Factoria Recycling and Transfer Station

Contract C00678C12

CONTRACT VOLUME 6 of 15

RFP Volume 2 of 8

Request for Proposal Technical Specifications Divisions 2 thru 10

August 2010



Department of Natural Resources and Parks Solid Waste Division

Factoria Recycling and Transfer Station Project

Contract C00678C12

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Request for Proposal

Technical Specifications Division 2 Thru 10

August, 2013



Department of Natural Resources and Parks Solid Waste Division

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SECTION 02 31 40 REMOVAL OF HAZARDOUS MATERIALS AND DANGEROUS WASTE

PART 1 – GENERAL

1.01 SUMMARY

A. Section includes the excavation, classification by Owner, temporary stockpiling and protection on the Project Site if necessary, loading, hauling and disposal of Hazardous Materials and Dangerous Waste encountered during Work.

1.02 RELATED SECTIONS

- A. Division 01 General Requirements.
- B. Section 02 41 00 Demolition.
- C. Section 31 23 00 Earthwork.

1.03 QUALITY ASSURANCE

- A. Use only firms or individual trades qualified to perform work required under this Section.
- B. Emergency Response Contact:
 - 1. Designate a 24 HR emergency response person who is familiar with the unique activities on the Site, and who has comprehensive emergency response and incident mitigation experience, or who has immediate access to that knowledge and information.
- C. Regulatory Requirements:
 - 1. Comply with the requirements of Section 01 09 05 Reference Standards and as listed herein.
 - 2. Arrange transport of Dangerous Waste with a WSDOT-licensed transporter complying with Dangerous Waste and RCRA Regulations.

D. Contingency Response Plan:

- 1. Identify the sequence of activities.
- 2. The Contingency Response Plan is to be in effect during the period the Plan is approved until such time the Contractor is informed by the Project Representative that the Plan is retired.
- 3. Conditions for retirement of the Contingency Response Plan include but are not limited to:
 - a. Completion of earthwork activities including excavation, fill, and placement of subgrade materials.
 - b. Completion of trenching activities that could pose a hazard or threat to surface water features and wetlands.
 - c. Completion of other work that could pose a hazard or threat to surface water features and wetlands.

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- d. Completion of work requiring liquids such as petroleum products, solvents, detergents, paint, pesticides, and concrete admixtures.
- E. Spill Response:
 - 1. Comply with other requirements of this Section and the Contingency Response Plan.
 - 2. Take immediate action to implement appropriate necessary containment and cleanup procedures.
 - 3. Minimize the effect of spills and release of Hazardous Materials.
 - 4. Comply with applicable regulations.

1.04 DEFINITIONS

- A. RCRA: Resource Conservation and Recovery Act.
- B. Dangerous Waste: As defined in Section 01 35 00 Health and Safety.
- C. Hazardous Material: As defined in Section 00700 General Terms and Conditions and to include the definition contained in Section 01 35 00 – Health and Safety, which also applies.
- D. Washington Administrative Code Chapter 173-303 Dangerous Waste Regulations.
- E. BMP: Best Management Practice.
- F. CHRL: Cedar Hills Regional Landfill.
- G. HWM: Hazardous waste manifest.
- H. TCLP: Toxicity Characteristic Leaching Procedure.
- I. SVOC: Semi-volatile organic compound.
- J. TPH: Total petroleum hydrocarbons.
- K. VOC: Volatile organic compound.
- L. PCB: Polychlorinated biphenyl.
- M. SVOC: Semivolatile organic compound.
- N. WSDOT: Washington State Department of Transportation.
- O. EPA: United States Environmental Protection Agency.
- P. HAZWOPER: Hazardous Waste Operations and Emergency Response.

1.05 SUBMITTALS

A. Submittal Procedures: See Section 01 33 00 – Submittal Procedures for requirements for the mechanics and administration of the submittal process.

- B. Approval Submittals:
 - Provide Pollution Prevention and Spill Contingency Response Plan ("Contingency Response Plan") within fourteen days following the First Notice to Proceed:
 - a. The intent of this plan is to describe measures that will be taken to reduce the risk of and to respond to a spill or other Hazardous Materials release on the Project Site.
 - b. The Contingency Response Plan shall consist of the following three elements:
 - The pollution prevention narrative shall address the type of materials, locations of use, locations and methods of storage, and methods of containment and treatment for potential pollution sources associated with the following activities:
 - a) Storage and Handling of Liquids (including but not limited to petroleum products, solvents, detergents, paint, pesticides, and concrete admixtures).
 - b) Storage and Stockpiling of Construction Materials, Debris, and Dangerous Wastes.
 - c) Fueling.
 - d) Maintenance, Repairs, and Storage of Vehicles and Equipment.
 - e) Concrete Saw Cutting, Slurry, and Washwater Disposal.
 - f) Handling of pH Elevated Water.
 - g) Application of Chemicals Including Pesticides and Fertilizers.
 - 2) Pollution Prevention Site Plan is required that shows the following:
 - a) Identify locations where liquids will be stored and delineate secondary containment areas that will be provided.
 - b) Identify locations were construction materials and wastes will be generated and stockpiled.
 - c) Identify location of fueling for vehicles and equipment if stationary tanks will be used. This includes showing lighting and signage for fueling during evening hours.
 - d) Delineate containment areas for fuel spills.
 - e) Delineate maintenance and repair areas for equipment. Clearly, note that signs must be posted that state that vehicle washing shall not occur in this area.
 - f) Delineate truck washout area and identify location of slurry/washwater sumps and tool rinsing areas.
 - g) Delineate where chemicals will be applied and identify where they will be stored.
 - h) Identify where spill response materials will be stored.

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- 3) Spill Prevention and Cleanup Report:
 - a) List possible sources of a spill and identify the BMPs to be used for each source to prevent a spill.
 - b) Identify personnel responsible for spill prevention and cleanup and clearly list responsibilities of each person identified. An emergency coordinator in compliance with WAC 173-303-350 shall be identified. Identify the designated 24 HR emergency response contact required elsewhere in this Section. 24 HR contact information for these personnel must be provided.
 - i Personnel identified shall be maintained on the Project throughout the duration of the Project. Any change in personnel shall meet the prior approval of the Project Representative.
 - c) Provide contact information to facilitate emergency notifications in the event of a Hazardous Materials release or other spill emergency.
 - d) Describe the procedures to be used for monitoring spill prevention BMPs and for responding to a spill incident, including record-keeping of inspections and spills.
 - e) Identify where spill response materials will be stored.
 - f) Identify disposal methods for contaminated water and soil after a spill.
- c. A form must be provided for each subcontractor that states it has read and agreed to the Contingency Response Plan prior to starting work on Site.
- d. One (1) additional bound copy of the final Contingency Response Plan shall be submitted to the Project Representative for distribution to Seattle-King County Public Health Department.
- C. Quality Assurance Submittals:
 - 1. Name and contact information for Contractor's emergency response contact person.
 - 2. Certifications: Provide copies of the current HAZWOPER Certifications prior to personnel performing work on the Project Site within four (4) weeks following the First Notice to Proceed.

1.06 DESCRIPTION

- A. Dispose of Dangerous Waste identified by the Project Representative.
- B. Provide labor and materials at no cost to the Owner to clean up all spills of Hazardous Materials caused by the Contractor and Subcontractors that occur on the Project Site, on roadways and other locations.
 - 1. Clean-up must comply with applicable regulations.

- C. Identification of Suspect Dangerous Waste:
 - 1. The Project Representative will observe excavation activities for the presence of suspect Dangerous Wastes.
 - a. If suspect Dangerous Wastes are encountered, the Project Representative will take material samples for testing to classify these materials.
 - b. Testing by an independent laboratory could include tests for total petroleum hydrocarbons (TPH), total metals, selected TCLP metals, PCBs/pesticides, SVOCs and VOCs.
 - c. Preliminary test results from samples received at the Seattle area laboratory before 3:00 PM (Monday through Friday) will normally be available within four to five working days and as short as three working days with advance notice to the laboratory.
 - d. Final results and summary reports for legal documentation will take additional time.
 - e. Contractor must accommodate isolation and sampling, collection and temporary storage of Suspect Dangerous Wastes.
 - f. Reimbursement for this effort exclusive of operator and equipment standby time will be provided under Cost Item No. 5 as described in Section 01 21 00 Allowances.
 - 2. The Project Representative will inform the Contractor of Dangerous Waste suspected or confirmed to be present.
 - a. Should such a notification be necessary, the Contractor will be instructed on how to proceed.
 - Immediately notify the Project Representative of soils encountered or conditions that differ significantly from those ordinarily encountered on Site based on the visual appearance, odors, sudden onset of health effects encountered during excavation and handling, or other distinguishing characteristics.
- D. Potential Areas with Hazardous Materials:
 - A Preliminary Environmental Assessment for a section of the Eastgate Property was prepared by HartCrowser (1991) and is provided as Available Information only in accordance with Section 01 10 00 – Summary of Work. Environmental work in this area was reported to include removal of gasoline, diesel, and oil underground storage tanks.
 - 2. If suspected contamination is encountered when working in this area, Project Representative shall provide Contractor with direction for how to proceed.
 - 3. If additional excavation is required in this area as directed by the Project Representative to remove contaminated materials, Contractor will be compensated in accordance with Section 01 21 00 Allowances.
- E. Handling of Hazardous Materials:
 - 1. Handle Hazardous Materials in accordance with WAC Chapter 173-303.

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- 2. Have appropriate vehicles or containers ready for use in a manner to support the Contractor's excavation operations.
- 3. Use spill containment barriers when appropriate to prevent the release of suspect Hazardous Materials.
- F. Transport Hazardous Materials in compliance with local, state and federal laws.
- G. Dispose of Hazardous Materials at approved, appropriately permitted facility.
- H. Disposal of Dangerous Waste:
 - 1. The disposal facility should be contacted to obtain authorization to transport Dangerous Waste to its facility for disposal prior to transport being performed.
 - 2. The disposal facility may require additional waste characterization prior to its acceptance of Dangerous Waste.
 - a. Arrange and manage additional waste characterization as required, and as approved by the Project Representative.
 - b. Pay for waste characterization required to be performed by the disposal facility in its process of accepting and determining final disposition and placement of Dangerous Waste which is beyond the characterization performed by the Project Representative.
 - c. The Owner will be the designated generator of Dangerous Waste. The EPA Identification Number for this site is WAD988508701.
- I. Lead and Asbestos encountered during demolition shall be abated in accordance with Section 01 91 00 - Lead and Asbestos.

1.07 **DELIVERY, STORAGE AND HANDLING**

- A. Deliver products to site under provisions of 01 60 00 Product Requirements.
- B. Store and protect products under provisions of 01 60 00 Product Requirements.
 - 1. Store materials in a protected location, accessible to workers, in a clearly marked closed container or containers.
 - 2. Once placed, do not move the spill response materials around the Project Site.
 - 3. Inform workers of the locations of the spill response materials.

1.08 ADDITIONAL REQUIREMENTS

- A. Disposal Facility Documentation:
 - 1. Provide the Project Representative the Dangerous Waste disposal facilities' appropriate Waste Profile forms and/or HWMs.
 - a. Request the Project Representative provide the information necessary to complete appropriate portions of the Waste Profile forms and/or HWMs.

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- b. Provide the completed Waste Profile forms and/or HWMs to the disposal facility operator at the time of delivery.
- B. Hazardous Material Release Events:
 - 1. Immediately notify the Project Representative upon knowledge of release of a Hazardous Material associated with the Project.
 - 2. Submit a written report to the Project Representative within 24 HRS of a release of Hazardous Material associated with the Project.
 - a. Forward copies of the report to other agencies as directed by the Project Representative.
 - b. Describe the location, size or volume, type, and affected area of the spill or release.
 - c. Identify the events and corrective actions taken.
 - d. Identify notifications that were made in the process of responding to the spill or release, and afterward.
 - e. Identify problems in implementing corrective actions or problems complying with the regulations.

MEASUREMENT AND PAYMENT 1.09

- A. The Owner will reimburse the Contractor from the established allowance for Cost Item No. 5 in accordance with Section 01 21 00 – Allowances with the exception of those described in 1.06 B. of this Section.
- B. Measurement:
 - 1. Dangerous Waste identified by the Project Representative and Hazardous Material:
 - a. Provide truck tickets including both tare weight (unloaded truck) and scale weight (loaded truck) measured to the hundredth of a ton (20 pounds) produced by the designated disposal facility within 24 HRs of load weighing.
- C. Payment Dangerous Waste and Hazardous Materials in accordance with Section 01 21 00 – Allowances:
 - 1. Tally the amount disposed of in accordance with the requirements.

PART 2 – PRODUCTS

2.01 EQUIPMENT

- A. Provide items and equipment as necessary to implement the Contingency Response Plan; and to prevent and contain spills.
- B. The items described in this Part 2 are the minimum required items.
- C. Spill Containment Barrier:
 - 1. Type: Inflatable or pop-up type spill containment barriers for use on level ground.

- 2. Capacity: Minimum one thousand (1,000) gallon capacity.
- 3. Quantity: Provide one (1).
- D. Containers:
 - 1. Provide two (2) 65 GAL minimum size empty containers with lids.
 - 2. Provide similar containers to the spill kits identified in this Section.
- E. Provide mobile, on-call tank truck for pumping and transporting liquids.

2.02 MATERIALS

- A. Spill Kits:
 - 1. Overpack drum type spill kit.
 - 2. Sixty-five (65) GAL minimum kit capable of adsorbing at least forty-six (46) GAL.
 - 3. Quantity: Provide two (2).
 - 4. Provide one of the following products:
 - a. Parker Systems, Inc. (866) 472-7537; "65 Gallon Overpack Spill Kit PS-SKA/65 - Universal."
 - b. DAWG Spill Control People (800) 935-3294; "KIT136 Universal 65 Gallon Overpack Spill Kit."
 - c. Absorbents Online (800) 869-9633; "GPSK65 65 Gallon Universal Spill Kit."
 - d. Or Approved Equal.

PART 3 – EXECUTION

3.01 PREPARATION

- A. Spill Response Materials:
 - 1. Have spill response materials, equipment, tools and other items on hand throughout the construction period.
 - 2. Provide spill response materials that are compatible with the types of Hazardous Materials likely to be encountered on the Project Site.
 - a. Include containers, adsorbents, and personal protective equipment.
 - 3. Provide miscellaneous equipment and tools necessary to perform the likely work activities necessary to contain, cleanup, handle, transport and dispose of Hazardous Materials in conformance with the regulations.

CONSTRUCTION 3.02

- A. Segregate suspect and confirmed Dangerous Waste from other materials.
- B. Minimize potential for spills and releases of Hazardous Materials.

- C. Temporarily store suspect and confirmed Dangerous Waste.
 - Retain suspect and confirmed Dangerous Waste at the Project Site until such time the material can be properly classified by the Project Representative.
 - 2. Establish and maintain sufficient temporary storage and stockpiling of suspect and confirmed Dangerous Waste in a location acceptable to the Project Representative in advance.
 - 3. Provide the Project Representative access to temporary storage and stockpiles of suspect and confirmed Dangerous Waste.

3.03 CLEANING

- A. Immediately clean up spills and releases of Hazardous Materials to the satisfaction of the Project Representative.
 - 1. The Project Representative will inform the Contractor when clean-up activities are satisfied.
- B. Decontaminate equipment and vehicle components coming in contact with suspect Dangerous Waste or Hazardous Materials before the equipment and vehicles are relocated to other locations:
 - 1. Decontamination using high pressure washing and steam cleaning methods are suitable.
 - 2. Propose alternative methods to the Project Representative for acceptance.
 - 3. Implement necessary procedures to contain, handle, transport, and properly dispose of wastewater resulting from decontamination activities.

3.04 FIELD QUALITY CONTROL

- A. Provide disposal receipts, truck trip and weight tickets to the Project Representative.
 - 1. Indicate the characteristics of the material being handled and hauled.
 - 2. Identify the driver and truck number.
- B. Provide copies of HWMs to the Project Representative.
 - 1. Instruct disposal facilities to provide copies of completed HWMs mailed directly to the Project Representative within thirty (30) calendar days of disposal.

END OF SECTION 02 31 40

SECTION 02 41 00 DEMOLITION

PART 1 – GENERAL

1.01 SUMMARY

- A. Section includes deconstruction, removal, abandonment, and salvage, recycle, or disposal of various existing improvements including, but not limited to, building superstructure slabs and foundations; building mechanical and electrical systems; packer crane; utilities; asphalt and concrete pavement; cement concrete curb and gutter; fencing; stairs, signs; light fixtures; fencing; poles; ecology blocks/concrete barriers, and other incidental items necessary for the accomplishment of the Work.
- B. Furnish all labor, materials, tools, equipment, and services for Demolition, as indicated, in accordance with provisions of Contract Documents.
- C. Completely coordinate with work of other trades.

