feeder and branch wiring circuits to elevator control cabinet.
 5. When heat, smoke or combustion sensing devices are required, connect to elevator control cabinet terminals.
 6. Provide telephone line or other communication cable to the elevator controller, and traveling cable in the shaft for the communication in the elevator cab.
 - a. Traveling Cables: Flexible cables shall run from the junction box on the car directly to the elevator controller, providing protection for shielded wires for

electrical power, ethernet cable, fiber-optic cables, or other required conductors. Terminal blocks shall be protected and securely anchored without tension or twisting on cables.

7. Provide an emergency stop switch in the pit adjacent to the pit access opening and ladder.
8. In the controller space, means shall be provided to keep the ambient air temperature and humidity in the range specified by the elevator equipment manufacturer. The temperature and humidity range shall be permanently posted where specified by the equipment manufacturer, in the machinery space.

1.2 REFERENCES

- A. ANSI/ASME A17.1 - Safety Code for Elevators and Escalators.
- B. ADAAG - Americans with Disabilities Act Accessibility Guidelines.
- C. NFPA 70 - National Electrical Code (NEC).
- D. NFPA 72 – National Fire Alarm and Signaling Code
- E. NFPA 80 - Fire Doors and Windows.
- F. NFPA 101 – Life Safety Code
- G. ANSI/UL 10B - Fire Tests of Door Assemblies.

1.3 SUBMITTALS

- A. Product Data: Include capacities, sizes, performances, operations, safety features, finishes, and similar information. Include product data for the following:
 1. Car enclosures and hoistway entrances.
 2. Operation, control, and signal systems.
 3. Car and hall fixtures, cab ceilings, and finish options.
 4. Power Information: Horsepower, starting current, running current, machine and control heat release, and electrical requirements.
- B. Shop Drawings: Show plans, elevations, sections, and large-scale details indicating service at each landing, machine room layout, coordination with building structure, relationships with other construction, and locations of equipment and signals.
 1. Include large-scale layout of car control station.
 2. Indicate maximum dynamic and static loads imposed on building structure, floors served, travel distances, and specific associated dimensions.
 3. Show equipment arrangement in the corridor, pit, hoistway and control space / equipment room. Provide plans, elevations, sections and details of assembly, erection, anchorage, equipment locations, and clearances required.

- 4. Indicate maximum and average power demands, electrical power requirements and branch circuit protection device recommendations.
- C. Samples: For any manufacturer-provided interior finishes.
- D. Manufacturer Certificates: Signed by elevator manufacturer certifying that hoistway, pit, and machine room layout and dimensions, as shown on Drawings, and electrical service, as shown and specified, are adequate for elevator system being provided.
- E. Qualification Data: For Installer.
- F. Operation and Maintenance Data: For elevators to include in emergency, operation, and maintenance manuals.
 - 1. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include diagnostic and repair information available to manufacturer's and Installer's maintenance personnel.
- G. Inspection and Acceptance Certificates and Operating Permits: As required by authorities having jurisdiction for normal, unrestricted elevator use.
- H. Warranty: Special project-specific warranty.
- I. Continuing Maintenance Proposal: Service agreement specified in this Section.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Elevator manufacturer or manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
- B. Source Limitations: Obtain elevators and major elevator components through one source from a single manufacturer.
- C. Regulatory Requirements: Comply with ASME A17.1.
- D. See Structural drawings for seismic and loading requirements.
- E. Accessibility Requirements: Comply with the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG)." and ICC A117.1.
- F. Fire-Rated Hoistway Entrance Assemblies: Door and frame assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated.

1.5 COORDINATION

- A. Coordinate installation of sleeves, block outs, and items that are embedded in concrete or masonry for elevator equipment. Furnish templates and installation instructions and deliver to Project site in time for installation.

- B. Coordinate sequence of elevator installation with other work to avoid delaying the Work.
- C. Coordinate locations and dimensions of other work relating to electric elevators including pit ladders, sumps, and floor drains in pits; entrance subsills; and electrical service, electrical outlets, lights, and switches in pits and machine rooms.
- D. Electrical Power: Arrange for temporary GFCI-protected electricity to be available for installation of elevator components.
- E. Preinstallation Meeting: Conduct prior to elevator delivery, with elevator installer and representatives of all affected trades, to review conditions of installation, preparation and installation procedures and coordination with related Work and work under separate contracts.
- F. Elevator Installer shall obtain and pay for all required inspections, tests, permits and fees for elevator installation.

1.6 WARRANTY

- A. Special Manufacturer's Warranty: Manufacturer's project-specific form in which manufacturer agrees to repair, restore, or replace defective elevator work within specified warranty period.
 - 1. Warranty Period: **One year** minimum from date of Substantial Completion.

1.7 MAINTENANCE SERVICE

- A. Initial Maintenance Service: Beginning at Substantial Completion, provide one full year of maintenance service by skilled employees of elevator Installer. Include monthly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper elevator operation at rated speed and capacity. Provide parts and supplies same as those used in the manufacture and installation of original equipment.
 - 1. Perform maintenance, including emergency callback service, during normal working hours.
 - 2. Include 24-hour-per-day, 7-day-per-week emergency callback service.
 - a. Response Time: Two hours or less.
 - 3. Thirty days before expiration of the twelve (12) month maintenance service, the elevator contractor shall schedule an inspection of the elevator equipment with the Owner or his representative. This inspection is to assure that the elevator equipment is in safe first-quality, operating condition and the equipment is operating in line with its original design. An authorized representative of the elevator contractor shall accompany the Owner or his representative.
 - 4. Examinations and log: During the warranty maintenance period the elevator contractor shall maintain maintenance records as per ANSI A17.1 Code for each elevator. The records shall be located in the elevator machine room and be used to indicate all call backs, repairs, replacement of parts, fire service test and adjustments performed by the mechanic. Each entry in the maintenance records shall be signed by the mechanic who performs the work and be kept up-to-date at all times.

- B. Continuing Maintenance Proposal: Provide a continuing maintenance proposal from Installer to Owner, in the form of a standard yearly (or other period) maintenance agreement, starting on date initial maintenance service is concluded. State services, obligations, conditions, and terms for agreement period and for future renewal options.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Basis of Design: "Ecospace" by KONE Inc.
 - 2. Do not substitute products without Architect's full review and approval. Similar products that may be considered include:
 - a. "Evolution 200" by TKElevator
 - b. "Gen 2" or "Gen 3" by Otis Elevator Co.
 - c. "3300" series by Schindler Elevator Corp.
 - d. Or approved equal.

2.2 SYSTEMS AND COMPONENTS

- A. General: Provide manufacturer's standard elevator systems. Where components are not otherwise indicated, provide standard components published by manufacturer as included in standard pre-engineered elevator systems and as required for complete system.
- B. Elevator Operation: Fully automatic group collective operation: Using a microprocessor based controller, operation shall be automatic to assign cars to hall calls based on a dispatching program designed to minimize passenger waiting time.
- C. Operating Features:
 - 1. Door Light Curtain Obstruction Detection Protection
 - 2. Phase Monitor Relay to protect motors from current fluctuations and voltage faults.
 - 3. Load-weighing device which, when the particular car is filled to an adjustable percentage of the capacity load, shall cause the car to bypass landing calls but not car calls.
 - 4. Cab Overload Indicator
 - 5. Fire Alarm system interface
 - 6. Remote Monitoring at Fire Alarm Control Panel
 - 7. Firefighter's Operation:
 - a. Phase I Emergency Recall Operation
 - b. Phase II Emergency In-Car Operation
 - 8. Shunt Trip Protection.
- D. Elevator Controller Location: Door Jamb or Wall access (Machine-Room-Less).