1.02 RELATED SECTIONS

- A. Section 01 14 00 Work Restrictions.
- B. Section 01 33 00 Submittal Procedures.
- C. Section 01 74 10 Construction Waste Management.
- D. Section 01 91 10 Regulated Building Materials.
- E. Section 01 81 30 Sustainability Requirements.
- F. Section 31 25 00 Soil Erosion and Sediment Control.

1.03 QUALITY ASSURANCE

- A. Conduct work in accordance with OSHA and EPA requirements.
- B. Use only firms or individual trades qualified to perform work required under this Section.

1.04 DEFINITIONS

- A. Abandon: Cut, cap, and fill the feature as approved by Project Representative of feature and leave in place.
- B. Relocate: Preserve the feature and the functionality of the feature. Move the feature to the designated location on the Site.
- C. Remove: Take appropriate action to eliminate the feature from the Project Site. Removal may include disposal, recycling, or salvage.
- D. Salvage: Preserve and protect the feature and the functionality of the feature. Move the feature to the designated location off the Site and turn over custody to the Project Representative.
- E. OSHA: Occupational Safety and Health Administration.

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F. EPA: United States Environmental Protection Agency.

1.05 SUBMITTALS

- A. Submittal Procedures: See Section 01 33 00 Submittal Procedures for requirements for the mechanics and administration of the submittal process.
- B. Leadership in Energy and Environmental Design (LEED[®]) Documentation: Submit the following in accordance with Section 01 81 30 – Sustainability Requirements:
 - 1. Completed LEED Tracking Form for MR Credit 2.
- C. Approval Submittals:
 - 1. Demolition Plan not later than thirty (30) calendar days prior to the intended start of demolition work. Demolition Plan shall discuss the following.
 - a. Sequencing of the work.
 - b. Protection of workers and the public.
 - c. Traffic control, where demolition is adjacent to existing facility operations or as required in public right-of-way.
 - d. Environmental protection.
 - e. Means and methods to minimize disposal and maximize salvage and recycling.
 - f. Demolition disposal procedures.
 - g. Salvaged items to be delivered to Project Representative.
 - h. Disposal of demolition debris.
 - Coordinate with the Waste Management Plan required in Section 01 74 10 – Construction Waste Management.

1.06 DESCRIPTION

- A. Work includes:
 - 1. Demolition of structures, utilities, and other site features as indicated.
 - 2. Removal of demolition debris.
 - 3. Protection of construction to remain, including:
 - a. Utilities to remain.
 - b. Other items indicated.
- B. Condition of existing structures to be demolished:
 - 1. Owner assumes no responsibility for actual condition of structures to be demolished.
 - 2. Conditions existing at time of inspection for bidding purposes will be maintained by Owner insofar as practicable.

- 3. Hazardous assessment for transfer station and warehouse structures has been conducted and is included in Appendix A: Hazardous Material Survey.
- A Phase I Environmental Site Assessment was conducted for the warehouse at 13429 SE 30th St and is provided as Available Information only in accordance with Section 01 10 00 – Summary of Work.
- C. Where a building is being demolished and a standpipe exists within such a building, such standpipe shall be maintained in an operable condition so as to be available for use by fire department.
 - 1. Such standpipe shall be demolished with building but shall not be demolished more than one floor below floor being demolished.

1.07 JOB CONDITIONS

- A. Perform preliminary investigations as required to ascertain extent of work.
 - 1. Conditions which would be apparent by such investigation will not be allowed as cause for claims for extra costs.
- B. Before start of work, obtain and pay for permits required by Authorities Having Jurisdiction and notify interested utilities companies.
- C. Obtain approval of authorities having jurisdiction for work which affects existing exit ways, exit stairs, means of egress, or access to, or exit from, areas.
 - 1. Review with and obtain approval of authorities for temporary construction which affects such areas.
 - 2. Obtain approval of fire authorities.
- D. Hazardous Materials and Dangerous Wastes shall be separated, stored and disposed of in accordance with: Section 01 91 00 – Lead and Asbestos; Section 01 91 10 – Regulated Building Materials; and Section 02 31 40 – Removal of Hazardous Materials and Dangerous Waste.

PART 2 – PRODUCTS - NOT USED

PART 3 – EXECUTION

3.01 PREPARATION

- A. Identification:
 - 1. Field locate and mark all structures to be removed.
 - 2. Existing Utilities:
 - a. Locate utilities within or adjacent to the Site.
 - b. Take all necessary precautionary measures to protect utilities.
 - c. Provide adequate means of support and protection during removal operations for utilities that are to remain in service.

- d. Do not interrupt existing utilities serving facilities occupied by King County or others, except when permitted in writing by the Project Representative, and then only after acceptable temporary utility services have been provided if required by Project Representative and utility owner.
 - 1) Provide minimum seven (7) calendar days notice to Project Representative and utility owner, and receive written notice to proceed before interrupting any utility.
 - 2) Coordinate with City of Bellevue for sewer relocation and abandonment to ensure service interruptions are minimized and conducted during approved periods.
- e. Coordinate with Project Representative and utility suppliers for shutoff of utilities serving each building and disconnect and seal utilities before starting demolition.
- f. Coordinate building demolition with required utility relocations for Puget Sound Energy (PSE) and City of Bellevue (COB).
- B. Protection:
 - 1. Maintain facility operations traffic for the duration of the work in accordance with Section 01 14 00 Work Restrictions and Owner-provided Traffic Management Plan.
 - 2. Take all necessary precautionary measures to protect all utilities, structures and surrounding areas.

3.02 POLLUTION CONTROLS

- A. Provide erosion and sedimentation controls in accordance with Section 31 25 00 – Soil Erosion and Sediment Control prior to initiating work.
- B. Clean adjacent structures and improvements of dust, dirt, and debris caused by demolition operations.
- C. Return adjacent areas to condition existing prior to start of work.

3.03 ITEMS TO BE SALVAGED FOR OWNER

- A. Unless determined as unsalvageable by the Project Representative, all items designated for salvage shall be removed with care to prevent damage.
- B. If, in the opinion of the Project Representative, salvageable features were unnecessarily damaged, damaged salvageable features shall be replaced or repaired, to the satisfaction of the Project Representative, by the Contractor at no additional cost to the Owner.
- C. Remove salvage items at appropriate stage of demolition, but early enough to prevent damage to them by demolition operations.
- D. Coordinate with Project Representative items Owner wishes to salvage or relocate:
 - 1. Standby engine generator (Transport to Cedar Hills Regional Landfill where Owner will off load).

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- 2. Two packer cranes complete with hydraulic power units (HPUs) (Transport to Cedar Hills Regional Landfill where Owner will off load).
- 3. Pumps and rails removed from Factoria sewer wetwell and Eastgate stormwater ponds (Transport to Cedar Hills Regional Landfill where Owner will off load).
- 4. Following request for Substantial Completion of Milestone 3, Contractor shall remove two HHW storage lockers relocated during the Transition Period from the within the new Transfer Building and transport to Cedar Hills Regional Landfill where Owner will off load.
 - a. Owner will remove contents of HHW storage lockers prior to removal and hauling by Contractor.
- 5. Other items as indicated by the Project Representative.
- E. Remove salvage items as a unit:
 - 1. Clean, list, and tag for storage.
 - 2. Protect from damage.
 - 3. Salvage each item with auxiliary or associated equipment required for operation.
 - 4. Store in an area designated by Project Representative.

3.04 ITEMS SALVAGED FOR CONTRACTOR

- A. Items of salvage value to Contractor not designated in Contract Documents as items to salvage or relocate may be removed from structures as work progresses.
- B. Transport salvaged items from site as they are removed.
- C. Storage or sale of removed items not permitted on site.

3.05 ITEMS TO BE REMOVED FOR RE-INSTALLATION IN PROJECT

- A. Remove items designated for re-use:
 - 1. Tag, protect from damage, store if required, and deliver to locations designated.
 - 2. Brace motors attached to flexible mountings until reinstallation.

3.06 GENERAL DEMOLITION PROCEDURES

- A. Remove facilities as indicated on the Drawings and as necessary to complete the work.
- B. Keep elements of the deconstructed facilities that are designated as contaminated and not suitable for recycling as designated in Section 01 74 10

 Construction Waste Management such as contaminated concrete and asphalt separate from similar materials that are recyclable.
- C. Demolition of entire structures or features:
 - 1. Demolish completely and remove from site.

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- 2. Use such methods as required to complete work within limitations of governing regulations.
- D. Demolition of portions of structures or features:
 - 1. Cut, cap, sawcut, or otherwise provide clean break between the portion of the feature to be demolished and portion to remain.
 - 2. Protect portion of feature to remain in place from damage during demolition.
- E. Start and complete work as established by approved schedule; operational procedures and sequence of work are optional provided schedule is maintained.
- F. Protect property to remain:
 - 1. Promptly repair damage caused by demolition, as directed by Project Representative, at no cost to Owner.
 - 2. Conduct operations to prevent damage by falling debris or other cause to adjacent buildings, structures, and other facilities as well as persons.
 - 3. Provide interior and exterior shoring, bracing, or support to prevent movement, settlement or collapse of structures.
- G. Conduct operations to ensure minimum interference with roads, walks, entrances, exits, and other adjacent occupied facilities.
 - 1. Do not close or obstruct private drives, walks or other occupied or used facilities unless approved in writing.
 - 2. Do not close or obstruct public thoroughfares or walks unless approved by Authorities Having Jurisdiction.
 - 3. Do not obstruct exits from existing facilities without approval of Authorities Having Jurisdiction.
 - 4. Provide alternate routes around closed or obstructed traffic ways.
- H. Provide covered passageways where necessary to ensure safe passage of persons in or near areas of work.
- I. Provide barricades and safety lights as required.
- J. Abandon utilities that are indicated to be abandoned.
- K. If suspected hazardous materials or unexpected structures such as underground storage tanks are encountered, Contractor shall stop work and notify Project Representative immediately for further direction.
- L. Structural Demolition:
 - 1. Demolish concrete and masonry in small sections.
 - 2. Perform removal to avoid excessive loads on supporting walls, floors or framing.

3.07 SAWCUTTING

- A. Make a neat vertical saw cut at the boundaries of the asphalt and/or concrete area to be removed.
 - 1. Care shall be taken when saw cutting so as not to damage any of the existing asphalt concrete pavement to remain in place.
 - 2. Sawcutting shall extend through the full pavement depth, or to a maximum depth of 12 IN whichever is less.
 - 3. Any pavement damaged by Contractor due to its operations shall be repaired or replaced at no cost to the Owner.
 - 4. Contractor is responsible for ensuring that special precautions are taken so that no concrete or concrete by-products, or products and by-products used in the saw cut of asphalt or concrete, are discharged into any storm drain or surface water system.
- B. Wastewater from Cutting Operations:
 - 1. Wastewater from Portland Cement Concrete, masonry, and asphalt concrete cutting operations shall not be discharged to storm drainage systems or surface waters.
 - 2. Cutting operations typically increase the pH of wastewater, therefore, just filtering of wastewater at treatment prior to discharge is not acceptable.
 - 3. To thoroughly clean saw cuts where necessary, use high pressure water (high pressure water is considered greater than 1400 psi).
 - 4. All wastewater shall be collected using a wet-dry vacuum or pumped into appropriate storage containers for disposal.
 - 5. Impervious surfaces contaminated with sediment and grit from cutting or pulverizing operations shall be cleaned by sweepers to prevent contaminants from entering the storm drainage system or surface waters when it rains.

3.08 REMOVAL OF PAVEMENT AND CURBS

- A. Pavement and curbs shall be sawcut in such a fashion to form a neat break line.
- B. All transitions to existing asphalt or cement concrete roadways and curb and gutter shall be vertically sawcut full depth with straight, uniform edges.
- C. Removing Asphalt Concrete Pavement:
 - 1. Existing asphalt concrete pavement shall be removed at the locations indicated in the Drawings or as designated by the Project Representative.
 - a. Concrete and asphalt pavement that have been exposed to solid waste, leachate and wastewater are not recyclable.
 - 2. Removal shall be accomplished by making a neat longitudinal vertical cut along the boundaries of the area to be removed.

- 3. Sawcutting shall be accomplished as previously specified with a selfpropelled machine capable of cutting to a twelve (12) IN depth. The use of pneumatic hammers or punches will not be permitted.
- 4. Care shall be taken in removing the pavement not to damage any of the existing pavement that is to remain in place.
- 5. Any remaining pavement damaged due to Contractor operations shall be replaced by the Contractor, to the satisfaction of the Project Representative, at Contractor's expense.
- D. Removing Cement Concrete Curb and Gutter:
 - 1. Existing cement concrete curb and gutter shall be removed as shown on the Drawings.
 - 2. Removal shall be accomplished by making a neat longitudinal vertical cut along the boundaries of the area to be removed or closest expansion/construction joint.
 - 3. Care shall be taken in removing the curb and gutter such as not to damage any curb and gutter or pavement that is to remain in place.
 - 4. Any remaining curb and gutter damaged due to Contractor operations shall be replaced by the Contractor, to the satisfaction of the Project Representative, at Contractor's expense.
- E. Removing Pavement Markings:
 - 1. Existing pavement markings including plastic stop bars and traffic arrows, and lane markers shall be removed at all locations indicated on the Drawings and as required for revisions to traffic lanes in accordance with Owner-provided Traffic Management Plan.
 - 2. Removal of existing pavement markings shall be conducted using such methods to prevent damage to the remaining pavement. Do not use chemicals that may be harmful to the pavement.
 - 3. Damaged pavement shall be replaced at Contractor's expense.
 - 4. Painted and thermoplastic pavement markings shall be removed by sandblasting or other method approved by Project Representative. All markers to be removed shall be done without damaging the pavement.

3.09 REMOVAL OF EXISTING UTILITY STRUCTURES

- A. Manholes and Catch Basins:
 - 1. All existing concrete manholes and catch basins shall be removed and disposed of off the Site.
 - a. Concrete manholes and catch basins that have been exposed to leachate and wastewater are not recyclable.

3.10 EXISTING PIPE ABANDONMENT

A. Clean interior contact surfaces of all pipes to be cut off and abandoned.

- B. Construct concrete plug in ends of pipes.
 - 1. Minimum length of plug shall be equal to two (2) diameters of the pipe.
- C. Concrete shall completely fill the pipe opening.
- D. Abandon water pipes and structures per City of Bellevue Water Engineering Standards January 2012, Section W5-29.
- E. Abandon sewer pipes and structures per City of Bellevue Sewer Engineering Standards January 2012, Section S5-32.
- F. Abandon side sewers per City of Bellevue Sewer Engineering Standards January 2012, Section S6-15.
- G. Abandon natural gas piping per PSE requirements.

3.11 REMOVAL AND/OR RESETTING OF MISCELLANEOUS ITEMS

- A. Remove and/or reset miscellaneous items as described in the Drawings and as necessary to satisfactorily complete the work.
- B. Items requiring resetting shall be protected from damage during removal as far as is practical. If, in the opinion of Project Representative, an item requires replacement due to the Contractor's operations it shall be replaced in kind at Contractor's expense.
- C. Fencing and signs identified for removal shall be legally disposed of by Contractor. Post holes shall be filled with approved excavated material from elsewhere on-site.
- D. Lighting fixtures identified for removal shall be disconnected and removed, including foundations and associated wiring.

3.12 CLEAN-UP AND DISPOSAL OF DEMOLITION MATERIALS

- A. Materials, except those identified as salvage, resulting from the removal of structures and obstructions shall be hauled to an approved off-site waste disposal site, secured by the Contractor and shall be disposed of in such a manner as to meet the requirements of federal, state, county, and municipal regulations regarding health, safety, and public welfare.
 - Coordinate with the Waste Management Plan required in Section 01 74 10 – Construction Waste Management.
 - 2. Do not burn materials on Site.
- B. Clean up other debris resulting from this work.

END OF SECTION 02 41 00

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SECTION 03 05 05 TESTING

PART 1 – GENERAL

1.01 SUMMARY

- A. Description:
 - 1. This work consists of testing concrete and grout where shown in the Plans or where designated by the Project Representative.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Division 00 Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 01 General Requirements.
 - 3. Section 03 21 00 Reinforcement.
 - 4. Section 03 31 30 Concrete, Materials and Proportioning.

1.02 RESPONSIBILITY AND PAYMENT

- A. Owner will hire an independent Testing Agency/Service Provider to perform the following testing and inspection and provide test results to the Project Representative and Contractor.
 - 1. Testing and inspection of concrete and grout produced for incorporation into the work during the construction of the Project for compliance with the Contract Documents.
 - 2. Additional testing or retesting of materials occasioned by their failure, be test or inspection, to meet requirements of the Contract Documents.
 - 3. Strength testing on concrete required by the Project Representative or Special Inspector when the water-cement ratio exceeds the water-cement ratio of the typical test cylinders.
 - 4. In-place testing of concrete as may be required by Project Representative when strength of structure is considered potentially deficient.
 - 5. Other testing services needed or required by Contractor such as field curing of test specimens and testing of additional specimens for determining when forms, form shoring or reshoring may re removed.
 - 6. Owner will pay for services defined in Paragraph 1.2A.1.
 - 7. See Specification Section 01 43 00.
- B. Contractor shall hire a qualified testing agency to perform the following testing and provide test results to the Project Representative.
 - Testing of materials and mixes proposed by the Contractor for compliance with the Contract Documents and retesting in the event of changes.

- 2. Additional testing and inspection required because of changes in materials or proportions requested by Contractor.
- 3. Contractor shall pay for services defined in Paragraphs 1.2B.1. and 1.2B.2.
- 4. Contractor shall reimburse Owner for testing services defined in Paragraphs 1.2A.2., 1.2A.3., 1.2A.4. and 1.2A.5.
- 5. See Specification Section 01 43 00.
- C. Duties and Authorities of Testing Agency/Service Provider:
 - Any Testing Agency/Service Provider or agencies and their representatives retained by Contractor or Owner for any reason are not authorized to revoke, alter, relax, enlarge, or release any requirement of Contract Documents, nor to reject, approve or accept any portion of the Work.
 - 2. Testing Agency/Service Provider shall inform the Contractor and Project Representative regarding acceptability of or deficiencies in the work including materials furnished and work performed by Contractor that fails to fulfill requirements of the Contract Documents.
 - 3. Testing Agency to submit test reports and inspection reports to Project Representative and Contractor immediately after they are performed.
 - a. All test reports to include exact location in the work at which batch represented by a test was deposited.
 - b. Reports of strength tests to include detailed information on storage and curing of specimens prior to testing.
 - 4. Project Representative retains the responsibility for ultimate rejection or approval of any portion of the Work.

1.03 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. American Association of State Highway and Transportation Officials (AASHTO):
 - a. T260, Standard Method of Test for Sampling and Testing for Chloride Ion in Concrete and Concrete Raw Materials.
 - 2. American Concrete Institute (ACI):
 - a. 318, Building Code Requirements for Structural Concrete.
 - 3. ASTM International (ASTM):
 - a. C31, Standard Practice for Making and Curing Concrete Test Specimens in the Field.
 - b. C39, Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
 - c. C42, Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.

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- d. C138, Standard Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete.
- e. C143, Standard Test Method for Slump of Hydraulic-Cement Concrete.
- f. C172, Standard Practice for Sampling Freshly Mixed Concrete.
- g. C231, Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
- h. E329, Standard Specification for Agencies Engaged in Construction Inspection and/or Testing.
- 4. National Bureau of Standards (NBS):
 - a. Cement and Concrete Reference Laboratory (CCRL).
- 5. City of Bellevue (COB):
 - a. Transportation Department Design Manual, September 2011.
 - b. Storm and Surface Water Engineering Standards, January 2012.
 - c. Sanitary Sewer Engineering Standards, January 2012.
 - d. Water Engineering Standards, January 2011.
- B. Qualifications:
 - 1. Contractor's Testing Agency:
 - a. Meeting requirements of ASTM E329.
 - b. Provide evidence of recent inspection by CCRL of NBS, and correction of deficiencies noted.
- C. Use of Testing Agency and approval by Project Representative of proposed concrete mix design shall in no way relieve Contractor of responsibility to furnish materials and construction in full compliance with Contract Documents.

1.04 DEFINITIONS

A. Testing Agency/Service Provider: An independent professional testing/inspection firm or service hired by Owner or by Contractor to perform testing, inspection or analysis services as directed, and as provided in the Contract Documents.

1.05 SUBMITTALS

- A. Submittal Procedures: See Section 01 33 00 Submittal Procedures for requirements for the mechanics and administration of the submittal process.
- B. Approval Submittals:
 - 1. Product technical data including:
 - a. Concrete materials and concrete mix designs proposed for use.
 - 1) Include results of all testing performed to qualify materials and to establish mix designs.

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- 2) Place no concrete until approval of mix designs has been received in writing.
- 3) Submittal for each concrete mix design to include:
 - a) Sieve analysis and source of fine and coarse aggregates.
 - b) Test for aggregate organic impurities.
 - c) Proportioning of all materials.
 - d) Type of cement with mill certificate for the cement.
 - e) Brand, quantity and class of fly ash proposed for use along with other submittal data as required for fly ash by Specification Section 03 31 30 – Concrete, Materials, and Proportioning.
 - f) Slump.
 - g) Brand, type and quantity of air entrainment and any other proposed admixtures.
 - h) Shrinkage test results in accordance with ASTM C157.
 - i) Total chloride ion content per cubic yard of concrete determined in accordance with AASHTO T260.
 - j) 28-day compression test results and any other data required by Specification Section 03 31 30 – Concrete, Materials, Proportioning to establish concrete mix design.
- C. Quality Assurance Submittals: Testing Agency qualifications.

PART 2 – PRODUCTS - (NOT APPLICABLE TO THIS SECTION)

PART 3 – EXECUTION

3.01 TESTING SERVICES TO BE PERFORMED BY OWNER

- A. The following concrete testing will be performed by the Owner's Service Provider:
 - 1. Concrete strength testing:
 - a. Secure concrete samples in accordance with ASTM C172.
 - Obtain each sample from a different batch of concrete on a random basis, avoiding selection of test batch other than by a number selected at random before commencement of concrete placement.
 - b. For each strength test mold and cure four (4) cylinders from each sample in accordance with ASTM C31.
 - 1) Record any deviations from requirements on test report.
 - 2) Cylinder size: Per ASTM C31.

- c. Field cure one cylinder for the seven (7) day test.
 - 1) Laboratory cure the remaining.
- d. Test cylinders in accordance with ASTM C39.
 - Test two (2) cylinders at 28 days for strength test result and one (1) at seven (7) days for information.
 - 2) Hold remaining cylinder in reserve.
- e. Strength test result:
 - 1) Average of strengths of two (2) cylinders from the same sample tested at 28 days.
 - If one (1) cylinder in a test manifests evidence of improper sampling, molding, handling, curing, or testing, discard and test reserve cylinder; average strength of remaining cylinders shall be considered strength test result.
 - 3) Should all cylinders in a test show any of above defects, discard entire test.
- f. Frequency of tests:
 - 1) Concrete sand cement grout: One (1) strength test for each 4 HR period of grout placement or fraction thereof.
 - Precast concrete, concrete topping, concrete fill and lean concrete: One (1) strength test for each 10 CY of each type of concrete or fraction thereof placed.
 - 3) All other concrete:
 - a) One (1) strength test consisting to be taken not less than once a day, nor less than once for each 60 CY or fraction thereof placed in any one (1) day.
 - b) If total volume of concrete on Project is such that frequency of testing required in above paragraph will provide less than five (5) strength tests for each concrete mix, tests shall then be made from at least five (5) randomly selected batches or from each batch if fewer than five (5) batches are provided.
- 2. Slump testing:
 - a. Determine slump of concrete sample for each strength test.
 - 1) Determine slump in accordance with ASTM C143.
 - b. If consistency of concrete appears to vary, the Project Representative shall be authorized to require a slump test for each concrete truck.
 - 1) This practice shall continue until the Project Representative deems it no longer necessary.
- 3. Air content testing: Determine air content of concrete sample for each strength test in accordance with either ASTM C231 or ASTM C173.

- 4. Temperature testing: One test hourly when air temperature is 40 deg F and below and when 80 Deg F and above and one test for each composite sample per ASTM C1064.
- 5. In-place concrete testing (if required).

3.02 SAMPLING ASSISTANCE AND NOTIFICATION FOR OWNER

- A. To facilitate testing and inspection, perform the following:
 - 1. Furnish any necessary labor to assist Testing Agency in obtaining and handling samples at site.
 - 2. Provide and maintain for sole use of Testing Agency adequate facilities for safe storage and proper curing of test specimens on site for first 24 HRS as required by ASTM C31.
- B. Notify Project Representative sufficiently in advance of operations (minimum of 24 HRS) to allow completion of quality tests for assignment of personnel and for scheduled completion of quality tests.

3.03 ACCEPTANCE

- A. Completed concrete work which meets applicable requirements will be accepted without qualification.
- B. Completed concrete work which fails to meet one or more requirements but which has been repaired to bring it into compliance will be accepted without qualification.
- C. Completed concrete work which fails to meet one or more requirements and which cannot be brought into compliance may be accepted or rejected as provided in these Contract Documents.
 - 1. In this event, modifications may be required to assure that concrete work complies with requirements.
 - 2. Modifications, as directed by Project Representative, to be made at no additional cost to Owner.
- D. Dimensional Tolerances:
 - 1. Formed surfaces resulting in concrete outlines smaller than permitted by tolerances shall be considered potentially deficient in strength and subject to modifications required by Project Representative.
 - 2. Formed surfaces resulting in concrete outlines larger than permitted by tolerances may be rejected and excess material subject to removal.
 - a. If removal of excess material is permitted, accomplish in such a manner as to maintain strength of section and to meet all other applicable requirements of function and appearance.
 - 3. Concrete members cast in wrong location may be rejected if strength, appearance or function of structure is adversely affected or misplaced items interfere with other construction.

- 4. Inaccurately formed concrete surfaces exceeding limits of tolerances and which are exposed to view, may be rejected.
 - a. Repair or remove and replace if required.
- 5. Finished slabs exceeding tolerances may be required to be repaired provided that strength or appearance is not adversely affected.
 - a. High spots may be removed with a grinder, low spots filled with a patching compound, or other remedial measures performed as permitted or required.
- E. Appearance:
 - 1. Concrete surfaces exposed to view with defects which, in opinion of Project Representative, adversely affect appearance as required by specified finish shall be repaired by approved methods.
 - 2. Concrete not exposed to view is not subject to rejection for defective appearance unless, in the opinion of the Project Representative, the defects impair the strength or function of the member.
- F. High Water-Cement Ratio:
 - 1. Concrete with water in excess of the specified maximum water-cement ratio will be considered potentially deficient in durability.
 - 2. Remove and replace concrete with high water-cement ratio or make other corrections as directed by Project Representative.
- G. Strength of Structure:
 - 1. Strength of structure in place will be considered potentially deficient if it fails to comply with any requirements which control strength of structure, including but not necessarily limited to following:
 - a. Low concrete strength:
 - 1) Test results for standard molded and cured test cylinders to be evaluated separately for each mix design.
 - a) Such evaluation shall be valid only if tests have been conducted in accordance with specified quality standards.
 - b) For evaluation of potential strength and uniformity, each mix design shall be represented by at least three (3) strength tests.
 - c) A strength test shall be the average of two (2) cylinders from the same sample tested at 28 days.
 - 2) Acceptance:
 - a) Strength level of each specified compressive strength shall be considered satisfactory if both of the following requirements are met:
 - i Average of all sets of three (3) consecutive strength tests equal or exceed the required specified 28 day compressive strength.

- ii No individual strength test falls below the required specified 28 day compressive strength by more than 500 psi.
- b. Reinforcing steel size, configuration, quantity, strength, position, or arrangement at variance with requirements in Specification Section 03 21 00 – Reinforcement or requirements of the Contract Drawings or approved Shop Drawings.
- c. Concrete which differs from required dimensions or location in such a manner as to reduce strength.
- d. Curing time and procedure not meeting requirements of this Specification Section.
- e. Inadequate protection of concrete from extremes of temperature during early stages of hardening and strength development.
- f. Mechanical injury, construction fires, accidents or premature removal of formwork likely to result in deficient strength.
- g. Concrete defects such as voids, honeycomb, cold joints, spalling, cracking, etc., likely to result in deficient strength or durability.
- 2. Structural analysis and/or additional testing may be required when strength of structure is considered potentially deficient.
- 3. In-place testing of concrete may be required when strength of concrete in place is considered potentially deficient.
 - a. Testing by impact hammer, sonoscope, or other nondestructive device may be permitted by the Project Representative to determine relative strengths at various locations in the structure or for selecting areas to be cored.
 - 1) Such tests shall not be used as a basis for acceptance or rejection.
 - b. Core tests:
 - 1) Where required, test cores will be obtained in accordance with ASTM C42.
 - a) If concrete in structure will be dry under service conditions, air dry cores (temperature 60 to 80 DegF, relative humidity less than 60 percent) for seven (7) days before test then test dry.
 - b) If concrete in structure will be wet or subjected to high moisture atmosphere under service conditions, test cores after immersion in water for at least 40 HRS and test wet.
 - c) Testing wet or dry to be determined by Project Representative.
 - 2) Three (3) representative cores may be taken from each member or area of concrete in place that is considered potentially deficient.
 - a) Location of cores shall be determined by Project Representative so as least to impair strength of structure.

- b) If, before testing, one (1) or more of cores shows evidence of having been damaged subsequent to or during removal from structure, damaged core shall be replaced.
- Concrete in area represented by a core test will be considered adequate if average strength of three (3) cores is equal to at least 85 percent of specified strength and no single core is less than 75 percent of specified strength.
- 4) Fill core holes with nonshrink grout and finish to match surrounding surface when exposed in a finished area.
- 4. If core tests are inconclusive or impractical to obtain or if structural analysis does not confirm safety of structure, load tests may be required and their results evaluated in accordance with ACI 318, Chapter 20.
- 5. Correct or replace concrete work judged inadequate by structural analysis or by results of core tests or load tests with additional construction, as directed by Project Representative, at Contractor's expense.
- 6. Contractor to pay all costs incurred in providing additional testing and/or structural analysis required.

END OF SECTION

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SECTION 03 09 00 CONCRETE

PART 1 – GENERAL

1.01 SUMMARY

- A. Description:
 - 1. The work described in this section includes the use of Cast-in-Place concrete and grout in the construction of site work concrete structures where shown in the Plans.
 - 2. This work includes but is not limited to:
 - a. Site Cement Concrete Retaining Walls, including cast-in-place concrete fascia panels for soldier pile and soldier pile tieback walls
 - b. Cement Concrete Vault: Cast-in-Place.
 - c. Cement Concrete Sidewalks: Curb and Gutters.
 - d. Cement Concrete Stairs: Chain Link Fence and Gate Foundations.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Division 00 Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 01 General Requirements.
 - 3. Section 03 11 13 Formwork.
 - 4. Section 03 21 00 Reinforcement.
 - 5. Section 03 31 32 Concrete Finishing and Repair of Surface Defects.
 - 6. Section 03 35 00 Concrete Sealer.
 - 7. Section 32 32 43 Soldier Pile and Soldier Pile Tieback Walls.

1.02 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. American Concrete Institute (ACI):
 - a. 116R, Cement and Concrete Terminology.
 - b. 211.1, Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass Concrete.
 - c. 212.3R, Chemical Admixtures for Concrete.
 - d. 304R, Guide for Measuring, Mixing, Transporting, and Placing Concrete.
 - e. 304.2R, Placing Concrete by Pumping Methods.
 - f. 305R, Hot Weather Concreting.
 - g. 306R, Cold Weather Concreting.

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- h. 318, Building Code Requirements for Structural Concrete.
- i. 347, Guide to Formwork for Concrete.
- j. 350 Code Requirements for Environmental Concrete Structures.
- 2. ASTM International (ASTM):
 - a. A82, Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
 - b. A185, Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
 - c. A615, Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
 - d. A775, Standard Specification for Epoxy-Coated Steel Reinforcing Bars.
 - e. A1064, Standard Specification for Steel Wire and Welded Wire Replacement, Plain and Deformed, for Concrete.
 - f. C31, Standard Practice for Making and Curing Concrete Test Specimens in the Field.
 - g. C33, Standard Specification for Concrete Aggregates.
 - h. C39, Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
 - i. C94, Standard Specification for Ready-Mixed Concrete.
 - j. C138, Standard Method of Test for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete.
 - k. C143, Standard Test Method for Slump of Hydraulic Cement Concrete.
 - I. C150, Standard Specification for Portland Cement.
 - m. C157, Standard Test Method for Length Change of Hardened Hydraulic-Cement, Mortar, and Concrete.
 - n. C172, Standard Practice for Sampling Freshly Mixed Concrete.
 - o. C173, Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
 - p. C231, Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
 - q. C260, Standard Specification for Air-Entraining Admixtures for Concrete.
 - r. C289, Standard Test Method for Potential Alkali-Silica Reactivity of Aggregates (Chemical Method).
 - s. C309, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
 - t. C494, Standard Specification for Chemical Admixtures for Concrete.