2.3 OPERATION SYSTEMS

- A. General: Provide manufacturer's standard microprocessor operation system for each elevator or group of elevators as required to provide type of operation system indicated.
 - 1. Complete 3 phase connections from the electric power mains to each controller, including necessary circuit breakers and fused mainline disconnect switches.
- B. The controller shall be distributed throughout the elevator system located in the overhead, cab and inspection and test panel. The inverter will be mounted in the overhead adjacent to the hoist machine and an inspection and test panel will be located in the door jamb at the top floor or one floor below the top floor. No elevator equipment mechanical rooms or closets are required.
- C. Automatic Self-Leveling: Provide each elevator car with a self-leveling feature to automatically bring the car to the floor landings and correct for over travel or under travel. Self-leveling shall, within its zone, be automatic and independent of the operating device. The car shall be maintained approximately level with the landing irrespective of its load.
- D. Service Panel shall be accessible from outside the hoistway, and shall provide the following functionality:
 - 1. Access to main control board and CPU
 - 2. Main controller diagnostics
 - 3. Main controller fuses
 - 4. Universal Interface Tool
 - 5. Remote valve adjustment
 - 6. Electronic motor starter adjustment and diagnostics
 - 7. Operation of pit motorized shut-off valve with LED feedback to the state of the valve in the pit
 - 8. Operation of auxiliary pump/motor (secondary hydraulic power source)
 - 9. Operation of electrical assisted manual lowering
 - 10. Provide male plug to supply 110VAC into the controller
 - 11. Run/Stop button
- E. Main Car Operating Panel: Full-height swinging return panel with all floor-selector push buttons, door open-close push buttons, key switches for inspection and fire-fighter operation, emergency buttons, and required emergency communication for elevator operation, mounted at ADA-compliant heights.
 - 1. Finish: Brushed stainless steel.
 - 2. Doors shall have concealed hinges, be in the same front plane as the faceplate and fitted with cylinder type key operated locks. Secure the faceplate with stainless steel tamperproof screws.
 - 3. Include elevator data plate showing elevator capacity and car number where applicable.
 - 4. Mark buttons and switches with standard identification for required use or function that complies with ASME A17.1. Use both tactile symbols and Braille.
 - 5. Provide "No Smoking" sign matching car control station, either integral with car control station or mounted adjacent to it, with text and graphics as required by authorities having jurisdiction.

6. Car Position Indicator: Provide illuminated in-car position indicator with illuminated numbers or arrows indicating the current floor number and the next direction of travel.
7. Audible chime: provide in-car audible signal to indicate to passengers that car is either stopping at or passing each of the floors served.

F. Auxiliary Car Operating Panel: Not required.

G. Automatic Light and Fan shut down: The control system shall evaluate the system activity and automatically turn off the cab lighting and ventilation fan during periods of inactivity. The settings shall be field programmable.

H. Car Top Inspection: Provide a car top inspection station with an "Auto-Inspection" switch, an "emergency stop" switch, and constant pressure "up and down" direction and safety buttons to make the normal operating devices inoperative. The station shall give the inspector complete control of the elevator.

I. Security Features: Provide compatibility with the following security features which may be coordinated with Owner. Security features shall not affect emergency firefighters' service.

1. Card-Reader Operation (if applicable): System may use card readers or proximity fobs at car control stations and hall push-button stations to authorize calls. Provide required conductors in traveling cable and panel in machine room for interconnecting card readers, other security access system equipment, and elevator controllers.

J. Keyswitches for Manual Operation: Push buttons are activated and deactivated by security keyswitches at in-car control panel and hall push-button stations at designated levels. Key is removable only in deactivated position.

1. Provide a number of keys equal to the number of elevators plus two extra keys.

K. Optional Digital Services:

1. Elevator shall include module for remote performance monitoring with REST API capable of transmitting relevant information from the cloud-based IoT monitoring system.
2. Elevator shall include module for dedicated wireless cellular phone service for the in-car communication system.

2.4 DOOR REOPENING DEVICES

A. Infrared Array: Provide door reopening devices with uniform array of 33 or more microprocessor-controlled, infrared light beams projecting across car entrance from ground level to a height of at least six feet. Interruption of one or more of the light beams shall cause doors to stop and reopen.

B. Door Operators: The door operator shall open the car door and hoistway door simultaneously, at a speed of 2.5 ft. per second. The closing speed of the doors shall be 1 ft. per second. A reversal of direction of the doors from the closing to opening operation, whether initiated by obstruction of the infrared curtain or the door "OPEN" button, shall be accomplished within 1.5 inches maximum of door movement. Door operation shall be quiet, smooth, fast, and shall provide dynamic braking for door reversals.

- C. In case of interruption or failure of electric power, the doors can be readily opened by hand from within the car, in accordance with applicable code. Provide emergency devices and keys for opening doors from the landing as required by local code.

2.5 HOISTWAY COMPONENTS

- A. Machine:
 - 1. Compact energy efficient permanent magnet Gearless traction type, consisting of motor, brake and driving sheave mounted on a rigid bedplate in the top of the hoistway.
 - 2. Design machine to enable direct power transfer, thereby avoiding loss of power.
 - 3. Mount to structural support channels on top of guide rail system as applicable in hoistway overhead.
- B. Governor:
 - 1. Tension type over-speed governor with remote manual reset.
 - 2. Mount to structural support channels as applicable in hoistway overhead.
- C. Buffers: Compression spring type buffers anchored to pit floor.
- D. Brake: The brake shall be a spring applied electric brake; held open by an electro-magnet actuated by a digital brake controller and designed to make smooth, positive stops.
- E. Hoistway Operating Devices:
 - 1. Emergency Stop switch in the pit.
 - 2. Terminal stopping switches.
 - 3. Emergency stop switch on the machine.
- F. Positioning System: System consisting of proximity sensors and door zone vanes.
- G. Guide Rails and Counterweight Attachments: Provide 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.
- H. Sling: Steel stiles bolted or welded to a steel crosshead and bolstered with bracing members.
- I. Suspension Belts: Suspension belts shall be flat belts of polyurethane with an inner core of 14 steel cords with an FT1 fire rating. Each belt shall have a suspension strength of 60 KN (13,488 pounds).
 - 1. Suspension tension monitor shall detect differences in belt tension and for loss of tension. If fault is detected, the car shall stop at the nearest floor and an Out of Service call be registered.
- J. Governor rope: Steel wire or iron rope.
- K. Counterweight: Counterbalance each elevator for smooth and economical operation by using iron or steel plate weights securely fastened in a steel counterweight frame. Counterweight shall equal the weight of the complete elevator car and approximately 50 percent of the specified capacity load.

- L. Emergency Terminal Limits: Electric limit devices in the hoistway near the terminal landings. Limit switch(es) shall be designed to cut off the electric current and stop the car if it runs beyond either terminal landing.