- u. C618, Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
- v. C1315, Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete.
- w. D882, Standard Test Method for Tensile Properties of Thin Plastic Sheeting.
- x. D994, Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type).
- y. D1056, Standard Specification for Flexible Cellular Materials-Sponge or Expanded Rubber.
- z. D1709, Standard Test Methods for Impact Resistance of Plastic Film by the Free-Falling Dart Method.
- aa. D1751, Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
- bb. E96, Standard Test Methods for Water Vapor Transmission of Materials.
- cc. E329, Standard Specification for Agencies Engaged in Construction Inspection and/or Testing.
- dd. E1745, Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs.
- 3. Corps of Engineers (COE):
 - a. CRD-C572, Specifications for Polyvinylchloride Waterstop.
 - b. CRD-C621, Standard Specification for Packaged, Dry, Hydraulic-Cement Grout (Nonshrink).
- 4. National Ready Mixed Concrete Association (NRMCA).
- 5. City of Bellevue:
 - a. Transportation Department Design Manual.
 - b. Utilities Department:
 - 1) Storm and Surface Water Engineering Standards.
 - 2) Sanitary Sewer Engineering Standards.
 - 3) Water Engineering Standards.
- B. Quality Control:
 - 1. Concrete testing agency:
 - a. Contractor to employ and pay for services of a testing laboratory to:
 - 1) Perform materials evaluation.
 - 2) Design concrete mixes.
 - b. Concrete testing agency to meet requirements of ASTM E329.

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- 2. Do not begin concrete production until proposed concrete mix design has been approved by Project Representative.
 - a. Approval of concrete mix design by Project Representative does not relieve Contractor of his responsibility to provide concrete that meets the requirements of this Specification.
- 3. Adjust concrete mix designs when material characteristics, job conditions, weather, strength test results or other circumstances warrant.
 - a. Do not use revised concrete mixes until submitted to and approved by Project Representative.
- 4. Perform structural calculations as required to prove that all portions of the structure in combination with remaining forming and shoring system has sufficient strength to safely support its own weight plus the loads placed thereon.
- C. Qualifications:
 - 1. Ready mixed concrete batch plant certified by NRMCA.
 - 2. Formwork, shoring and reshoring for slabs and beams except where cast on ground to be designed by a professional engineer currently registered in Washington State.

1.03 DEFINITIONS

- A. Per ACI 116R except as modified herein:
 - 1. Concrete fill: Non-structural concrete.
 - 2. Concrete Testing Agency: Testing agency employed to perform materials evaluation, design of concrete mixes or testing of concrete placed during construction.
 - 3. Exposed concrete: Exposed to view after construction is complete.
 - 4. Indicated: Indicated by Contract Documents.
 - 5. Lean concrete: Concrete with low cement content.
 - 6. Non-exposed concrete: Not exposed to view after construction is complete.
 - 7. Required: Required by Contract Documents.
 - 8. Specified strength: Specified compressive strength at 28 days.
 - 9. Submitted: Submitted to Project Representative.

1.04 SUBMITTALS

- A. Submittal Procedures: See Section 01 33 00 Submittal Procedures for requirements for the mechanics and administration of the submittal process.
- B. Leadership in Energy and Environmental Design (LEED) Documentation: Submit the following in accordance with Section 01 81 30 – Sustainability Requirements:
 - 1. Completed LEED Materials Submittal Form MR Credit 4.

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- 2. Completed LEED VOC Submittal Form.
- C. Approval Submittals:
 - 1. Concrete mix designs proposed for use.
 - a. Concrete mix design submittal to include the following information:
 - 1) Sieve analysis and source of fine and coarse aggregates.
 - 2) Test for aggregate organic impurities.
 - 3) Test for deleterious aggregate per ASTM C289.
 - 4) Proportioning of all materials.
 - 5) Type of cement with mill certificate for cement.
 - 6) Type of fly ash with certificate of conformance to specification requirements.
 - 7) Slump.
 - 8) Air content.
 - 9) Brand, type, ASTM designation, and quantity of each admixture proposed for use.
 - 10) 28-day cylinder compressive test results of trial mixes per ACI 318 and as indicated herein.
 - 11) Shrinkage test results.
 - 12) Standard deviation value for concrete production facility.
 - 2. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 - c. Manufacturers and types:
 - 1) Joint fillers.
 - 2) Curing agents.
 - 3) Chemical sealer.
 - 4) Bonding and patching mortar.
 - 5) Construction joint bonding adhesive.
 - 6) Nonshrink grout with cure/seal compound.
 - 7) Waterstops.
 - 3. Shop Drawings for reinforcing steel:
 - a. Show grade, sizes, number, configuration, spacing, location and all fabrication and placement details.
 - b. In sufficient detail to permit installation of reinforcing without having to make reference to Contract Drawings.

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- c. Obtain approval of Shop Drawings by Project Representative before fabrication.
- 4. Strength test results of in place concrete including slump, air content and concrete temperature.
- D. Quality Assurance Submittals:
 - 1. Concrete batch tickets.
 - 2. Reinforcing steel mill certificates.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Storage of Material:
 - 1. Cement and fly ash:
 - a. Store in moisture-proof, weather-tight enclosures.
 - b. Do not use if caked or lumpy.
 - 2. Aggregate:
 - a. Store to prevent segregation and contamination with other sizes or foreign materials.
 - b. Obtain samples for testing from aggregates at point of batching.
 - c. Do not use frozen or partially frozen aggregates.
 - d. Do not use bottom 6 IN of stockpiles in contact with ground.
 - e. Allow sand to drain until moisture content is uniform prior to use.
 - 3. Admixtures:
 - a. Protect from contamination, evaporation, freezing, or damage.
 - b. Maintain within temperature range recommended by manufacturer.
 - c. Completely mix solutions and suspensions prior to use.
 - 4. Reinforcing steel: Support and store all rebar above ground.
- B. Delivery:
 - 1. Concrete:
 - a. Prepare a delivery ticket for each load for ready-mixed concrete.
 - b. Truck operator shall hand ticket to Project Representative at the time of delivery.
 - c. Ticket to show:
 - 1) Mix identification mark.
 - 2) Quantity delivered.
 - 3) Amount of each material in batch.
 - 4) Outdoor temp in the shade.
 - 5) Time at which cement was added.

- 6) Numerical sequence of the delivery.
- 7) Amount of water added.
- 2. Reinforcing steel:
 - a. Ship to jobsite with attached plastic or metal tags with permanent mark numbers.
 - b. Mark numbers to match Shop Drawing mark number.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following products and manufacturers are acceptable:
 - 1. Nonshrink, nonmetallic grout:
 - a. Sika "SikaGrout 212."
 - b. Euclid Chemial "NS Grout."
 - c. BASF Admixtures, Inc. "Masterflow 713."
 - d. Or approved equal.
 - 2. Epoxy grout:
 - a. BASF Admixtures, Inc. "Brutem MPG."
 - b. Euclid Chemical Company, "E3-G."
 - c. Fosroc, "Conbextra EPHF".
 - d. Or approved equal.
 - 3. Expansion joint fillers:
 - a. Permaglaze Co.
 - b. Rubatex Corp.
 - c. Williams Products, Inc.
 - d. Or approved equal.
 - 4. Waterstops, PVC:
 - a. Greenstreak Plastic Products, Inc.
 - b. Burke Company.
 - c. Vinylex Corporation.
 - d. Or approved equal.
 - 5. Form coating:
 - a. Richmond "Rich Cote."
 - b. Industrial Lubricants "Nox-Crete Form Coating."
 - c. Euclid Chemical "Eucoslip VOX."

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- d. Or approved equal.
- 6. Prefabricated forms:
 - a. Simplex "Industrial Steel Frame Forms."
 - b. Symons "Steel Ply."
 - c. Universal "Uniform."
 - d. Or approved equal.
- 7. Chemical sealer:
 - a. L&M Construction Chemicals, Inc.
 - b. Euclid Chemical Company.
 - c. Dayton Superior.
 - d. Or approved equal.
- 8. Bonding agent:
 - a. Euclid Chemical Co.
 - b. BASF Admixtures, Inc.
 - c. L&M Construction Chemicals Inc.
 - d. Or approved equal.
- B. Submit request for substitution in accordance with Specification Section 01 60 00 – Product Requirements.

2.02 MATERIALS

- A. Portland Cement: Conform to ASTM C150 Type II.
- B. Fly Ash:
 - 1. ASTM C618, Class F or Class C.
 - 2. Nonstaining.
 - a. Hardened concrete containing fly ash to be uniform light gray color.
 - 3. Maximum loss on ignition: 4 percent.
 - 4. Compatible with other concrete ingredients.
 - 5. Obtain proposed fly ash from a source approved by the State Highway Department in the state where the Project is located for use in concrete for bridges.

C. Admixtures:

- 1. Air entraining admixtures: ASTM C260.
- 2. Water reducing, retarding, and accelerating admixtures:
 - a. ASTM C494 Type A through E.
 - b. Conform to provisions of ACI 212.3R.

- c. Do not use retarding or accelerating admixtures unless specifically approved in writing by Project Representative and at no cost to Owner.
- d. Follow manufacturer's instructions.
- e. Use chloride free admixtures only.
- 3. Maximum total water soluble chloride ion content contributed from all ingredients of concrete including water, aggregates, cementitious materials and admixtures by weight percent of cement:
 - a. 0.10 all concrete.
- 4. Do not use calcium chloride.
- 5. Pozzolanic admixtures: ASTM C618.
- 6. Provide admixtures of same type, manufacturer and quantity as used in establishing required concrete proportions in the mix design.
- D. Water: Potable, clean, free of oils, acids and organic matter.
- E. Aggregates:
 - 1. Normal weight concrete: ASTM C33, except as modified below.
 - 2. Fine aggregate:
 - a. Clean natural sand.
 - b. No manufactured or artificial sand.
 - 3. Coarse aggregate:
 - a. Crushed rock, natural gravel, or other inert granular material.
 - b. Maximum amount of clay or shale particles: 1 percent.
 - 4. Gradation of coarse aggregate:
 - a. Lean concrete and concrete topping: Size #7.
 - b. All other concrete: Size #57 or #67.
- F. Concrete Grout:
 - 1. Nonshrink, nonmetallic grout:
 - a. Nonmetallic, noncorrosive, nonstaining, premixed with only water to be added.
 - b. Grout to produce a positive but controlled expansion.
 - c. Mass expansion not to be created by gas liberation.
 - d. Minimum compressive strength of nonshrink grout at 28 days: 6500 psi.
 - e. In accordance with COE CRD-C621.
 - 2. Epoxy grout:
 - a. 3-component epoxy resin system.
 - 1) Two liquid epoxy components.

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- 2) One inert aggregate filler component.
- b. Each component packaged separately for mixing at jobsite.
- G. Reinforcing Steel:
 - 1. Reinforcing bars: Per Section 03 21 00 Reinforcement.
 - 2. Welded wire reinforcement: Per Section 03 21 00 Reinforcement.
 - 3. Column spirals: ASTM A82 or ASTM A1064.

H. Forms:

- 1. Prefabricated or job built.
- 2. Wood forms: Per Section 03 11 13 Formwork.
- 3. Metal forms: Per Section 03 11 13 Formwork.
- 4. Chamfer strips: Clear white pine, surface against concrete planed.
- 5. Form ties:
 - a. Removable end, permanently embedded body type with cones on outer ends not requiring auxiliary spreaders.
 - b. Cone diameter: 3/4 IN minimum to 1 IN maximum.
 - c. Embedded portion 1-1/2 IN minimum back from concrete face.
 - d. If not provided with threaded ends, constructed for breaking off ends without damage to concrete.
- 6. Form release: Nonstaining and shall not prevent bonding of future finishes to concrete surface.
- I. Waterstops:
 - 1. Plastic: COE CRD-C572.
 - 2. Serrated with center bulb.
 - 3. Thickness: 3/8 IN.
 - 4. Length (general use): 6 IN unless indicated otherwise.
 - 5. Expansion joints:
 - a. Length: 9 IN.
 - b. Center bulb: 1 IN OD x 1/2 IN ID.
 - 6. Provide hog rings or grommets spaced at maximum 12 IN OC along the length of the water stop.
 - 7. Provide factory made waterstop fabrications at all changes of direction, intersections and transitions leaving only straight butt splices for the field.
 - 8. Hydrophilic Rubber waterstops as indicated
 - 9. Thickness: 0.28 IN.
 - 10. Width: 0.98 IN.

- J. Chairs, Runners, Bolsters, Spacers, and Hangers:
 - 1. Stainless steel, epoxy coated, or plastic coated metal.
 - a. Plastic coated: Rebar support tips in contact with the forms only.
- K. Vapor Retarder:
 - 1. ASTM E1745, Class A, minimum 15 mil thickness.
 - 2. Water vapor permeance: 0.03 maximum per ASTM E96.
 - 3. Puncture resistance: ASTM D1709, Method B, 2200 grams.
 - 4. Minimum tensile strength: 45 LBS/IN, ASTM D882.
 - 5. Vapor retarder tape: As recommended by vapor retarder manufacturer.
- L. Membrane Curing Compound:
 - 1. ASTM C309, Type I-D.
 - 2. Resin based, dissipates upon exposure to UV light.
 - 3. Curing compound shall not prevent bonding of any future coverings, coatings or finishes.
 - 4. Curing compounds used in water treatment plant construction to be nontoxic and taste and odor free.
- M. Bonding Agent:
 - 1. High solids acrylic latex base liquid for interior or exterior application as a bonding agent to improve adhesion and mechanical properties of concrete patching mortars.
 - a. Euclid Chemical Co. "Flex-Con."
 - b. BASF Admixtures, Inc. "Acryl-Set."
 - c. L&M Construction Chemicals "Everbond."
 - d. Thoro System Products "Acryl 60."
 - e. Or approved equal.
- N. Expansion Joint Filler:
 - 1. In contact with water or wastewater:
 - a. Closed cell neoprene.
 - b. ASTM D1056, Class SC (oil resistant and medium swell) of 2 to 5 psi compression deflection (Grade SCE41).
 - 2. Exterior driveways, curbs and sidewalks:
 - a. Asphalt expansion joint filler.
 - b. ASTM D994.
 - 3. Other use:
 - a. Fiber expansion joint filler.
 - b. ASTM D1751.

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2.03 CONCRETE MIXES

A. General:

- 1. All concrete to be ready mixed concrete conforming to ASTM C94.
- 2. Provide concrete of specified quality capable of being placed without segregation and, when cured, of developing all properties required.
- 3. All concrete to be normal weight concrete except where lightweight concrete is indicated on Drawings.

B. Strength:

1. Unless otherwise noted in the Plans, provide the specified strength and type of concrete for each use in structure(s) as follows:

		SPECIFIED
TYPE	WEIGHT	STRENGTH*
Concrete fill	Normal weight	3000 psi
Lean concrete	Normal weight	3000 psi
Concrete topping	Normal weight	4000 psi
	and lightweight	
Precast hollowcore	Normal weight	8000 psi
concrete	and lightweight	
Vault Structure Concrete	Normal weight	5000 psi
All other general use	Normal weight	4000 psi
concrete		

* Minimum 28-day compressive strength.

C. Air Entrainment:

1. Provide air entrainment in all concrete resulting in a total air content percent by volume as follows:

MAX AGGREGATE	TOTAL AIR CONTENT
SIZE	PERCENT
1 IN or 3/4 IN	5 to 7
1/2 IN	5 1/2 to 8

- 2. Air content to be measured in accordance with ASTM C231, ASTM C173, or ASTM C138.
- D. Slump 4 IN maximum, 1 IN minimum:
 - 1. Measured at point of discharge of the concrete into the concrete construction member.
 - 2. Concrete of lower than minimum slump may be used provided it can be properly placed and consolidated.
 - 3. Pumped concrete:
 - a. Provide additional water at batch plant to allow for slump loss due to pumping.

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- b. Provide only enough additional water so that slump of concrete at discharge end of pump hose does not exceed maximum slump specified above.
- 4. Determine slump per ASTM C143.
- E. Selection of Proportions:
 - 1. General:
 - a. Proportion ingredients to:
 - 1) Produce proper workability, durability, strength, and other required properties.
 - 2) Prevent segregation and collection of excessive free water on surface.
 - 2. Minimum cement contents and maximum water cement ratios for concrete to be as follows:

	MINIMU	JM CEMENT,	MAXIMUM	
	MAXIMU	M AGGREGA	WATER CEMENT	
SPECIFIED	1/2 IN	3/4 IN	1 IN	RATIO BY
STRENGTH				WEIGHT
3000		517	517	0.45
4000	611	611	611	0.45
5000		686	665	0.35

- Substitution of fly ash: Minimum fly ash content shall be 15 percent, maximum of 35 percent by weight of cement at rate of 1 LB fly ash for 1 LB of cement.
- 4. Sand cement grout:
 - a. Three parts sand.
 - b. One part Portland cement.
 - c. Entrained air: Six percent plus or minus one percent.
 - d. Sufficient water for required workability.
 - e. Minimum 28-day compressive strength: 3,000 psi.
- 5. Pan stair fill:
 - a. Coarse aggregate: 100 percent passing a 1/2 IN sieve.
 - b. Proportions:
 - 1) 1 sack cement.
 - 2) 150 LBS coarse aggregate.
 - 3) 150 LBS fine aggregate (sand).
 - c. Adjust mix to obtain satisfactory finishing.