2.6 HOISTWAY ENTRANCES

- A. General: Provide manufacturer's standard horizontal-sliding, door-and-frame hoistway entrances complete with track systems, hardware, sills, and accessories. Provide frame size and profile to coordinate with hoistway wall construction.
- B. Interlocks: Equip each hoistway entrance with an approved type interlock tested as required by code. Provide door restriction devices as required by code.
- C. Hoistway Doors and Frames:
 - 1. UL rated with required fire rating.
 - 2. Doors: Rigid flush panel construction with reinforcement ribs.
 - 3. Frames: Securely fasten at corners to form unit frame. Frames shall be bolted.
- D. Finish:
 - 1. Exposed Areas of Corridor Frames: #4 brushed stainless steel on all floors.
 - 2. Doors: #4 stainless steel on all floors.
 - 3. Sills: Aluminum on all floors.
- E. Entrance Markings and Jamb Plates: Provide standard entrance jamb tactile braille markings on both jambs, at all floors.
- F. Where gypsum board wall construction is indicated, provide self-supporting frames with reinforced head sections.
- G. Provide landing identification inside the hoistway to the side of entrance doors. Stencil 4" min. high numerals both 12" above the bottom and 12" below the top of the door panel at each level.

2.7 CAR ENCLOSURES

- A. General: Provide steel-framed car enclosures with nonremovable wall panels, with car roof, access doors, power door operators, and ventilation.
 - 1. Provide standard railings complying with ASME A17.1 on car tops where required by ASME A17.1.
 - 2. Provide finished car including materials and finishes specified below.
- B. Cab Materials: Provide manufacturer's standards, but not less than the following:
 - 1. Fire rating: Provide Class B fire rating for cab, or Class A fire rating where required by local Code.
 - 2. Fabricate car with recesses and cutouts for signal equipment.
 - 3. Fabricate car door frame integrally with front wall of car.
- C. Cab Features:

1. Ventilation: Provide one-speed fan in canopy.
2. Emergency Car Lighting: Provide an emergency power unit employing a 12 volt sealed rechargeable battery and static circuits to illuminate the elevator car and provide current to the alarm bell in the event of building power failure.
3. Emergency Siren: Provide siren mounted on top of the car that is activated when the Alarm button in the car operating panel is engaged.
4. Emergency Exit Switch: Provide an electrical contact to open the safety circuit when the emergency car top exit is opened. When the exit door is opened, the top exit switch shall signal the control and the car will be unable to move.
5. Emergency Exit Lock: Provide an emergency exit lock where required by local code.
6. Emergency Exit Guard: Provide emergency exit guard on top of car when required for hoistway wall to platform clearance exceeds 12” or for multiple cars in hoistway.
7. Provide inspection certificate in each car, mounted under acrylic cover with frame.

2.8 SIGNAL EQUIPMENT

- A. General: Provide hall-call buttons that illuminate when activated and remain lit until call has been fulfilled. Fabricate lighted elements with LED lamps and acrylic or other permanent, nonyellowing translucent diffusers.
- B. Hall Push-Button Stations: Provide one hall push-button station at each landing for each single elevator.
 1. Provide manufacturer's standard wall-mounted units.
 2. Provide units with flat faceplate for mounting with body of unit recessed in wall.
 3. Equip units with buttons for calling elevator and for indicating desired direction of travel.
 4. Mark buttons and switches with standard identification for required use or function that complies with ASME A17.1. Use both tactile symbols and Braille.
- C. Hall Lanterns: Manufacturer's standard wall-mounted units, for mounting above entrance frames indicating car arrival and direction of travel. Units with illuminated up and down arrow shapes; but provide single arrow at terminal landings.
 1. Hall Annunciator: not required.
- D. Fixture Cover Plates: For push buttons, hall lanterns and position indicators, resistant white back-printed glass, no screws required for mounting. Provide stainless steel cover plates for Firefighters Phase I switch and hoistway access switches, with tamper resistant screws in same finish.
- E. Corridor Call Station Pictograph Signs: Provide signs with text and graphics as required by authorities having jurisdiction, indicating that in case of fire elevators are out of service and exits should be used instead. Provide one sign at each hall push-button station, unless otherwise indicated.

2.9 EMERGENCY OPERATIONS

- A. Emergency Communication System: Provide system that complies with ASME A17.1 and ADA, accessible by the deaf, hard-of-hearing, speech-impaired, and hearing-only. On activation, system dials the preprogrammed number of a designated monitoring station and identifies elevator location to monitoring station.
 - 1. System provides two-way voice, text, and video-based communication without using a handset, for communicating with emergency personnel utilizing chat or texting software, or other approved technology.
 - 2. System provides visible and audible signals that indicate when system has been activated and when monitoring station has responded.
 - 3. System is contained in a flush-mounted cabinet in each car with identification, instructions for use, a battery backup power supply, and any required conductors in a traveling cable for two-way communication service.

- B. Upon main power interruption:
 - 1. Standby Power Automatic Operation: Upon loss of the normal power supply, building-supplied standby power is switched to the elevator on the same wires as the normal power. The elevator automatically resumes normal service using building generator-supplied power.
 - a. If there is a delay between loss of building power and transfer to generator power, the elevator shall remain stopped at a floor if already there, or shall continue travel to the next floor before stopping. During a loss-of-power delay time, elevator doors shall open when stopped at a floor. An emergency light inside each car shall instantly illuminate and remain illuminated during the delay.

- C. Code Blue Operation: not required.

- D. Occupant Evacuation Operation: not required.

- E. Emergency Recall:
 - 1. Main recall floor: 1st Floor (Ground Floor)
 - 2. Alternate recall floor: 2nd Floor

- F. Firefighter’s Service:
 - 1. Phase I Recall Operation: all elevators.
 - 2. Phase II In-Car Operation: all elevators.

2.10 ELEVATORS

- A. Elevator Description: See drawings for number of stops and travel distance.
 - 1. Service: General-purpose Passenger
 - 2. Rated Load: 3,500 lb
 - 3. Rated Speed: 150 fpm.
 - 4. Entrance Type: Front only, one-speed Center-Opening pair of sliding doors
 - 5. Entrance Width: 42” clear
 - 6. Entrance Height: 7’-0”
 - 7. Car Inside Width: +/-6’-8” from side wall to side wall.
 - 8. Car Inside Depth: +/-5’-5” from back wall to front wall.

9. Car Inside Height: +/-7'-4" to underside of ceiling
- B. General Elevator Requirements: See drawings for project-specific conditions.
 1. Freight Loading Class for Service Elevators: Class A.
 2. Application: Gearless Traction (Machine-Room-Less)
 3. Pit Depth: 5'-0" min. (verify with manufacturer, model, travel, and speed.)
 4. Counterweight Location: Side
 5. Machine Location: Top of the hoistway
 6. Control Space Location: Top landing entrance wall
 7. Power Supply: 480 Volts 3 Phase 60 Hz (or as indicated on Electrical Drawings.)
 8. Operation System: Microprocessor Single Car Automatic operation.
 9. Auxiliary Operations:
 - a. Battery-powered lowering: not required.
 - b. Standby power fully automatic operation as basis of design.
 10. Car Enclosures:
 - a. Front Walls (Return Panels): Satin stainless steel, No. 4 finish with integral car door frames.
 - b. Car Fixtures: Upgraded vandal-resistant stainless steel
 - 1) Push-button illumination: white
 - c. Side and Rear Wall Panels: Verify with Architect and Owner, plastic-laminate panels basis of design.
 - d. Sheet Steel Base, Frieze, and Reveals: Powder-coat enamel.
 - e. Door Faces (Interior): Satin stainless steel, No. 4 finish
 - f. Door Sills: Aluminum, mill finish
 - g. Ceiling: Suspended translucent panels with LED lights above.
 - h. Handrails: three, one at rear of car and one at each side of car, 4" flat bar satin stainless steel, No. 4 finish.
 - i. Floor substrate prepared to receive thin-set ceramic tile floor finish.
 11. Hoistway Entrances:
 - a. Fire-Protection Rating: 2 hours
 - b. Frames: Satin stainless steel, No. 4
 - c. Doors and Transoms: Satin stainless steel, No. 4 finish
 12. Hall Fixtures: Satin stainless steel, No. 4 finish
 - a. Upgraded vandal-resistant where available.
 13. Additional Requirements:
 - a. Provide inspection certificate in each car, mounted under acrylic cover with frame.
 - b. Verify clear height required for mounting hoist beam in shaft.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine elevator areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance. Verify critical dimensions and examine supporting structure and other conditions under which elevator work is to be installed.
 - 1. For the record, prepare a written report, endorsed by Installer, listing dimensional discrepancies and conditions detrimental to performance or indicating that dimensions and conditions were found to be satisfactory.