- 6. Normal weight concrete:
 - a. Proportion mixture to provide desired characteristics using one of methods described below:
 - 1) Method 1 (Trial Mix):
 - a) Per ACI 318 and 350, Chapter 5, except as modified herein.
 - b) Air content within range specified above.
 - c) Record and report temperature of trial mixes.
 - d) Proportion trial mixes per ACI 211.1.
 - 2) Method 2 (Field Experience):
 - a) Per ACI 318 and 350, Chapter 5, except as modified herein:
 - b) Field test records must be acceptable to Project Representative to use this method.
 - c) Test records shall represent materials, proportions and conditions similar to those specified.
- 7. Required average strength to exceed the specified 28-day compressive strength by the amount determined or calculated in accordance with the requirements of Paragraph 5.3 of ACI 318 and 350 using the standard deviation of the proposed concrete production facility as described in Paragraph 5.3.1 of ACI 318 and 350.
- F. Allowable Shrinkage: 0.048 percent per ASTM C157.

PART 3 – EXECUTION

3.01 FORMING AND PLACING CONCRETE

- A. Subgrade:
 - Subgrade shall be a minimum of 6-inches of Structural Fill per Section 31 23 00 – Earthwork.
 - a. If Structural Fill is underlain by quarry spalls, separate Structural Fill with Geotextile as per Section 31 25 00 – Soil Erosion and Sediment Control.
- B. Formwork:
 - 1. Contractor is responsible for design and erection of formwork.
 - 2. Construct formwork so that concrete members and structures are of correct size, shape, alignment, elevation and position.
 - a. Allowable tolerances: As recommended in ACI 347.
 - 3. Provide slabs and beams of minimum indicated depth when sloping foundation base slabs.
 - a. For slabs on grade, slope top of subgrade to provide floor slabs of minimum uniform indicated depth.

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- 4. Openings:
 - a. Provide openings in formwork to accommodate work of other trades.
 - b. Accurately place and securely support items built into forms.
- 5. Chamfer strips: Place 3/4 IN chamfer strips in forms to produce 3/4 IN wide beveled edges on permanently exposed corners of members.
- 6. Clean and adjust forms prior to concrete placement.
- 7. Tighten forms to prevent mortar leakage.
- 8. Coat form surfaces with form release agents prior to placing reinforcing bars in forms.
- C. Reinforcement:
 - 1. Position, support and secure reinforcement against displacement.
 - 2. Locate and support with chairs, runners, bolsters, spacers and hangers, as required.
 - 3. Set wire ties so ends do not touch forms and are directed into concrete, not toward exposed concrete surfaces.
 - 4. Lap splice lengths: ACI 318 Class B top bar tension splices unless indicated otherwise on the Drawings.
 - 5. Extend reinforcement to within 2 IN of concrete perimeter edges.
 - a. If perimeter edge is earth formed, extend reinforcement to within 3 IN of the edge.
 - 6. Minimum concrete protective covering for reinforcement: As shown on Drawings.
 - 7. Do not weld reinforcing bars.
 - 8. Welded wire reinforcement:
 - a. Install welded wire reinforcement in maximum practical sizes.
 - b. Splice sides and ends with a splice lap length measured between outermost cross wires of each fabric sheet not less than:
 - 1) One spacing of cross wires plus 2 IN.
 - 2) 1.5 x development length.
 - 3) 6 IN.
 - c. Development length: ACI 318 and 350 basic development length for the specified fabric yield strength.
- D. Construction, Expansion, and Contraction Joints:
 - 1. Provide at locations indicated.
 - 2. Locate wall vertical construction joints at 30 FT maximum centers and wall horizontal construction joints at 10 FT maximum centers unless otherwise noted in the Drawings.

- Locate construction joints in floor slabs and foundation base slabs so that concrete placements are approximately square and do not exceed 2500 SF.
- 4. Locate construction joints in columns and walls:
 - a. At the underside of beams, girders, haunches, drop panels, column capitals, and at floor panels.
 - b. Haunches, drop panels, and column capitals are considered part of the supported floor or roof and shall be placed monolithically therewith.
 - c. Column base need not be placed monolithically with the floor below.
- 5. Locate construction joints in beams and girders:
 - a. At the middle of the span, unless a beam intersects a girder at that point.
 - b. If the middle of the span is at an intersection of a beam and girder, offset the joint in the girder a distance equal to twice the beam width.
 - c. Provide satisfactory means for transferring shear and other forces through the construction joint.
- 6. Locate construction joints in suspended slabs:
 - a. At or near the center of span in flat slab or T-beam construction.
 - b. Do not locate a joint between a slab and a concrete beam or girder unless so indicated on Drawings.
- 7. In pan-formed joists:
 - a. At or near span center when perpendicular to the joists.
 - b. Centered in the slab, midway between joists, when parallel to the joists.
- 8. Install construction joints perpendicular to main reinforcement with all reinforcement continued across construction joints.
- 9. At least 48 HRS shall elapse between placing of adjoining concrete construction.
- 10. Thoroughly clean and remove all laitance and loose and foreign particles from construction joints.
- 11. Before new concrete is placed, coat all construction joints with an approved bonding adhesive used and applied in accordance with manufacturer's instructions.
- E. Embedments:
 - 1. Set and build in anchorage devices and other embedded items required for other work that is attached to, or supported by concrete.
 - 2. Use setting diagrams, templates and instructions for locating and setting.

- 3. Secure waterstops in correct position using hog rings or grommets spaced along the length of the waterstop and wire tie to adjacent reinforcing steel.
- F. Placing Concrete:
 - 1. Place concrete in compliance with ACI 304R and ACI 304.2R.
 - 2. Place in a continuous operation within planned joints or sections.
 - 3. Begin placement when work of other trades affecting concrete is completed.
 - 4. Place concrete by methods which prevent aggregate segregation.
 - 5. Do not allow concrete to free fall more than 4 FT.
 - 6. Where free fall of concrete will exceed 4 FT, place concrete by means of tremie pipe or chute.
- G. Consolidation: Consolidate all concrete using mechanical vibrators supplemented with hand rodding and tamping, so that concrete is worked around reinforcement and embedded items into all parts of forms.
- H. Protection:
 - 1. Protect concrete from physical damage or reduced strength due to weather extremes.
 - 2. In cold weather comply with ACI 306R except as modified herein.
 - a. Do not place concrete on frozen ground or in contact with forms or reinforcing bars coated with frost, ice or snow.
 - b. Minimum concrete temperature at the time of mixing:

OUTDOOR	CONCRETE
TEMPERATURE AT	TEMPERATURE AT
PLACEMENT (IN SHADE)	MIXING
Below 30 DegF	70 DegF
Between 30-45 DegF	60 DegF
Above 45 DegF	50 DegF

- c. Do not place heated concrete that is warmer than 80 DegF.
- d. If freezing temperatures are expected during curing, maintain the concrete temperature at or above 50 DegF for 7 days or 70 DegF for 3 days.
- e. Do not allow concrete to cool suddenly.
- 3. In hot weather comply with ACI 305R except as modified herein.
 - a. At air temperature of 90 DegF and above, keep concrete as cool as possible during placement and curing.
 - b. Do not allow concrete temperature to exceed 90 DegF at placement.
 - c. Prevent plastic shrinkage cracking due to rapid evaporation of moisture.

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- d. Do not place concrete when the actual or anticipated evaporation rate equals or exceeds 0.2 LBS/SF/HR as determined from ACI 305R, Figure 2.1.5.
- I. Curing:
 - 1. Begin curing concrete as soon as free water has disappeared from exposed surfaces.
 - 2. Cure concrete by use of moisture retaining cover, burlap kept continuously wet or by membrane curing compound.
 - 3. Provide protection as required to prevent damage to concrete and to prevent moisture loss from concrete during curing period.
 - 4. Provide curing for minimum of 7 days.
 - 5. Form materials left in place may be considered as curing materials for surfaces in contact with the form materials except in periods of hot weather.
 - 6. In hot weather follow curing procedures outlined in ACI 305R.
 - 7. In cold weather follow curing procedures outlined in ACI 306R.
 - 8. If forms are removed before 7 days have elapsed, finish curing of formed surfaces by one of above methods for the remainder of the curing period.
 - 9. Curing vertical surfaces with a curing compound:
 - a. Cover vertical surfaces with a minimum of two coats of the curing compound.
 - b. Allow the preceding coat to completely dry prior to applying the next coat.
 - c. Apply the first coat of curing compound immediately after form removal.
 - d. Vertical surface at the time of receiving the first coat shall be damp with no free water on the surface.
 - e. A vertical surface is defined as any surface steeper than 1 vertical to 4 horizontal.
- J. Form Removal: Per Section 03 11 13 Formwork.

3.02 CONCRETE FINISHES

- A. Tolerances:
 - 1. Class A: 1/8 IN in 10 FT.
 - 2. Class B: 1/4 IN in 10 FT.
- B. Surfaces Exposed to View:
 - 1. Provide a smooth finish for exposed concrete surfaces and surfaces that are:
 - a. To be covered with a coating or covering material applied directly to concrete.

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- b. Scheduled for grout cleaned finish.
- 2. Remove fins and projections, and patch voids, air pockets, and honeycomb areas with cement grout.
- 3. Fill tie holes with nonshrink, nonmetallic grout.
- C. Surfaces Not Exposed to View:
 - 1. Patch voids, air pockets and honeycomb areas with cement grout.
 - 2. Fill tie holes with nonshrink, nonmetallic grout.
- D. Grout Cleaned Finish:
 - 1. Mix one part Portland cement and 1-1/2 parts fine sand with sufficient bonding agent/water mixture to produce a grout with the consistency of thick paint.
 - a. White Portland cement shall be substituted for gray Portland cement to produce a color that matches color of surrounding concrete as determined by trial patch for areas not to be painted.
 - 2. Wet surface of concrete to prevent absorption of water by grout and uniformly apply grout with brushes or spray gun.
 - 3. Immediately scrub the surface with a cork float or stone to coat and fill air bubbles and holes.
 - 4. While grout is still plastic, remove all excess grout by working surface with rubber float, sack or other approved means.
 - 5. After the surface whitens from drying, rub vigorously with clean burlap.
 - 6. Keep final finish damp for a minimum of 36 HRS after final rubbing.
- E. Slab Float Finish:
 - 1. After concrete has been placed, consolidated, struck off, and leveled, do no further work until ready for floating.
 - 2. Begin floating when water sheen has disappeared and surface has stiffened sufficiently to permit operation.
 - 3. During or after first floating, check planeness of entire surface with a 10 FT straightedge applied at not less than two different angles.
 - 4. Cut down all high spots and fill all low spots during this procedure to produce a surface within Class B tolerance throughout.
 - 5. Refloat slab immediately to a uniform sandy texture.
- F. Troweled Finish:
 - 1. Float finish surface.
 - 2. Next power trowel, and finally hand trowel.
 - 3. Produce a smooth surface which is relatively free of defects with first hand troweling.
 - 4. Perform additional trowelings by hand after surface has hardened sufficiently.

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- 5. Final trowel when a ringing sound is produced as trowel is moved over surface.
- 6. Thoroughly consolidate surface by hand troweling.
- 7. Leave finished surface essentially free of trowel marks, uniform in texture and appearance and plane to a Class A tolerance.
- 8. On surfaces intended to support floor coverings remove any defects of sufficient magnitude that would show through floor covering by grinding.
- G. Broom Finish: Immediately after concrete has received a float finish as specified, give it a transverse scored texture by drawing a broom across surface.
- H. Apply chemical floor hardener to permanently exposed interior concrete floor slab surfaces where indicated.
 - 1. Apply in accordance with manufacturer's instructions.

3.03 GROUT

- A. Preparation:
 - 1. Nonshrinking, nonmetallic grout:
 - a. Clean concrete surface to receive grout.
 - b. Saturate concrete with water for 24 HRS prior to grouting.
 - 2. Rock anchors:
 - a. Clean rock anchors of all loose material.
 - b. Orient hook or bends in anchor bars to clear anchor bolts, reinforcements, and other embedments to be installed later.
 - 3. Epoxy grout: Apply only to clean, dry, roughened, sound surface, use only oil-free air compressors when cleaning with air compressor.
- B. Application:
 - 1. Nonshrinking, nonmetallic grout:
 - a. Mix in a mechanical mixer.
 - b. Use no more water than necessary to produce flowable grout.
 - c. Place in accordance with manufacturer's instructions.
 - d. Completely fill all spaces and cavities below the bottom of baseplates.
 - e. Provide forms where baseplates and bedplates do not confine grout.
 - f. Where exposed to view, finish grout edges smooth.
 - g. Except where a slope is indicated on Drawings, finish edges flush at the baseplate, bedplate, member, or piece of equipment.
 - h. Protect against rapid moisture loss by covering with wet rags or polyethylene sheets.
 - i. Wet cure grout for seven (7) days, minimum.

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- 2. Rock anchors:
 - a. See Item 1 above.
 - b. If rodded:
 - 1) Fill each hole so that it overflows when anchor bar is inserted.
 - 2) Force anchor bars into place.
 - c. If pressure placed, set anchor bar before grouting.
 - d. Take special care to avoid any movement of anchors that have been placed.
- 3. Epoxy grout:
 - a. Mix and place in accordance with manufacturer's instructions.
 - b. Completely fill all cavities and spaces around dowels and anchors without voids.
 - c. Obtain manufacturer's field technical assistance as required to ensure proper placement.

3.04 FIELD QUALITY CONTROL

- A. To perform testing of concrete placed during construction.
 - 1. Contractor to cooperate with Project Representative in obtaining and testing samples.
- B. Tests During Construction:
 - 1. Strength test procedure:
 - a. Three cylinders, 6 IN DIA x 12 IN high, will be taken from each sample per ASTM C172 and ASTM C31.
 - b. Cylinders will be tested per ASTM C39:
 - 1) One (1) at seven (7) days.
 - 2) Two (2) at 28 days.
 - 2. Strength test frequency:
 - a. Not less than one test each day concrete placed.
 - b. Not less than one test for each 50 CY or major fraction thereof placed in one day.
 - c. Not less than one test for each type of concrete poured.
 - d. Not less than one test for each concrete structure exceeding 2 CY volume.
 - 3. Slump test:
 - a. Per ASTM C143.
 - b. Determined for each strength test sample.
 - c. Additional slump tests may be taken.

- 4. Air content:
 - a. Per ASTM C231, ASTM C173, and ASTM C138.
 - b. Determined for each strength test sample.
- 5. Temperature: Determined for each strength test sample.
- C. Evaluation of Tests:
 - 1. Strength test results:
 - a. Average of 28-day strength of two cylinders from each sample.
 - 1) If one cylinder manifests evidence of improper sampling, molding, handling, curing or testing, strength of remaining cylinder will be test result.
 - 2) If both cylinders show any of above defects, test will be discarded.
- D. Acceptance of Concrete:
 - 1. Strength level of each type of concrete shall be considered satisfactory if both of the following requirements are met:
 - a. Average of all sets of three consecutive strength tests equals or exceeds the required specified 28-day compressive strength.
 - b. No individual strength test falls below the required specified 28-day compressive strength by more than 500 psi.
 - 2. If tests fail to indicate satisfactory strength level, perform additional tests and/or corrective measures as directed by Project Representative.
 - a. Perform additional tests and/or corrective measures at no additional cost to Owner.

3.05 SCHEDULES

- A. Form Types:
 - 1. Surfaces exposed to view:
 - a. Prefabricated or job-built wood forms.
 - b. Laid out in a regular and uniform pattern with long dimensions vertical and joints aligned.
 - c. Produce finished surfaces free from offsets, ridges, waves, and concave or convex areas.
 - d. Construct forms sufficiently tight to prevent leakage of mortar.
 - 2. Surfaces normally submerged or not normally exposed to view: Wood or steel forms sufficiently tight to prevent leakage of mortar.
 - 3. Other types of forms may be used:
 - a. For surfaces not restricted to plywood or lined forms.
 - b. As backing for form lining.

- B. Grout:
 - 1. Nonshrinking, nonmetallic grout: General use.
 - 2. Epoxy grout:
 - a. Grouting of dowels and anchor bolts into existing concrete.
 - b. Other uses indicated on Drawings.
 - 3. Sand cement grout: Keyways of precast members.
- C. Concrete:
 - 1. Precast concrete: Where indicated on Drawings.
 - 2. Lean concrete: Where indicated on Drawings.
 - 3. Concrete fill: Where indicated on Drawings.
 - 4. Lightweight concrete: Where indicated on Drawings.
 - 5. Normal weight concrete: All other locations.
 - 6. Concrete pan fill: Stair and landings where indicated on Drawings.
 - 7. General use concrete: All other locations.
- D. Concrete Finishes:
 - 1. Grout cleaned finish: Where indicated on Drawings.
 - 2. Slab finishes:
 - a. Use following finishes as applicable, unless otherwise indicated:
 - 1) Floated finish: Surfaces intended to receive roofing, concrete topping, lean concrete, concrete fill and waterproofing.
 - 2) Troweled finish: Interior floor slabs, exposed roof slabs and base slabs of structures, equipment bases, and column bases.
 - 3) Broom finish: Sidewalks, docks, concrete stairs, and ramps.