3.2 INSTALLATION

- A. Install elevator systems components and coordinate installation of hoistway wall construction.
 - 1. Work shall be performed by competent elevator installation personnel in accordance with ASME A17.1, manufacturer's installation instructions and approved shop drawings.
 - 2. Comply with the National Electrical Code for electrical work required during installation.
- B. Coordination: Coordinate elevator work with the work of other trades, for proper time and sequence to avoid construction delays. Use benchmarks, lines, and levels designated by the Contractor, to ensure dimensional coordination of the work.
- C. Welded Construction: Provide welded connections for installing elevator work where bolted connections are not required for subsequent removal or for normal operation, adjustment, inspection, maintenance, and replacement of worn parts. Comply with AWS standards for workmanship and for qualifications of welding operators.
- D. Sound Isolation: Mount rotating and vibrating equipment on vibration-isolating mounts designed to effectively prevent transmission of vibrations to structure and thereby eliminate sources of structure-borne noise from elevator system.
- E. Install piping above the floor, where possible. Where not possible, install underground piping in Schedule 40 PVC pipe casing assembled with solvent-cemented fittings.
- F. Lubricate operating parts of systems as recommended by manufacturers.
- G. Alignment: Coordinate installation of hoistway entrances with installation of elevator guide rails for accurate alignment of entrances with car. Where possible, delay installation of sills and frames until car is operable in shaft. Reduce clearances to minimum, safe, workable dimension at each landing.
- H. Leveling Tolerance: 1/4 inch, up or down, regardless of load and direction of travel.
- I. Set sills flush with finished floor surface at landing. Fill space under sill solidly with nonshrink, nonmetallic grout.
- J. Locate hall signal equipment for elevators as follows, unless otherwise indicated:
 - 1. For groups of elevators, locate hall push-button stations between two elevators at center of group or at location most convenient for approaching passengers.
 - 2. Place hall lanterns either above or beside each hoistway entrance.

3. Mount hall lanterns at a minimum of 72 inches above finished floor.

3.3 FIELD QUALITY CONTROL

- A. Acceptance Testing: On completion of elevator installation and before permitting use (either temporary or permanent) of elevators, perform acceptance tests as required and recommended by ASME A17.1 and by governing regulations and agencies.
- B. Advise Owner, Architect, and authorities having jurisdiction in advance of dates and times tests are to be performed on elevators.

3.4 PROTECTION

- A. Temporary Use: Comply with the following requirements for each elevator used for construction purposes, after obtaining permission from Owner:
 1. Provide car with temporary enclosure, either within finished car or in place of finished car, to protect finishes from damage.
 2. Provide strippable protective film on entrance and car doors and frames.
 3. Provide padded wood bumpers on entrance door frames covering jambs and frame faces.
 4. Provide other protective coverings, barriers, devices, signs, and procedures as needed to protect elevator and elevator equipment.
 5. Do not load elevators beyond their rated weight capacity.
 6. Engage elevator Installer to provide full maintenance service during temporary use time, in addition to specified warranty time. Include preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as necessary for proper elevator operation at rated speed and capacity. Provide parts and supplies same as those used in the manufacture and installation of original equipment.
 7. Engage elevator Installer to restore damaged work, if any, so no evidence remains of correction.
- B. Before final acceptance, remove protection from finished surfaces and clean and polish surfaces in accordance with manufacturer's recommendations for type of material and finish provided. Stainless steel shall be cleaned with soap and water and dried with a non-abrasive surface; it shall not be cleaned with bleach-based cleansers.

3.5 ADJUSTING

- A. Adjust elevators for proper operation in accordance with manufacturer/installer's instructions.
- B. Adjust elevators for smooth acceleration and deceleration of car so not to cause passenger discomfort.
- C. Adjust doors to prevent opening of doors at landing on corridor side, unless car is at rest at that landing, or is in leveling zone and stopping at that landing.

- D. Adjust automatic floor leveling feature at each floor to within 1/4 inch of landing.
- E. Repair minor damages to finish in accordance with manufacturer/installer's instructions and as approved by Architect.
- F. Remove and replace damaged components that cannot be successfully repaired to the satisfaction of the Owner and Architect.
- G. Make a final check of each elevator operation immediately before date of substantial completion. Determine that control systems and operating devices are functioning properly.

3.6 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to operate, adjust, and maintain elevator. Review emergency provisions, including emergency access and procedures to be followed at time of failure in operation and other building emergencies.

END OF SECTION – 14 21 00 ELECTRIC TRACTION ELEVATORS

14 42 00 WHEELCHAIR LIFTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes: Permanently installed unenclosed exterior commercial Vertical Platform Lift.
- B. Related Sections Include:
 - 1. Division 03 Sections for Cast-In-Place Concrete.
 - 2. Engineering drawings for Electrical.

1.3 REFERENCES

- A. American Society of Mechanical Engineers (ASME):
 - 1. ASME A17.1 - Safety Code for Elevators and Escalators.
 - 2. ASME A17.5 - Elevator and Escalator Electrical Equipment.
 - 3. ASME A18.1 - Safety Standard for Platform Lifts and Stairway Chairlifts.
- B. ICC/ANSI A117.1 - Accessible and Usable Buildings and Facilities.
- C. ADA Accessibility Guidelines for Buildings and Facilities (ADAAG).
- D. NFPA 70 - National Electric Code (NEC).
- E. NFPA 101 – Life Safety Code

1.4 SUBMITTALS

- A. Product Data: Manufacturer's data sheets on each product to be used, and:
 - 1. Submit manufacturer's installation instructions, including preparation, storage and handling requirements.
 - 2. Include complete description of performance and operating characteristics.
 - 3. Show maximum and average power demands.
- B. Shop Drawings: Show plans, elevations, sections, and large-scale details indicating conditions at each landing, controller box layout, anchors, recesses, relationships with other construction, and locations of related equipment and signals.

1. Include large-scale layout of control station(s).
2. Indicate maximum dynamic and static loads imposed on building structure.
3. Show travel distances and specific associated dimensions.
4. Provide plans, elevations, sections and details of assembly, erection, anchorage, equipment locations, and clearances required.
5. Indicate maximum and average power demands, electrical power requirements and branch circuit protection device recommendations.

C. Samples: For each component having a factory-applied finish, provide complete sets of color chips representing manufacturer's full range of available colors and patterns.

D. Qualification Data: For Installer.

E. Operation and Maintenance Data: For wheelchair lifts, to include in emergency operation, and maintenance manuals.

1. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include diagnostic and repair information available to manufacturer's and Installer's maintenance personnel.

F. Inspection and Acceptance Certificates and Operating Permits: As required by authorities having jurisdiction for normal, unrestricted wheelchair lift use.

G. Warranty: Manufacturer's project-specific equipment warranty.

H. Continuing Maintenance Proposal: Service agreement terms offered to Owner.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company with a minimum of 10 years experience in manufacturing of vertical platform lifts, able to provide evidence of successful experience with similar installations of the type specified for this project.

B. Installer Qualifications: Licensed or authorized to install equipment of this scope, with evidence of past experience with similar installations of this equipment. Installer shall maintain an adequate stock of replacement parts, and have qualified technicians available to ensure fulfillment of maintenance and callback services within the project site.

C. Accessibility Requirements: Comply with the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG)." and ICC A117.1.

1.6 COORDINATION

A. Coordinate installation of recesses, block outs, and items that are embedded in concrete or masonry for lift equipment. Furnish templates and installation instructions and deliver to Project site in time for installation.

- B. Preinstallation Meeting: Conduct prior to wheelchair lift delivery, with lift installer and representatives of all affected trades, to review conditions of installation, preparation and installation procedures and coordination with related Work and work under separate trades.
- C. Lift Installer shall obtain and pay for all required inspections, tests, permits and fees for commercial lift installation.
- D. Maintain environmental conditions (temperature, humidity, and ventilation) before and during installation within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle materials, components and equipment in manufacturer's unopened packaging, bearing the brand name and manufacturer's identification, until ready for installation.
- B. Store materials, components, and equipment off of ground, under cover, and in a dry location. Handle according to manufacturer's written recommendations to prevent damage, deterioration, or soiling.
- C. Do not use wheelchair lift for hoisting materials or personnel during construction period.

1.8 WARRANTY

- A. Manufacturer's Warranty: Manufacturer's project-specific limited warranty in which manufacturer agrees to repair, restore, or replace defective equipment within specified warranty period.
 - 1. Warranty Period: Four (4) years minimum from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 UNENCLOSED WHEELCHAIR LIFT

- A. Unenclosed Commercial Vertical Platform Lift (VPL): Permanently installed, self-contained vertical wheelchair platform lift designed for use by individuals with disabilities to provide accessibility at exterior, outdoor, low-rise applications.
- B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following:
 - 1. AmeriGlide Distributing, Inc.
 - 2. Ascension, a division of AGM Container Controls, Inc.
 - 3. Garaventa Lift Group North America
 - 4. Or an approved equal.
- C. Standard Lift Characteristics:

1. Rated Weight Capacity: 750 pounds.
 2. Maximum Travel Height: 60 inches
 3. Vertical Travel Speed: approx. 10 ft per min
 4. Materials:
 - a. Platform, Base Frame, and Lifting Device: ASTM A-36 or similar low-carbon steel.
 - b. Platform Sheet Metal and Under-Platform Safety Pan: Aluminum alloy.
 5. Hydraulic Power Unit: Mounted on vibration-isolating supports minimizing vibration transmission and reducing frame-borne noise.
 - a. Self-lubricating acme screw drive: 1.5 HP, 115 VAC
 6. Finish of exposed metal: Powder-coated color.
 7. Provide ramp where required for smooth landing to platform transition.
- D. Size and configuration: see Drawings for specific requirements.
1. Platform clear space of not less than 36 x 48 inches for straight-through enter/exit configuration.
 2. Provide both Upper and Lower Gates:
 - a. Gate and sidewall height: 42 inches min.
 - b. Platform Gate: Travels with platform and opens at the lower landing.
 - c. Upper Landing Gate: Detached, separately anchored.
 - d. Gate Operation:
 - 1) Automatic powered opening and closing by pressing a button or applying pressure to the gate.
 - e. Gate Materials: 16 gauge (min.) galvanized steel sheet with powder-coat color.
 - f. Provide keyed locks at gates to prevent unauthorized access. Coordinate with Division 08 Section for door hardware and keying.
- E. Mounting at lower landing:
1. Floor Mount: Base of lift shall be mounted on the concrete slab surface of the lower landing. For access onto the platform provide a compliant ramp plate of 16 gauge galvanized steel sheet with a slip resistant surface texture and finish.
- F. Operation and Safety:
1. Hold-to-run (constant pressure) controls provided at each landing and on platform, surface mounted to rail frames.
 2. Manual lowering device during loss of power.
 3. Grab rails at both sides.
 4. Manufacturer's standard non-slip black platform surface.
 5. Emergency Stop Button activates lights and sounds audible alarm.
 6. Electro-Mechanical Interlock: Prevents opening of one platform gate when the other platform gate is open, and prevents lift operation if either platform gate is open.
 7. Under-Platform Safety: Safely stops lift if platform is obstructed during downward travel.
 8. Battery auxiliary power: not required.

PART 3 - EXECUTION**3.1 EXAMINATION**

- A. Examine substrates and adjacent construction, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance. Verify critical dimensions and examine supporting structure and other conditions under which wheelchair lift is to be installed. Verify electrical rough-ins.
 - 1. For the record, prepare a written report, endorsed by Installer, listing dimensional discrepancies and conditions detrimental to performance or indicating that dimensions and conditions were found to be satisfactory.

3.2 INSTALLATION

- A. Install lift in accordance with approved submittals, manufacturer's instructions, and ASME A18.1 requirements.
- B. Lift base shall independently support the weight of the entire unit, and shall be anchored to the floor pad at all four corners or as required by the lift manufacturer. No part of the lift base frame shall require anchoring to an adjacent wall for support.
- C. Install system components and connect to building utilities. Startup equipment in accordance with manufacturer's instructions. Adjust for smooth operation.

3.3 FIELD QUALITY CONTROL

- A. Perform acceptance tests as required by code and the authority having jurisdiction. Place rated load on platform and operate for several cycles to verify correct installation and operation. No mechanical failures shall occur and no wear that would affect the reliability of the lift shall be detected.
- B. Protect installed products until completion of project. Do not use wheelchair lift for hoisting materials or personnel during construction period. Touch-up, repair or replace damaged products before Substantial Completion.

3.4 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to operate, adjust, and maintain the wheelchair lift. Review procedures to be followed at times of failure in operation.

END OF SECTION – 14 42 00 WHEELCHAIR LIFTS

32 20 10 YARD SCALE PIT

1.1 YARD SCALE PIT GENERAL REQUIREMENTS

- A. Provide a concrete pit for owner furnished and installed truck yard scale. See drawings for additional dimensions, details, and location. Obtain specific product information from Owner.
- B. Contractor to provide perimeter edge angles, 2-1/2" x 2-1/2" legs, with 1/2" x 4" anchors.
- C. Concrete mix, forms, reinforcing, and foundation to be per scale manufacturer's recommendations and engineering drawings. Form base plate footings accurately in correct locations for the scale to be installed.
- D. Provide a drain in side wall of pit to drain to storm system or daylight on grade. (Coordinate with civil drawings). Slope pit floor 1/8" per foot to drain.
- E. Provide conduit, wiring, and cabling for power, signal/data, and pit heating system per project requirements; coordinate with Owner and scale vendor.
- F. Provide a concrete pedestal with a rigid galvanized conduit pipe for mounting of scorecard. Top of post to be 8'-0" above grade; concrete pedestal height to be 3'-6" above grade.
- G. Provide grounding rod at scorecard concrete pedestal for scorecard electronics enclosure.
- H. Provide level concrete paving for approach and exit aprons the same width as the pit and scale. Verify with Owner and civil drawings for lengths of concrete aprons required.