END OF SECTION

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SECTION 03 11 13 FORMWORK

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes: Formwork requirements for concrete construction.1. This work includes but is not limited to:
 - a. Structural Foundations/Footings.
 - b. Structural Slabs, girders, beams, and columns.
 - c. Structural walls, stem walls, and curbs.
- B. Related Sections include but are not necessarily limited to:
 - 1. Division 00 Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 01 General Requirements.
 - 3. Section 03 31 31 Concrete Mixing, Placing, Jointing, and Curing.

1.02 QUALITY ASSURANCE

- A. Referenced Standards
 - 1. City of Bellevue (COB):
 - a. Transportation Department Design Manual, September 2011.
 - b. Storm and Surface Water Engineering Standards, January 2012.
 - c. Sanitary Sewer Engineering Standards, January 2012.
 - d. Water Engineering Standards, January 2011.
 - 2. American Concrete Institute (ACI):
 - a. 116R, Cement and Concrete Terminology.
 - b. 301, Specifications for Structural Concrete
 - c. 347, Guide to Formwork for Concrete.
 - 3. Building Code:
 - a. International Code Council (ICC):
 - International Building Code and associated standards, 2009 Edition as amended by the State of Washington, and the City of Bellevue Amendments, referred to herein as Building Code.

- B. Qualifications:
 - 1. Formwork, shoring and reshoring to be designed by a Professional Structural Engineer currently registered in Washington State and having a minimum of three (3) years experience in this type of design work.
 - a. Above qualifications apply to slabs and beams not cast on the ground, wall and column pours over 15 FT high.
- C. Miscellaneous:
 - 1. Design and engineering of formwork, shoring and reshoring as well as its construction is the responsibility of the Contractor.
 - 2. Design requirements:
 - a. Design formwork for loads, lateral pressures and allowable stresses outlined in ACI 347 and for design considerations, wind loads, allowable stresses and other applicable requirements of the controlling local Building Code.
 - 1) Where conflicts occur between the above two (2) standards, the more stringent requirements shall govern.
 - b. Design formwork to limit maximum deflection of form facing materials reflected in concrete surfaces exposed to view to 1/240 of span between structural members.
 - 3. For slabs and beams not cast on the ground, develop a procedure and schedule for removal of shores and for calculating the loads transferred to the structure during this process.
 - a. Perform structural calculations as required to prove that all portions of the structure in combination with remaining forming and shoring system has sufficient strength to safely support its own weight plus the loads placed thereon.
 - b. When developing procedure, schedule and structural calculations, consider the following at each stage of construction:
 - 1) The structural system that exists.
 - 2) Effects of all loads during construction.
 - 3) Strength of concrete.
 - 4) The influence of deformations of the structure and shoring system on the distribution of dead loads and construction loads.
 - 5) The strength and spacing of shores or shoring systems used, as well as the method of shoring, bracing, shore removal, and reshoring including the minimum time intervals between the various operations.
 - 6) Any other loading or condition that affects the safety or serviceability of the structure during construction.

1.03 DEFINITIONS

A. Words and terms used in these Specifications are defined in ACI 116R.

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1.04 SUBMITTALS

- A. Submittal Procedures: See Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
- B. Approval Submittals:
 - 1. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 - c. Manufacturer and type of proposed form materials.
 - d. Manufacturer and type of proposed form ties.
 - e. Manufacturer and type of proposed form coating material.
 - f. Manufacturer and type of void forms including compressive strength.
 - 2. Samples:
 - a. A 12 IN SQ sample of each form finishes.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- 1. Void forms:
 - a. SureVoid Products, Inc. (www.surevoid.com).
 - b. Deslauriers, Inc. (<u>www.deslinc.com</u>).
 - c. Or approved equal.
- 2. Stay-in-place forms:
 - a. Alabama Metal Industries Corporation. (www.amico-online.com).
 - b. Nuform Building Technologies Inc. (www.nuformdirect.com)
 - c. Or approved equal.
- B. Submit request for substitution in accordance with Specification Section 01 60 00 Product Requirements.

2.02 MATERIALS

- A. Forms for Surfaces Exposed to View:
 - 1. Wood forms:
 - a. New 5/8 or 3/4 IN 5-ply structural plywood of concrete form grade.
 - b. Built-in-place or prefabricated type panel.
 - c. 4 x 8 FT sheets for built-in-place type except where smaller pieces will cover entire area.
 - d. When approved, plywood may be reused.

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- 2. Metal forms:
 - a. Metal forms excluding aluminum may be used.
 - b. Forms to be tight to prevent leakage, free of rust and straight without dents to provide members of uniform thickness.
- B. Forms for Surfaces Not Exposed to View:
 - 1. Wood or metal sufficiently tight to prevent leakage.
 - 2. Do not use aluminum forms.

2.03 ACCESSORIES

- A. Form Ties:
 - 1. Commercially fabricated for use in form construction.
 - a. Do not use wire ties.
 - 2. Constructed so that ends or end fasteners can be removed without causing spalling at surfaces of the concrete.
 - 3. 3/4 IN minimum to 1 IN maximum diameter cones on both ends.
 - 4. Embedded portion of ties to be not less than 1-1/2 IN from face of concrete after ends have been removed.
 - 5. Provide ties with built-in waterstops in all walls that will be in contact with process liquid during plant operation.
 - 6. Through-wall ties that are designed to be entirely removed are not allowed in all walls that will be in contact with process liquid during plant operation.
- B. Void Forms:
 - 1. Continuous void forms.
 - 2. Specially designed and manufactured for the purpose of creating a void area directly under concrete members which will allow a space for soil vertical upward movement.
 - 3. Able to support the weight of concrete and construction loads to be placed thereon with no decrease in required void form depth.
 - 4. Constructed from double faced corrugated cardboard or fiberboard which is wax impregnated and laminated with moisture-resistant adhesive.
 - 5. Capable of resisting moisture with no loss of load carrying strength or change in depth or configuration.
- C. Stay-In-Place Forms:
 - 1. Ribbed expanded metal leave-in-place concrete forms commercially fabricated to provide an intentionally rougher surface.
 - 2. Hot-dipped galvanized.

PART 3 – EXECUTION

3.01 PREPARATION

- A. Form Surface Treatment:
 - 1. Before placing of either reinforcing steel or concrete, cover surfaces of forms with an approved coating material that will effectively prevent absorption of moisture and prevent bond with concrete, will not stain concrete or prevent bonding of future finishes.
 - a. A field applied form release agent or sealer of approved type or a factory applied nonabsorptive liner may be used.
 - 2. Do not allow excess form coating material to stand in puddles in forms nor in contact with hardened concrete against which fresh concrete is to be placed.
- B. Provide temporary openings at base of column and wall forms and at other points where necessary to facilitate cleaning and observation immediately before concrete is placed, and to limit height of free fall of concrete to prevent aggregate segregation.
 - 1. Temporary openings to limit height of free fall of concrete shall be spaced no more than 8 FT apart.
- C. Clean surfaces of forms, reinforcing steel and other embedded materials of any accumulated mortar or grout from previous concreting and of all other foreign material before concrete is placed.

3.02 ERECTION

- A. Install products in accordance with manufacturer's instructions.
- B. Tolerances:
 - 1. Variation from plumb:
 - a. In lines and surfaces of columns, piers, walls, and in risers.
 - 1) Maximum in any 10 FT of height: 1/4 IN.
 - 2) Maximum for entire height: 1/2 IN.
 - b. For exposed corner columns, control-joint grooves, and other exposed to view lines:
 - 1) Maximum in any 20 FT length: 1/4 IN.
 - 2) Maximum for entire length: 1/2 IN.
 - 2. Variation from level or from grades specified:
 - a. In slab soffits, ceilings, beam soffits and in arises, measured before removal of supporting shores.
 - 1) Maximum in any 10 FT of length: 1/4 IN.
 - 2) Maximum in any bay or in any 20 FT length: 3/8 IN.
 - 3) Maximum for entire length: 3/4 IN.

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- b. In exposed lintels, sills, parapets, horizontal grooves, and other exposed to view lines:
 - 1) Maximum in any bay or in 20 FT length: 1/4 IN.
 - 2) Maximum for entire length: 1/2 IN.
- 3. Variation of linear structure lines from established position in plan and related position of columns, walls, and partitions:
 - a. Maximum in any bay: 1/2 IN.
 - b. Maximum in any 20 FT of length: 1/2 IN.
 - c. Maximum for entire length: 1 IN.
- 4. Variation in sizes and location of sleeves, floor openings, and wall openings: Maximum of +1/2 IN.
- 5. Variation in horizontal plan location of beam, column and wall centerlines from required location: Maximum of +1/2 IN.
- 6. Variation in cross sectional dimensions of columns and beams and in thickness of slabs and walls: Maximum of -1/4 IN, +1/2 IN.
- 7. Footings and foundations:
 - a. Variations in concrete dimensions in plan: -1/2 IN, +2 IN.
 - b. Misplacement or eccentricity:
 - 1) 2 percent of footing width in direction of misplacement but not more than 2 IN.
 - c. Thickness:
 - 1) Decrease in specified thickness: 5 percent.
 - 2) Increase in specified thickness: No limit except that which may interfere with other construction.
- 8. Variation in steps:
 - a. In a flight of stairs:
 - 1) Rise: +1/8 IN.
 - 2) Tread: +1/4 IN.
 - b. In consecutive steps:
 - 1) Rise: +1/16 IN.
 - 2) Tread: +1/8 IN.
- 9. Establish and maintain in an undisturbed condition and until final completion and acceptance of Project, sufficient control points and bench marks to be used for reference purposes to check tolerances.
- 10. Regardless of tolerances listed allow no portion of structure to extend beyond legal boundary of Project.
- 11. To maintain specified tolerances, camber formwork to compensate for anticipated deflections in formwork prior to hardening of concrete.

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- C. Make forms sufficiently tight to prevent loss of mortar from concrete.
- D. Place 3/4 IN chamfer strips in exposed to view corners of forms to produce 3/4 IN wide beveled edges.
- E. At construction joints, overlap contact surface of form sheathing for flush surfaces exposed to view over hardened concrete in previous placement by at least 1 IN.
 - 1. Hold forms against hardened concrete to prevent offsets or loss of mortar at construction joint and to maintain a true surface.
 - 2. Where possible, locate juncture of built-in-place wood or metal forms at architectural lines, control joints or at construction joints.
- F. Where circular walls are to be formed and forms made up of straight sections are proposed for use, provide straight lengths not exceeding 2 FT wide.
 - 1. Brace and tie formwork to maintain correct position and shape of members.
- G. Construct wood forms for wall openings to facilitate loosening, if necessary, to counteract swelling.
- H. Anchor formwork to shores or other supporting surfaces or members so that movement of any part of formwork system is prevented during concrete placement.
- I. Provide runways for moving equipment with struts or legs, supported directly on formwork or structural member without resting on reinforcing steel.
- J. Provide positive means of adjustment (wedges or jacks) of shores and struts and take up all settlement during concrete placing operation.
 - 1. Securely brace forms against lateral deflection.
 - 2. Fasten wedges used for final adjustment of forms prior to concrete placement in position after final check.
- K. After void forms are in place and before concrete is placed thereon, cover joints between abutting form sections and cover ends of forms to prevent intrusion of soil, concrete or any other materials.
 - 1. Install void forms in accordance with manufacturer's instructions.
- L. Stay-In-Place Forms:
 - 1. Support stay-in-place forms as required to maintain the formwork in proper position.
 - 2. Hold the edge of stay-in-place forms back a minimum of 2 IN from all smooth formed concrete surfaces.
 - 3. Stay-in-place forms may be used at the Contractor's option at:
 - a. Surfaces that will be backfilled with soil.
 - 1) Maintain a minimum of 3 IN of concrete cover over all reinforcing.
 - b. Roughened construction joints.
 - c. Other locations approved by Project Representative.

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3.03 REMOVAL OF FORMS

- A. No construction loads shall be supported on, nor any shoring removed from, any part of the structure under construction except when that portion of the structure in combination with remaining forming and shoring system has sufficient strength to safely support its weight and loads places thereon.
- B. When required for concrete curing in hot weather, required for repair of surface defects or when finishing is required at an early age, remove forms as soon as concrete has hardened sufficiently to resist damage from removal operations or lack of support.
- C. Remove top forms on sloping surfaces of concrete as soon as concrete has attained sufficient stiffness to prevent sagging.
 - Perform any needed repairs or treatment required on such sloping surfaces at once, followed by curing specified in Section 03 31 31 Concrete Mixing, Placing, Jointing and Curing.
- D. Loosen wood forms for wall openings as soon as this can be accomplished without damage to concrete.
- E. Formwork for columns, walls, sides of beams, and other parts not supporting weight of concrete may be removed as soon as concrete has hardened sufficiently to resist damage from removal.
- F. Where no reshoring is planned, leave forms and shoring used to support weight of concrete in place until concrete has attained its specified 28 day compressive strength.
 - 1. Where a reshoring procedure is planned, supporting formwork may be removed when concrete has reached the concrete strength required by the formwork designer's structural calculations.
- G. When shores and other vertical supports are so arranged that non-loadcarrying form facing material may be removed without loosening or disturbing shores and supports, facing material may be removed when concrete has sufficiently hardened to resist damage from removal.

3.04 RESHORING

- A. No construction loads shall be supported on, nor any shoring removed from, any part of the structure under construction except when that portion of the structure in combination with remaining forming and shoring system has sufficient strength to safely support its weight and loads placed thereon.
- B. While reshoring is underway, no superimposed dead or live loads shall be permitted on the new construction.
- C. During reshoring do not subject concrete in structural members to combined dead and construction loads in excess of loads that structural members can adequately support.
- D. Place reshores as soon as practicable after stripping operations are complete but in no case later than end of working day on which stripping occurs.
- E. Tighten reshores to carry their required loads without overstressing.

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- F. Shoring, reshoring and supporting formwork may be removed when concrete has reached the concrete strength required by the formwork designer's structural calculations.
- G. For floors supporting shores under newly placed concrete leave original supporting shores in place or reshore.
 - 1. Reshoring system shall have a capacity sufficient to resist anticipated loads.
 - 2. Locate reshores directly under a shore position above.
- H. In multi-story buildings, extend reshoring over a sufficient number of stories to distribute weight of newly placed concrete, forms, and construction live loads in such a manner that design superimposed loads of floors supporting shores are not exceeded.

END OF SECTION

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SECTION 03 21 00 REINFORCEMENT

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes: Reinforcing bar requirements for concrete construction.1. This work includes but is not limited to:
 - a. Structural Foundations/Footings.
 - b. Structural Slabs, girders, beams, and columns.
 - c. Structural walls, stem walls, and curbs.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Division 00 Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 01 General Requirements.

1.02 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. American Concrete Institute (ACI):
 - a. SP 66, ACI Detailing Manual.
 - b. 318, Building Code Requirements for Structural Concrete.
 - 2. ASTM International (ASTM):
 - a. A185, Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
 - b. A497, Standard Specification for Steel Welded Wire Reinforcement, Deformed, for Concrete.
 - c. A615, Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
 - d. A706, Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.
 - e. A775, Standard Specification for Epoxy-Coated Steel Reinforcing Bars.
 - 3. American Welding Society (AWS):
 - a. D1.4, Structural Welding Code Reinforcing Steel.
 - 4. Concrete Reinforcing Steel Institute (CRSI):
 - a. Manual of Standard Practice.
 - 5. City of Bellevue (COB):
 - a. Transportation Department Design Manual, January 9, 2013.

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- b. Storm and Surface Water Engineering Standards, January 2012.
- c. Sanitary Sewer Engineering Standards, January 2012.
- d. Water Engineering Standards, January 2011.
- B. Qualifications:
 - 1. Welding operators, processes and procedures to be qualified in accordance with AWS D1.4.
 - 2. Welding operators to have been qualified during the previous 12 months prior to commencement of welding.

1.03 SUBMITTALS

- A. Submittal Procedures: See Section 01 33 00 Submittal Procedures for requirements for the mechanics and administration of the submittal process.
- B. Leadership in Energy and Environmental Design (LEED) Documentation: Submit the following in accordance with Section 01 81 30 – Sustainability Requirements:
 - Product Data for MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content; include statement indicating costs for each product having recycled content.
 - 2. Product Data for MR 5: For products and materials required to comply with requirements for regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.
- C. Approval Submittals:
 - 1. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 - c. Mill certificates for all reinforcing.
 - d. Manufacturer and type of proprietary rebar mechanical splices.
 - e. Manufacturer and type of rebar adhesive anchor including installation instructions.
 - 2. Qualifications of welding operators, welding processes and procedures.