END OF SECTION – 32 20 10 YARD SCALE PIT

32 31 00 FENCES AND GATES

PART 2 - GENERAL

2.1 SUMMARY

- A. Section Includes furnishing all materials, equipment, and labor for the following:
 - 1. Chain-Link Fences
 - 2. Telescoping Sliding Vehicle Gates
 - 3. Pedestrian Swing Gates
 - 4. Gate Operators.

- B. Related Sections:
 - 1. Division 03 Section "Cast-in-Place Concrete" for cast-in-place concrete equipment bases/pads for gate operators and controls and post footings.
 - 2. Division 08 Sections for Door Hardware, for electrified locksets, exit devices, access controls, and other hardware that may be installed on swinging chain-link gates.
 - 3. Engineering drawings for electrical service and connections for motor operators, controls, limit and disconnect switches.

2.2 DESIGN AND PERFORMANCE REQUIREMENTS

- A. Comply with applicable State and Local codes. Comply with requirements of Authorities Having Jurisdiction (AHJ) in Project location.

- B. Delegated Design: Design gate assemblies, including comprehensive engineering analysis by a qualified professional engineer, considering project wind speed, height of fence, and snow/ice conditions at the project site.

- C. Wind Bracing: Provide wind bracing to meet the gate dead loads and wind live loads design criteria, minimum 75 mph wind design load, or more as indicated on structural drawings or as applicable to project location.

2.3 SUBMITTALS

- A. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Indicate materials, dimensions, sizes, weights, and finishes of components and accessory items.
 - 2. Storage and handling requirements and recommendations, and preparation instructions.
 - 3. Installation methods and instructions.

- B. Shop Drawings: Show locations and details of vehicle gate systems including each major element, dimensions, and details of operation, hardware, and accessories.

1. Include plans, elevations, sections, foundation drawings and other required installation and operational clearances, and details of anchorage, sleeves, and bolts installed by others.
2. Controls: Show locations and details for control components, switches and motor drive system. Indicate motor size, drive schematic, electrical characteristics, drive arrangement, mounting, and grounding.
3. Wiring Diagrams: Power and control wiring, communication features, and access control features. Differentiate between factory-installed and field-installed wiring, and between components provided by manufacturer and those provided by others.

C. Samples: Not required if providing the exact products and colors indicated on drawing finish schedules.

D. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

E. Operation and Maintenance Data: To include in emergency, operation, and maintenance manuals.

1. Provide manufacturer's maintenance and service instructions that include recommendations for periodic maintenance and cleaning of all gate and vehicle gate system components.
2. Include recommended spare and consumable parts lists, including lights, fuses, lubricants, recommended accessories, mechanical components, etc.

2.4 QUALITY ASSURANCE

- A. Provide each type of complete gate system, with all components by a single manufacturer, including all panels, posts, gates, fittings and hardware for that type of fence assembly.
- B. Manufacturer Qualifications: Company specializing in manufacturing of the indicated gate systems with a minimum of 5 years documented experience.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- D. Emergency Access Requirements: Comply with requirements of authorities having jurisdiction for gates with automatic gate operators serving as a required means of access.

2.5 PROJECT CONDITIONS

- A. Field Measurements and Verification: Measure, verify and generate dimensions where Fences, gates and operators are to be located. Indicate specific locations with regard to roadways, curb locations, grade changes and elevations. Indicate specific location of gate operator and its respective concrete foundation; include surrounding landscaping, fencing, buildings and other fixed stationary objects near the gate operator and gate panel in both open and closed positions.

2.6 WARRANTY

- A. Warranty: Manufacturer agrees to repair or replace components of fences gates that fail in materials or workmanship within specified warranty period.
 - 1. Faulty operation of exterior gate operators and controls:
 - a. Operator Warranty Period: Three (3) years from date of Substantial Completion.
 - 2. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - a. Material Warranty Period: Ten (10) years from date of Substantial Completion.

PART 3 - PRODUCTS

3.1 CHAIN-LINK FENCE FABRIC

- A. Materials shall conform to ASTM F-1083 and ASTM A-392 ferrous metals.
- B. Provide fabric in one-piece heights measured between top and bottom of outer edge of selvage knuckle or twist.
 - 1. Steel Wire Fabric:
 - a. Wire Size: 9 gauge
 - b. Mesh Size: 2 inches to 2-1/8 inches
 - c. Zinc-Coated Fabric: ASTM A-392
 - 1) Class 2, 2.0 oz./sq.ft., typical unless otherwise approved.
 - 2) Class 1, 1.2 oz./sq.ft., when specifically allowed by Architect review.
 - 2. Coat selvage ends of fabric that is metallic coated before the weaving process with manufacturer's standard clear protective coating.
- C. PVC Coated Wire: Fused and adhered PVC coated wire shall pass the test for adhesion in ASTM F-668 for Class 2b chain link fabric.
 - 1. Color: Black, unless selected otherwise by Architect from manufacturer's standard colors.
 - 2. Products: available manufacturers for coated chain link fence systems include, but are not limited to:
 - a. "PermaCoat PC-20" by Ameristar Fence Products, a division of Assa Abloy.
 - b. Or an approved equal.
- D. Tension Wire: Metallic-Coated Steel Wire, 0.177-inch-diameter, marcelled tension wire complying with ASTM A-817 and ASTM A-824, with Type II, zinc coated (galvanized) by hot-dip process, 2.0 oz/sq.ft.
 - 1. Polymer coating matching wire fabric, where applicable.

3.2 CHAIN-LINK FENCE FRAMING

- A. Posts and Rails: ASTM F-1083 standard weight schedule 40 hot-dipped galvanized steel pipe having a minimum zinc coating g of 1.8 oz/ft² on the outside surface and 1.8 oz/ft² on the inside surface of the pipe.
 - 1. Pipe Grade:

- a. Regular Grade: minimum yield strength 30,000 psi, typical unless otherwise noted.
 - b. Intermediate Grade: minimum yield strength 50,000 psi; only where specifically indicated on drawings.
 - c. High-Strength Grade: minimum yield strength 83,000 psi, for high-security applications and at jamb posts for heavy-duty gates.
2. Post and Rail Sizes, Minimums:
- a. Line Posts:
 - 1) 1.9 inches in diameter for fence heights up to 6'-0"
 - 2) 2.375 inches in diameter for fence heights up to 7'-11"
 - 3) 2.875 inches in diameter for fence heights 8'-0" to 10'-0"
 - 4) Or larger as required.
 - b. End, Corner and Pull Post: generally one size larger than line posts, or as indicated on drawings, or by calculations.
 - c. Top Rails and Intermediate Rails: generally one size smaller than line posts, or as required by calculations.
- B. Fence and gate contractor shall consider the design and sizing of posts and support structures for fences that may have windscreens or privacy slats attached; delegated design for wind load force analysis where applicable.
- C. Fence Height: 96 inches nominal, unless otherwise indicated on drawings.
1. Not including barbed wire; barbed wire mounted at 8 feet above grade and higher.
- D. Post Spacing: 10 feet (120 inches) typical max, unless otherwise approved on drawings.

3.3 CHAIN-LINK FENCE FITTINGS

- A. General: Comply with ASTM F-626.
- B. Post Caps: Provide for each post.
 1. Provide line post caps with loop to receive tension wire or top rail.
- C. Rail and Brace Ends: For each gate, corner, pull, and end post.
- D. Tension and Brace Bands: Pressed steel, galvanized with same coating as posts.
 1. Bars for 2 in. and 1 ¾ in. mesh shall have a minimum cross section of 3/16 in. by 3/4 in.
- E. Tension Bars: Steel, length not less than 2 inches shorter than full height of chain-link fabric. Provide one bar for each gate and end post, and two for each corner and pull post, unless fabric is integrally woven into post.
- F. Tie Wires, Clips, and Fasteners: According to ASTM F-626.

3.4 BARBED WIRE

- A. Barbed Wire Arms: Pressed steel arms with provisions for attaching 3 rows of barbed wire. Arms shall withstand 250 lb. downward pull at outermost end of arm without failure.

1. Type I, single slanted arm, three-strand, 45-degree, typical unless otherwise noted.
 2. Type III, "V" double slanted arm, 6 total barbed wire strands, where specifically indicated on drawings.
- B. Steel Barbed Wire: Comply with ASTM A-121, 0.099-inch- diameter line wire, two-strand twisted barbed wire.
1. Barbs: 0.080-inch-diameter four-point round barbs spaced not more than 5 inches o.c.
 2. Zinc Coating: Type Z, Class 3.

3.5 SWING PEDESTRIAN GATES

- A. General: Comply with ASTM F-900 for gate posts and swing gates.
- B. Coordination will be required with access control components to be installed at gates where indicated on Drawings, such as card readers, video cameras, and intercoms.
1. Contractor shall provide sitework, electrical and low-voltage wiring and cabling, and conduit for running access control components out to gate location.
- C. Gate Leaf Width and Height: As indicated on drawings.
- D. Pipe and Tubing:
1. Zinc-Coated Steel: Comply with ASTM F-1043 and ASTM F-1083; protective coating and finish to match fence framing.
 2. Post diameters sized depending on gate leaf width, height, fabric type, and weight.
- E. Gate Frame Corner Construction: Welded.
- F. Extended Gate Posts and Frame Members: Extend gate posts and frame end members above top of chain-link fabric at both ends of gate frame as required to attach barbed wire assemblies.
- G. Hardware:
1. Hinges: 180-degree outward swing.
 2. Latches for manual swing gates: Galvanized fork-type permitting operation from both sides of gate, with provision for padlocking accessible from both sides of gate.
 3. Provide pull handle and push plate welded to gate frame at electronically-operated swing gates.
- H. Double Gates: Provide galvanized drop rod or cane bolt with recessed stop pipe or in-ground receiver to manually secure inactive leaf in the closed position. Include fittings to allow rod to be fixed in the "up" or open position, with padlock tabs to secure the rod in either the up/open or down/closed position.

3.6 FENCE GROUNDING

- A. Conductors: Bare, solid wire for No. 6 AWG and smaller; stranded wire for No. 4 AWG and larger.

1. Material above Finished Grade: Copper or Aluminum.
2. Material on or below Finished Grade: Copper.
3. Bonding Jumpers: Braided copper tape, 1 inch wide, woven of No. 30 AWG bare copper wire, terminated with copper ferrules.

B. Connectors and Grounding Rods: Comply with UL 467.

1. Connectors for Below-Grade Use: Exothermic welded type.
2. Grounding Rods: Copper-clad steel, 5/8 by 96 inches.

3.7 TELESCOPING VEHICLE SLIDE GATES AND OPERATORS

A. Electronically-operated, telescoping box-frame cantilever rolling/sliding gate system. Subject to compliance with requirements, manufacturers and products that may be incorporated into the Work include the following:

1. Cantilever Slide Gate by Tymetal Corp.
2. Do not substitute products without Architect's and Owner's approval.

B. Telescoping Gate Track:

1. The outer frame assembly and the front of the inner frame assembly shall roll on two parallel tracks, which are embedded in concrete so that the top of the track is level with the ground surface. The track shall consist of two (2) parallel W4x13 A36 steel beams (may be provided by separate subcontractor – coordinate requirements). The tracks shall be hot dipped galvanized and set so as to vary no more than 1/4" in width between tracks with the maximum width as shown in the shop drawings (+/- 1/8" for each track).
2. The gate frame is to be supported from the track by two (2) swivel-type, self-aligning, 4 wheeled, sealed lubricant, ball-bearing truck assemblies.
3. Box-frame trolley assemblies shall be bolted to the frame assembly at intervals as specified on the shop drawings. Each assembly shall consist of a galvanized steel carriage to which two (2) wheel assemblies are secured. Each wheel shall be rated for a minimum load capacity of 2,000 lb.
4. Safety guides of 3/8" x 3" galvanized steel bar with attached guide wheels shall be provided at a maximum of 10'-0" on center along the entire gate length.
5. Wheel assemblies shall be covered by a single 11 gauge galvanized steel cover at each location.

3.8 SLIDE GATE OPERATORS

A. General: Provide factory-assembled automatic operating system in a weatherproof enclosure, designed for gate size, type, weight, and operation frequency. Provide operation control system with characteristics suitable for Project conditions, capable of interacting with remote-control stations, access control equipment, safety devices, RF transmitters, and sensing loops. Coordinate electrical requirements with building electrical system.

B. Manufacturers: Subject to compliance with requirements, provide:

1. TYM-VS operator By Tymetal Corp. (Basis of Design)

2. Do not substitute products without Architect's full review and approval. Similar products that may be considered include:
 - a. HySecurity SlideDriver 50VF2/3
 - b. Or an approved equal.

- C. Electronic Operation Requirements:
 1. Mechanical Slide Gate Operators:
 - a. Duty: Heavy duty, commercial/industrial.
 - b. Rated to operate a gate weighing up to 5,000 lbs.
 - c. Gate Speed: Variable/Programmable, minimum 45 feet per minute, up to 2.2 feet per second.
 - d. Frequency of Use: Continuous duty
 - e. Drive Type: Enclosed worm gear and chain-and-sprocket reducers, roller-chain drive. All chain brackets and required attachment hardware shall be supplied.
 - f. Automatic closing timer: provides automatic closure of the gate from the full open position, adjustable from 0 to 60 seconds.
 - g. Manual Operation: Crank handle inside lockable motor enclosure box.
 2. Entry side is activated by code, key-card, or other access control device.
 3. Egress-side is automatically activated by detection of vehicles by magnetic sensing loops under the pavement.
 - a. An additional magnetic sensing loop under the pavement detects vehicles in the control area of the gate and maintains the gate in the open position until the vehicle has cleared the control area.
 - 1) Loop Wire: 14 gage, XHWN or THWN copper; loop size of 48 inches by 72 inches.
 - b. Wiring may or may not be provided by gate and operator supplier; Contractor to coordinate and provide for all electrical requirements between different trades and subcontractors.
 4. Provide operator designed so motor may be removed without disturbing limit-switch adjustment and without affecting auxiliary emergency operator.
 5. Provide operator with UL -approved components.
 6. Provide electronic components with built-in troubleshooting diagnostic feature.
 7. Provide unit designed and wired for both right-hand/left-hand opening, permitting universal installation.
 8. Microprocessor based solid-state control board with integrated radio receiver, plug-in loop detector capability and surge protection.