- 3. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.
 - a. Shop Drawings shall not be prepared by reproducing the plans and details indicated on the Contract Drawings but shall consist of completely redrawn plans and details as necessary to indicate complete fabrication and installation of all reinforcing steel.
- 4. Sufficient rebar details to permit installation of reinforcing.
- 5. Rebar details in accordance with ACI SP 66.
- 6. Locations where proprietary rebar mechanical splices are required or proposed for use.
- 7. Shop Drawings shall be in sufficient detail to permit installation of reinforcing without reference to Contract Drawings.
 - a. Shop Drawings shall not be prepared by reproducing the plans and details indicated on the Contract Drawings but shall consist of completely redrawn plans and details as necessary to indicate complete fabrication and installation of all reinforcing steel.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Support and store all reinforcing above ground.
- B. Ship to jobsite with attached plastic or metal tags with permanent mark numbers which match the Shop Drawing mark numbers.
- C. Handling of Epoxy-Coated Rebar:
 - 1. Use padded or nonmetallic slings and padded straps to protect coated reinforcement from damage.
 - 2. Handle bundled bars to prevent sagging that could damage the coating.
 - 3. Do not drop or drag rebars.
 - 4. Store on wooden cribbing.
 - 5. Coated rebars subject to rejection by Project Representative if rebar coating has been damaged.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURES

- 1. Rebar adhesive anchors:
 - a. HIT-HY150 MAX-SD System by Hilti Fastening Systems, Inc.
 - b. HIT-RE 500-SD System by Hilti Fastening Systems, Inc.
 - c. SET Adhesive Anchor System by Simpson Strong-Tie Company, Inc.
 - d. Or approved equal.

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- 2. Rebar mechanical splices:
 - a. Lenton Rebar Splicing by Erico, Inc.
 - b. Richmond dowel bar splicer system by Richmond Screw and Anchor Co., Inc.
 - c. Bar-Grip Systems by Barsplice Products, Inc.
 - d. Or approved equal.
- B. Submit request for substitution in accordance with Specification Section 01 60 00 Product Requirements.

2.02 MATERIALS

- A. Reinforcing Steel.
- B. Reinforcing Bars: ASTM A615, grade 60, deformed.
- C. Reinforcing Bars to be Welded:
 - 1. ASTM A706.
 - 2. ASTM A615, with supplemental reports as required on Drawings.
- D. Welded Wire Reinforcement: ASTM A185 or ASTM A497.
- E. Smooth Dowel Bars: ASTM A615, grade 60 with metal end cap to allow longitudinal movement equal to joint width plus 1 IN.
- F. Epoxy-Coated Rebars: ASTM A775 and ASTM A615, Grade 60, meeting Annex A1 for epoxy coating.
- G. Epoxy-Coated Rebar Patching Material:
 - 1. Compatible with the coating material.
 - 2. Inert in concrete.
 - 3. Meet requirements of Annex A1 of ASTM A775.
 - 4. Obtained from the manufacturer of the epoxy resin that was used to originally coat the rebars.
- H. Proprietary Rebar Mechanical Splices: To develop in tension and compression a minimum of 125 percent of the yield strength of the rebars being spliced.
- I. Welding Electrodes: E90 meeting requirements of AWS D1.4.
- J. Rebar Adhesive Anchors:
 - 1. Manufactured for the specific purpose of embedding and developing the yield strength of rebars in hardened concrete.

2.03 ACCESSORIES

- A. Metal Chairs, Runners, Bolsters, Spacers, Hangers, and Other Rebar Supports:
 - 1. Plastic-coated tips in contact with forms.

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- 2. Plastic coating meeting requirements of CRSI Manual of Standard Practice.
- B. Protective plastic caps at mechanical splices.

2.04 FABRICATION

- A. Tolerances:
 - 1. Sheared lengths: +1 IN.
 - 2. Overall dimensions of stirrups, ties and spirals: +1/2 IN.
 - 3. All other bends: +0 IN, -1/2 IN.
- B. Minimum diameter of bends measured on the inside of the rebar to be as indicated in ACI 318 Paragraph 7.2.
- C. Ship rebars to jobsite with attached plastic or metal tags.
 - 1. Place on each tag the mark number of the rebar corresponding to the mark number indicated on the Shop Drawing.
 - 2. Mark numbers on tags to be so placed that the numbers cannot be removed.
 - 3. For epoxy-coated rebars, use only plastic tags secured to rebars by nylon or plastic ties.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Tolerances:
 - 1. Rebar placement:
 - a. Clear distance to formed surfaces: +1/4 IN.
 - b. Minimum spacing between bars: -1/4 IN.
 - c. Top bars in slabs and beams:
 - 1) Members 8 IN deep or less: +1/4 IN.
 - 2) Members between 8 IN and 2 FT deep: -1/4 IN, +1/2 IN.
 - 3) Members more than 2 FT deep: -1/4 IN, +1 IN.
 - d. Crosswise of members: Spaced evenly within +1 IN.
 - e. Lengthwise of members: +2 IN.
 - 2. Minimum clear distances between rebars:
 - a. Beams, walls and slabs: Distance equal to rebar diameter or 1 IN, whichever is greater.
 - b. Columns: Distance equal to 1-1/2 times the rebar diameter or 1-1/2 IN, whichever is greater.

- c. Beam and slab rebars shall be threaded through the column vertical rebars without displacing the column vertical rebars and still maintaining the clear distances required for the beam and slab rebars.
- B. Minimum concrete protective covering for reinforcement: As shown on Drawings.
- C. Unless indicated otherwise on Drawings, provide splice lengths for reinforcing as follows:
 - 1. For rebars: Class B splice meeting the requirements of Paragraph 12.15 of ACI 318.
 - 2. For welded wire reinforcement:
 - a. Splice lap length measured between outermost cross wires of each fabric sheet shall not be less than one (1) spacing of cross wires plus 2 IN, nor less than 1.5 x development length nor less than 6 IN.
 - Development length shall be as required for the yield strength of the welded wire reinforcement in accordance with Paragraph 12.8 of ACI 318.
 - 3. Provide splices of reinforcing not specifically indicated or specified subject to approval of Project Representative.
 - a. Mechanical proprietary splice connectors may only be used when approved or indicated on the Contract Drawings.
- D. Welding:
 - 1. Obtain approval by the Project Representative prior to welding reinforcing.
 - 2. Perform welding of rebars in accordance with requirements of AWS D1.4.
 - 3. Have each welder place an approved identifying mark near each completed weld.
- E. Placing Rebars:
 - 1. Assure that reinforcement at time concrete is placed is free of mud, oil or other materials that may affect or reduce bond.
 - 2. Reinforcement with rust, mill scale or a combination of both will be accepted as being satisfactory without cleaning or brushing provided dimensions and weights including heights of deformations on a cleaned sample is not less than required by applicable ASTM Specification that governs for the rebar supplied.
 - 3. Rebar support:
 - a. Uncoated rebar:
 - 1) Support rebars and fasten together to prevent displacement by construction loads or placing of concrete.
 - a) Locate and support reinforcement with bar supports to maintain minimum concrete cover.

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- b) Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- 2) On ground, provide supporting concrete blocks or metal bar supports with bottom plate.
 - a) Do not use concrete blocks to support slab-on-grade reinforcing.
- 3) Over formwork, provide plastic-coated metal chairs, runners, bolsters, spacers, hangers and other rebar support.
 - a) Only tips in contact with the forms need to be plastic coated.
- b. Coated rebar:
 - 1) Support coated rebars and fasten together to prevent displacement.
 - 2) Use plastic or nylon ties to hold rebars rigidly in place.
 - 3) Support rebars by use of plastic or plastic-coated chairs, runners, bolsters, spacers, hangers and rebar supports as required.
- 4. Support rebars over cardboard void forms by means of concrete supports which will not puncture or damage the void forms during construction nor impair the strength of the concrete members in any way.
- 5. Where parallel horizontal reinforcement in beams is indicated to be placed in two or more layers, rebars in the upper layers shall be placed directly above rebars in the bottom layer with clear distance between layers to be 1 IN.
 - a. Place spacer rebars at 3 FT maximum centers to maintain the required 1 IN clear distance between layers.
- 6. Extend reinforcement to within 2 IN of concrete perimeter edges.
 - a. If perimeter edge is formed by earth or stay-in-place forms, extend reinforcement to within 3 IN of the edge.
- 7. To assure proper placement, furnish templates for all column vertical bars and dowels.
- 8. Do not bend reinforcement after embedding in hardened concrete unless approved by Project Representative.
 - a. Do not bend reinforcing by means of heat.
- 9. Do not tack weld reinforcing.
- 10. Embed rebars into hardened concrete utilizing adhesive anchor system specifically manufactured for such installation:
 - a. Drill hole in concrete with diameter and depth as indicated on Drawings.
 - b. Clean holes per manufacturer's recommendations.
 - c. Place adhesive in drilled hole.

d. Insert rebar into hole and adhesive in accordance with manufacturer's instructions.

3.02 FIELD QUALITY CONTROL

- A. Reinforcement Congestion and Interferences:
 - 1. Notify Project Representative whenever the specified clearances between rebars cannot be met.
 - 2. Do not place any concrete until the Project Representative submits a solution to rebar congestion problem.
 - 3. Rebars may be moved as necessary to avoid interference with other reinforcing steel, conduits, or embedded items.
 - 4. If rebars are moved more than one bar diameter, obtain Project Representative's approval of resulting arrangement of rebars.
 - 5. No cutting of rebars shall be done without written approval of Project Representative.
- B. Inspection of Epoxy-Coated Rebars:
 - 1. Coated rebars will be inspected on the jobsite for handling defects, coating abrasion, coating thickness and continuity of coating.
 - 2. Project Representative may defer final inspection of rebar coating integrity and repairs until the rebars have been erected and all handling is completed.
 - 3. Repair coated areas as directed by Project Representative.
 - a. Do not place concrete until all repairs to coatings have been completed.
- C. Patching of Epoxy-Coated Rebar:
 - 1. Patching and repair to be performed in accordance with the instructions of patching material manufacturer.
 - 2. Patching material to provide a minimum film thickness of 5 mils over the bare area.
 - a. Thickness of area adjacent to patched area not to exceed 15 mils.
 - 3. Areas to be patched to be clean and free of surface contaminants.
 - a. Treat areas in accordance with patching material manufacturer's instructions before oxidation occurs.
 - 4. Total surface area covered by patching material not to exceed 2 percent of total surface area of the rebar.
 - 5. Rebar welds and adjacent bare rebar areas to also be patched after welding is completed.
- D. Employ a testing laboratory to perform and report following:
 - 1. Review and approve Contractor proposed welding procedures and processes for conformance with AWS D1.4.

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- 2. Qualify welders in accord with AWS D1.4.
- 3. Test three (3) samples of each bar size and each type of weld in accord with AWS D1.4.
 - a. The tensile strength of each test shall be not less than 125 percent of the required yield strength of the rebar tested.
- 4. Conduct nondestructive field tests (radiographic or magnetic particle) on not less than one (1) random sample for each ten (10) welds.
 - a. In addition if any welds are found defective, test five (5) previous welds performed by same welder.
- 5. Visually inspect each weld for presence of cracks, undercuts, inadequate size and other visible defects.

END OF SECTION

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SECTION 03 31 30 CONCRETE, MATERIALS AND PROPORTIONING

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. This work shall consist of manufacturing concrete materials in the proportions and strengths necessary to complete the work specified.
 - 2. This work includes but is not limited to:
 - a. Structural Foundations/Footings.
 - b. Structural Slabs, girders, beams, and columns.
 - c. Structural walls, stem walls, and curbs.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Division 00 Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 01 General Requirements.
 - 3. Section 03 05 05 Testing.

QUALITY ASSURANCE 1.02

- A. Referenced Standards:
 - 1. American Concrete Institute (ACI):
 - a. 116R, Cement and Concrete Terminology.
 - b. 211.1, Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete.
 - c. 212.3R, Chemical Admixtures for Concrete.
 - d. 301, Specification for Structural Concrete.
 - e. 318, Building Code Requirements for Structural Concrete.
 - f. 350, Code Requirements for Environmental Engineering Concrete Structures.
 - ASTM International (ASTM):
 - a. C33, Standard Specification for Concrete Aggregates.
 - b. C39, Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
 - c. C94, Standard Specification for Ready-Mixed Concrete.
 - d. C150, Standard Specification for Portland Cement.
 - e. C157, Standard Test Method for Length Change of Hardened Hydraulic-Cement, Mortar, and Concrete.

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- f. C192, Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory.
- g. C260, Standard Specification for Air-Entraining Admixtures for Concrete.
- h. C494, Standard Specification for Chemical Admixtures for Concrete.
- i. C618, Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
- 3. Corps of Engineers (COE):
 - a. CRD-C621, Standard Specification for Packaged, Dry, Hydraulic-Cement Grout (NonShrink).
- 4. City of Bellevue (COB):
 - a. Transportation Department Design Manual, January 9, 2013.
 - b. Storm and Surface Water Engineering Standards, January 2012.
 - c. Sanitary Sewer Engineering Standards, January 2012.
 - d. Water Engineering Standards, January 2011.

1.03 DEFINITIONS

A. Words and terms used in these Specifications are defined in ACI 116R.

1.04 SUBMITTALS

- A. Submittal Procedures: See Section 01 33 00 Submittal Procedures for requirements for the mechanics and administration of the submittal process.
- B. Leadership in Energy and Environmental Design (LEED) Documentation: Submit the following in accordance with Section 01 81 30 – Sustainability Requirements:
 - 1. Product Data for MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content; include statement indicating costs for each product having recycled content.
 - 2. Product Data for MR 5: For products and materials required to comply with requirements for regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.
- C. Approval Submittals:
 - 1. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's instructions.
 - c. Concrete mix designs as required by Specification Section 03 05 05 Testing.

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- d. Manufacturer and type of proposed admixtures.
- e. Manufacturer and type of proposed non-shrink grout and grout cure/seal compound.
- D. Quality Assurance Submittals:
 - 1. Certifications:
 - a. Certification of standard deviation value in psi for ready mix plant supplying the concrete.
 - b. Certification that the fly ash meets the quality requirements stated in this Specification Section, and fly ash supplier's certified test reports for each shipment of fly ash delivered to concrete supplier.
 - c. Certification that the class of coarse aggregate meets the requirements of ASTM C33 for type and location of concrete construction.
 - d. Certification of aggregate gradation.
 - 2. Test reports: Cement mill reports for all cement to be supplied.

1.05 **DELIVERY, STORAGE AND HANDLING**

- A. Delivery, Storage, and Handling shall be made in accordance with the following:
 - 1. Store cement and pozzolan in weathertight buildings, bins, or silos which will exclude moisture and contaminants.
 - 2. Arrange aggregate stockpiles and use in a manner to avoid excessive segregation and to prevent contamination with other materials or with other sizes of like aggregates.
 - 3. Allow natural sand to drain until it has reached a relatively uniform moisture content before use.
 - 4. Store admixtures in such a manner as to avoid contamination, evaporation, or damage.
 - a. For those used in form of suspensions or non-stable solutions, provide agitating equipment to assure thorough distribution of ingredients.
 - b. Protect liquid admixtures from freezing and temperature changes which would adversely affect their characteristics and performance.

PART 2 – PRODUCTS

2.01 **ACCEPTABLE MANUFACTURERS**

- A. Subject to compliance with the Contract Documents, the manufacturers listed in the applicable Articles below are acceptable.
- B. Submit request for substitution in accordance with Specification Section 01 60 00 – Product Requirements.

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2.02 MATERIALS

A. Cement:

- 1. ASTM C150, Type II.
- 2. Cement type used shall correspond to that upon which selection of concrete proportions was based in the mix design.
- B. Fly Ash:
 - 1. ASTM C618, Class F or Class C.
 - 2. Non-staining.
 - 3. Suited to provide hardened concrete of uniform light gray color.
 - 4. Maximum loss on ignition: 3 percent.
 - 5. Compatible with other concrete ingredients and having no deleterious effects on the hardened concrete.
 - 6. Cement and fly ash type used shall correspond to that upon which selection of concrete proportions was based in the mix design.
- C. Admixtures:
 - 1. Air entraining: ASTM C260.
 - 2. Water reducing, retarding, and accelerating: Conform to ASTM C494, Types A through E, and provisions of ACI 212.3R. Follow manufacturer's instructions.
 - 3. High range water reducers (superplasticizers): Conform to ASTM C494, Types F or G.
 - 4. Admixtures to be chloride free.
 - a. Do not use calcium chloride.
 - 5. Provide admixtures of same type, manufacturer and quantity as used in establishing required concrete proportions in the mix design.
- D. Water:
 - 1. ASTM C94 and Potable.
 - 2. Clean and free from deleterious substances.
 - 3. Free of oils, acids and organic matter.
- E. Aggregates for Normal Weight Concrete:
 - 1. ASTM C33.
 - 2. Fine and coarse aggregates to be regarded as separate ingredients.
 - 3. Fine aggregates to be natural, not manufactured and free of materials with deleterious reactivity to alkali in cement.
 - 4. Coarse aggregate sieve analysis:
 - a. For lean concrete, concrete topping, and integral wearing course: ASTM C33, size number 7 (maximum 1/2 IN).