- D. Comply with NFPA 70.

- E. UL Standard: Fabricate and label gate operators to comply with UL 325.

- F. Motor Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, within installed environment, with indicated operating sequence, and without exceeding nameplate rating or considering service factor. Comply with NEMA MG 1 and the following:

1. Voltage: NEMA standard voltage selected to operate on nominal circuit voltage to which motor is connected.
 2. Verify electrical motor power: 208/230 Volt AC single phase, or 208/230 Volt AC, or 460 Volt AC three phase power.
 3. Horsepower: 3/4 min.
 4. Variable frequency AC drive unit shall allow for programmable speeds and programmable soft-start and soft-stop features.
 5. Motor shall be protected against overload by either a thermal or a current sensing overload device.
 6. Enclosure: Totally enclosed
 - a. Motor Housing Box: water resistant, 10-gauge sheet steel, hot-dip galvanized, gasketed, powder-coated color finish. and located at ground level for easy maintenance.
 - b. Security tamper-resistant hinges and screws shall be furnished to secure operator enclosure components.
 - c. Motor box shall be lockable with a detention-grade keyed deadbolt.
 - d. Gear Box Heater: Include internal heater strip for the controller box.
- G. Remote Controls: Electric controls separated from gate and motor and drive mechanism, with enclosure for pedestal mounting and with space for additional optional equipment. Provide the following remote-control device(s):
1. Control Station: Keyed, two-position switch, located remotely from gate. Provide two keys per station.
 2. Digital Keypad Entry Unit: Multiple-programmable code capability of not less than five possible individual codes, consisting of one- to seven-digit codes.
 3. Radio Control: Digital system consisting of code-compatible universal receiver for each gate, located where indicated, with remote antenna with coaxial cable and mounting brackets designed to operate gates.
 4. Telephone Entry System: Hands-free voice-communication system for connection to building telephone system with keypad for digital-entry code activation of gate operator.
 5. Vehicle Loop Detector: System including automatic closing timer with adjustable time delay before closing and loop detector designed to hold gate open until traffic clears.
- H. Obstruction Detection Devices: Provide each motorized gate with automatic safety sensor(s). Activation of sensor(s) causes operator to immediately function as follows:
1. Action: Stop gate in opening cycle and reverse gate in closing cycle and hold until clear of obstruction.
 2. Entrapment Protection: Photoelectric beams/photo eyes shall be installed to span the clear opening and gate path at the tail section.
 3. Contact and non-contact devices include photoelectric sensors, vehicle detectors, proximity sensors, and contact edges.
- I. Limit Switches: Adjustable switches, interlocked with motor controls and set to automatically stop gate at fully retracted and fully extended positions.
- J. Optional accessories shall include
1. Lights to indicate gate movement.

2. Cycle counter.

PART 4 - EXECUTION

4.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements. Verify survey of property lines and legal boundaries, site clearing, earthwork, pavement work, and other conditions affecting performance of the Work.
 1. Do not begin installation before final grading is completed.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. Stake locations of fence lines, gates, and terminal posts. Indicate locations of utilities, lawn sprinkler system, underground structures, benchmarks, and property monuments.

4.2 CHAIN-LINK FENCE INSTALLATION

- A. Post Setting: Set posts in concrete at required spacing into firm, undisturbed soil.
 1. Verify that posts are set plumb, aligned, and at correct height and spacing, and hold in position during setting with concrete or mechanical devices.
 2. Concrete Fill: Place concrete around posts to dimensions indicated and vibrate or tamp for consolidation. Protect above ground portion of posts from concrete splatter.
 - a. Concrete for post footings shall have a minimum 28-day compressive strength of 2,500 psi, or more if indicated on civil or structural drawings, or if recommended for project site conditions.
 - b. Concealed Concrete: Top 2 inches below grade to allow covering with surface material.
- B. Terminal Posts: Locate terminal end, corner, and gate posts per ASTM F-567 and terminal pull posts at changes in horizontal or vertical alignment of 15 degrees or more.
- C. Line Posts: Space line posts uniformly.
- D. Tension Wire: Install according to ASTM F-567, maintaining plumb position and alignment of fencing. Pull wire taut, without sags.
- E. Top Rail: Install according to ASTM F-567, maintaining plumb position and alignment of fencing. Run rail continuously through line post caps, bending to radius for curved runs and terminating into rail end attached to posts or post caps fabricated to receive rail at terminal posts. Provide expansion couplings as recommended in writing by fencing manufacturer.
- F. Chain-Link Fabric: Apply fabric to outside of enclosing framework. Pull fabric taut and tie to posts, rails, and tension wires. Anchor to framework so fabric remains under tension after pulling force is released.
- G. Barbed Wire: Install barbed wire uniformly spaced angled toward security side of fence. Pull wire taut, install securely to extension arms, and secure to end post or terminal arms.

4.3 GATE INSTALLATION

- A. Install gates according to manufacturer's written instructions, level, plumb, and secure for full opening without interference. Attach hardware using tamper-resistant or concealed means. Install ground-set items in concrete for anchorage.
- B. Excavate, place concrete footings, and install specified sized posts as detailed and in accordance with approved shop drawings.
- C. To be UL 325 compliant automated swing gates shall be installed no more than 4" above grade. If installed greater than 4" above grade reversing edges shall be installed on each side (leading edge) of the bottom horizontal gate frame member.
- D. Wire in accordance with national electric codes. Enclose all splices in easily accessible junction boxes or on terminal boards. Tag and identify all cable runs in all junction boxes.

4.4 GROUNDING AND BONDING

- A. Fence Grounding: Install at maximum intervals of 1500 feet except as follows:
 - 1. Fences within 100 Feet of Buildings, Structures, Walkways, and Roadways: Ground at maximum intervals of 750 feet.
 - 2. Gates and Other Fence Openings: Ground fence on each side of opening.
- B. Protection at Crossings of Overhead Electrical Power Lines: Ground fence at location of crossing and at a maximum distance of 150 feet on each side of crossing.
- C. Fences Enclosing Electrical Power Distribution Equipment: Ground as required by IEEE C2 unless otherwise indicated.

4.5 ADJUSTING

- A. Gates: Adjust gates to operate smoothly, easily, and quietly, free of binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding.
- B. Automatic Gate Operator: Energize circuits to electrical equipment and devices. Adjust operators, controls, safety devices, alarms, and limit switches.
- C. Lubricate hardware, gate operator, and other moving parts.

4.6 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's personnel to adjust, operate, and maintain chain-link fences and gates.

4.7 MAINTENANCE

- A. Provide Owner with two copies of standard operation, installation, and maintenance manuals including typical wiring diagrams.
- B. Provide Owner with two copies of project-specific risers, layouts, and special wiring diagrams showing any changes to standard drawings.
- C. Instruct the Owner's personnel in proper operation and maintenance per Division 01 demonstration and training requirements.
- D. Provide maintenance service, at no additional cost to the Owner, for 1 year beginning on the date of Substantial Completion.
 - 1. At three-month intervals:
 - a. Check the in-ground electromagnetic flux loops for proper ohms of resistance.
 - 2. At one-month intervals:
 - a. Check functioning of entrapment protection devices.

END OF SECTION – 32 31 00 FENCES AND GATES