- b. For slabs on grade: ASTM C33, 1-1/2 IN nominal maximum.
- c. For all other concrete: ASTM C33, 3/4 IN nominal maximum.
- F. Maximum total chloride ion content for concrete mix including all ingredients measured as a weight percent of cement:
 - 1. Prestressed concrete: 0.06.
 - 2. All other concrete: 0.10.
- G. Sand Cement Grout:
 - Approximately three (3) parts sand, one (1) part Portland cement, 6 <u>+</u>1 percent entrained air and water to produce a slump which allows grout to completely fill required areas and surround adjacent reinforcing.
 - a. Provide sand in accordance with requirements for fine aggregate for concrete.
 - 2. Minimum 28 day compressive strength: 3,000 psi.
- H. Non-shrink Grout:
 - 1. Non-shrink, non-metallic, non-corrosive, and non-staining.
 - 2. Premixed with only water to be added in accordance with manufacturer's instructions at jobsite.
 - 3. Grout to produce a positive but controlled expansion.
 - a. Mass expansion shall not be created by gas liberation or by other means.
 - 4. Minimum 28 day compressive strength: 6,500 psi.
 - 5. Acceptable manufacturers:
 - a. BASF Admixtures, Inc. "Masterflow, 713 Plus".
 - b. Euclid Chemical "NS Grout".
 - c. Sauereisen Cements "F-100 Level Fill Grout".
 - d. U.S. Grout "Five Star Grout".
 - e. Set Products, Inc. "Set Non-Shrink Grout".
 - f. The Upco Corp "Upcon".
 - g. L&M "Crystex".
 - h. Sika Corporation "Sika Grout 212".
 - i. Or approved equal.
 - 6. In accordance with COE CRD-C621.
- I. Epoxy Grout:
 - 1. Three-component epoxy resin system:
 - a. Two (2) liquid epoxy components.
 - b. One (1) inert aggregate filler component.

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- 2. Adhesive acceptable manufacturers:
 - a. BASF "Masterflow 648 CP".
 - b. Exxon Chemical Company "Escoweld 2505."
 - c. Sika "Sikadur Hi-Mod."
 - d. U.S. Grout "Five Start Epoxy Grout."
 - e. Euclid Chemical "E3-G."
 - f. Or approved equal.
- 3. Aggregate acceptable manufacturers:
 - a. BASF "Masterflow 648 CP."
 - b. Exxon Chemical Company "Escoweld 2510."
 - c. Sika aggregate.
 - d. U.S. Grout aggregate.
 - e. Euclid Chemical "Euclid aggregate."
 - f. Or approved equal.
- 4. Aggregate manufacturer shall be the same as the adhesive manufacturer.
- 5. The aggregate shall be compatible with the adhesive.
- 6. Each component furnished in separate package for mixing at jobsite.

2.03 MIXES

- A. General: Mixing of concrete shall be done in accordance with:
 - 1. Provide concrete capable of being placed without aggregate segregation and, when cured, of developing all properties specified.
 - 2. Ready-mixed concrete shall conform to ASTM C94.
 - 3. All concrete to be normal weight concrete, weighing approximately 145 to 150 LBS/CU FT at 28 days after placement.
- B. Minimum 28 Day Compressive Strengths: As indicated on Drawings.
- C. Air Entrainment:
 - 1. Provide air entrainment in all concrete resulting in a total air content percent by volume as follows:
 - a. 1-1/2 IN maximum aggregate size: 4-1/2 to 6-1/2 percent total air content.
 - b. 1 IN maximum aggregate size: 5 to 7 percent total air content.
 - c. 3/4 IN maximum aggregate size: 5 to 7 percent total air content.
 - d. 1/2 IN maximum aggregate size: 5-1/2 to 8 percent total air content.
 - e. Interior slabs and mats with power trowel finish: Maximum 3 percent total air content.

- D. Slump:
 - 1. 4 IN maximum, 1 IN minimum measured at point of discharge into the concrete construction member.
 - 2. Concrete of lower than minimum slump may be used provided it can be properly placed and consolidated.
 - 3. Provide additional water or water reducing admixture at ready mix plant for concrete that is to be pumped to allow for slump loss due to pumping.
 - a. Provide only enough additional water so that slump of concrete at discharge end of pump hose does not exceed maximum slump specified and the maximum specified water-cement ration is not exceeded.
- E. Proportioning:
 - 1. General:
 - a. Proportion ingredients to produce a mixture which will work readily into corners and angles of forms and around reinforcement by methods of placement and consolidation employed without permitting materials to segregate or excessive free water to collect on surface.
 - b. Proportion ingredients to produce proper placability, durability, strength, maximum specified allowable shrinkage and other required properties.
 - 2. Minimum Compressive Strength: As indicated on Drawings.
 - 3. Maximum Water-Cementitious Materials Ratio: 0.50.
 - 4. Air Content within range specified above.
 - 5. Maximum concrete shrinkage, as indicated on Drawings, shall comply with ASTM C157 for testing indicated.
 - 6. Fly ash:
 - a. For cast-in-place concrete only, a maximum as indicated on Drawings.
 - b. If fly ash is used, the water to fly ash plus cement ratio not to exceed the maximum water cement ratio specified in this Specification Section.
 - 7. Water reducing, retarding, and accelerating admixtures:
 - a. Use in accordance with manufacturer's instructions.
 - b. Do not use unless required by these Specifications or approved for use by Project Representative.
 - 8. High range water reducers (superplasticizers):
 - a. Use in accordance with manufacturer's instructions.
 - b. Do not use unless required by these Specifications or approved for use by Project Representative.

- 9. Concrete mix proportioning methods for normal weight concrete:
 - a. Method 1:
 - 1) Used when combination of materials proposed is to be evaluated and proportions selected to be on a basis of trial mixes according to ACI 301.
 - 2) Air content within range specified above.
 - 3) For each trial mix, make at least three (3) compression test cylinders for specified test age, and cure in accordance with ASTM C192.
 - a) Test for strength at 28 days in accordance with ASTM C39.
 - b) Test for shrinkage at 28 days in accordance with ASTM C157.
 - 4) Record and report temperature of trial mixes.
 - b. Method 2:
 - 1) In lieu of trial mixes, field test records for concrete made with similar ingredients may be used in accordance with ACI 301.
 - 2) Use of proposed concrete mix proportions based on field test records subject to approval by Project Representative based on information contained in field test records and demonstrated ability to provide the required average strength and meet maximum allowable shrinkage requirements, where indicated on the Drawings.
 - 3) Test records shall represent materials, proportions and conditions similar to those specified.
- F. Allowable Shrinkage: As indicated on the Drawings per ASTM C157.

2.04 SOURCE QUALITY CONTROL

- A. To assure stockpiles are not contaminated or materials are segregated, perform any test for determining conformance to requirements for cleanness and grading on samples secured from aggregates at point of batching.
- B. Do not use frozen or partially frozen aggregates.

PART 3 – EXECUTION

3.01 FIELD QUALITY CONTROL

- A. Perform concrete tests per Specification Section 03 05 05 Testing.
- B. Perform strength test on any concrete to which water has been added at the jobsite.

END OF SECTION

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SECTION 03 31 31 CONCRETE MIXING, PLACING, JOINTING, AND CURING

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes: Mixing, placing, jointing, and curing of concrete construction.
 - 1. This work includes but is not limited to:
 - a. Structural Foundations/Footings.
 - b. Structural Slabs, girders, beams, and columns.
 - c. Structural walls, stem walls, and curbs.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Division 00 Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 01 General Requirements.
 - 3. Section 03 11 13 Formwork.
 - 4. Section 03 21 00 Reinforcement.
 - 5. Section 03 31 30 Concrete, Materials and Proportioning.
 - 6. Section 03 31 32 Concrete Finishing and Repair of Surface Defects.
 - 7. Section 03 05 05 Testing.
 - 8. Section 07 92 00 Joint Sealants.

1.02 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. American Concrete Institute (ACI):
 - a. 116R, Cement and Concrete Terminology.
 - b. ACI 301, Specifications for Structural Concrete
 - c. 302.1R, Guide for Concrete Floor and Slab Construction
 - d. 304R, Guide for Measuring, Mixing, Transporting and Placing Concrete.
 - e. 304.2R, Placing Concrete by Pumping Methods.
 - f. 305R, Hot Weather Concreting.
 - g. 306R, Cold Weather Concreting.
 - h. 308R, Guide to Curing Concrete.
 - i. 309R, Guide for Consolidation of Concrete.

- 2. ASTM International (ASTM):
 - a. C94, Standard Specification for Ready-Mixed Concrete.
 - b. C156, Standard Test Method for Water Loss (from a Mortar Specimen) Through Liquid Membrane-Forming Curing Compounds for Concrete.
 - c. C171, Standard Specification for Sheet Materials for Curing Concrete.
 - d. C309, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
 - e. D994, Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type).
 - f. D1056, Standard Specification for Flexible Cellular Materials-Sponge or Expanded Rubber.
 - g. D1751, Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
- 3. Corps of Engineers (COE):
 - a. CRD-C572, Specifications for Polyvinylchloride Waterstop.
- 4. National Ready Mixed Concrete Association (NRMCA):
 - a. Checklist for Certification of Ready Mixed Concrete Production Facilities.
- 5. NSF International (NSF).
- 6. City of Bellevue (COB):
 - a. Transportation Department Design Manual, September 2011.
 - b. Storm and Surface Water Engineering Standards, January 2012.
 - c. Sanitary Sewer Engineering Standards, January 2012.
 - d. Water Engineering Standards, January 2011.
- B. Qualifications:
 - 1. Ready Mixed Concrete Batch Plant: Certified by NRMCA.

1.03 DEFINITIONS

A. Words and terms used in this Specification Section are defined in ACI 116R.

1.04 SUBMITTALS

A. Submittal Procedures: See Section 01 33 00 for requirements for the mechanics and administration of the submittal process.

- B. Leadership in Energy and Environmental Design (LEED) Documentation: Submit the following in accordance with Section 01 81 30 – Sustainability Requirements:
 - 1. Product Data for MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content; include statement indicating costs for each product having recycled content.
 - 2. Product Data for MR 5: For products and materials required to comply with requirements for regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.
- C. Approval Submittals:
 - 1. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 - 1) Procedure for adding high-range water reducer at the jobsite.
 - c. Scaled (minimum 1/8 IN/FT) Drawings showing proposed locations of construction joints and joint keyway dimensions.
 - d. Manufacturers and types:
 - 1) Joint fillers.
 - 2) Curing agents.
 - 3) Construction joint bonding adhesive.
 - 4) Pressure relief valves.
 - 5) Waterstops.
 - 2. Waterstops: Products shipped meet or exceed the physical properties specified.
 - 3. Chemical Stains.
 - a. Provide Color Mock up for Project Representative review and approval prior to applying product.
 - 4. Cold Weather Plan.
- D. Quality Assurance Submittals:
 - 1. Certifications:
 - a. Ready mix concrete plant certification.
- E. Closeout Submittals: Copies of concrete delivery tickets.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Delivery:
 - 1. Concrete:
 - a. Prepare a delivery ticket for each load of ready mixed concrete.
 - b. Truck operator shall hand ticket to Contractor at the time of delivery.
 - c. Ticket to show:
 - 1) Mix identification.
 - 2) Quantity delivered.
 - 3) Amount of material in each batch.
 - 4) Outdoor temperature in the shade.
 - 5) Time at which cement was added.
 - 6) Time of delivery.
 - 7) Time of discharge.
 - 8) Amount of water that may be added at the site without exceeding the specified water-cement ratio.
 - 9) Amount of water added at the site.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the manufacturers listed in the applicable Articles below are acceptable. Placement shall be in accordance with manufacturer's written instructions.
- B. Submit request for substitution in accordance with Specification Section 01 60 00.

2.02 COMPONENTS

- A. Neoprene Expansion Joint Fillers:
 - 1. Acceptable manufacturers:
 - a. Euclid Chemical Company (The).
 - b. W R Meadows.
 - c. Rubatex.
 - d. BASF.
 - e. Or approved equal.
 - 2. Materials:
 - a. Closed cell neoprene.
 - b. ASTM D1056, Class SC.

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- c. Compression deflection: As required to limit deflection to 50 percent of joint thickness under pressure from concrete pour height.
- B. Epoxy Joint Fillers:
 - 1. Comply with requirements of ACI 302.1R
 - 2. Acceptable manufacturers:
 - a. Euclid Chemical Company (The).
 - b. W R Meadows.
 - c. BASF.
 - d. Or approved equal.
- C. Polyurea Joint Fillers:
 - 1. Comply with requirements of ACI 302.1R.
 - 2. Acceptable manufacturers:
 - a. Euclid Chemical Company (The).
 - b. W R Meadows.
 - c. BASF.
 - d. Or approved equal.
- D. Waterstops, PVC Type:
 - 1. Acceptable manufacturers:
 - a. Greenstreak Plastic Products.
 - b. W R Meadows.
 - c. Or approved equal.
 - 2. Materials:
 - a. Virgin polyvinyl chloride compound not containing any scrap or reclaimed materials or pigment.
 - b. Standard: COE CRD-C572.
 - 3. In expansion joints:
 - a. 9 IN wide by 3/8 IN thick tear web type waterstop.
 - b. 2 IN minimum horizontal movement without rupturing.
 - c. Greenstreak Plastic Products Style #700.
 - d. Durajoint Type 5.
 - e. Or approved equal.
 - 4. In control joints:
 - a. 6 IN wide by 3/8 IN thick with ribs and center bulb.
 - b. Greenstreak Plastic Products Style #705.
 - c. Durajoint Type 5.

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- d. Or approved equal.
- 5. In all other joints:
 - a. 6 IN wide by 3/8 IN thick with ribs and center bulb.
 - b. Greenstreak Plastic Products Style #705, #679 or #783.
 - c. Durajoint Type 5.
 - d. or approved equal.
- 6. Provide hog rings or grommets at maximum 12 IN OC along the length of the waterstop.
- 7. Provide factory-made waterstop fabrications at all changes in direction, intersections and transitions, leaving only straight butt splices for the field.
- E. Waterstops, Preformed Strip Type:
 - 1. Acceptable manufacturers:
 - a. Hydrotite CJ by Greenstreak Plastics, Inc.
 - b. Adeka Ultra Seal USA.
 - c. Or approved equal.
 - 2. Materials:
 - a. Hydrophilic type waterstop manufactured solely for the purpose of preventing water from traveling through construction joints.
 - b. Hydrotite type CJ-0725-3K.
 - c. Or approved equal.
- F. Sand cement grout, non-shrink grout and epoxy grout: See Specification Section 03 31 30 Concrete, Materials, and Proportioning.
- G. Chemical Stains and compatible Sealers: Subject to compliance with the requirements, furnish products of a single manufacturer as follows.
 - 1. Brickform (800) 483-9628
 - a. Color: "Quarry Red."
 - 2. L.M. Scofield Co. (800) 800-9000.
 - a. Color: "Quarry Red."
 - 3. L&M Construction Chemicals, Inc. (402) 453-6600.
 - a. Color: "Cherry Nut."
 - 4. Or approved equal.
 - 5. Sealer:
 - a. Clear.
 - b. VOC: 100g/L.

PART 3 – EXECUTION

3.01 PREPARATION

A. General:

- 1. Complete formwork.
 - a. See Specification Section 03 11 13 Formwork.
- 2. Remove earth, snow, ice, water, and other foreign materials from areas that will receive concrete.
- 3. Secure reinforcement in place.
 - a. See Specification Section 03 21 00 Reinforcement.
- 4. Position expansion joint material, anchors and other embedded items.
- 5. Obtain approval of reinforcement erection and placement prior to placing concrete.
- 6. Do not place concrete during rain, sleet, or snow, unless adequate protection is provided and approval is obtained.
 - a. Plan size of crews with due regard for effects of concrete temperature and atmospheric conditions on rate of hardening of concrete as required to obtain good surfaces and avoid unplanned cold joints.
 - b. Do not allow rainwater to increase mixing water nor to damage surface finish.
- 7. Prepare all construction joints for proper bond per Paragraph 3.4.C. of this Specification Section.
- 8. Remove hardened concrete and foreign materials from inner surfaces of conveying equipment and formwork.
- 9. Provide slabs and beams of minimum indicated required depth when sloping structural foundation base slabs and elevated slabs to drains.
 - a. For floor slabs on grade, slope top of subgrade to provide slab of required uniform thickness.
- B. Preparation of Subgrade for Slabs on Ground:
 - 1. Subgrade drained and of adequate and uniform load-bearing nature.
 - 2. Obtain approval of subgrade compaction density prior to placing slabs on ground.
 - 3. Maintain subgrade at a temperature above 32 DegF before concrete placing begins for a sufficient amount of time to remove frost.
 - 4. Moisten subgrade to eliminate absorption.
 - a. Keep subgrade moist at time of concreting.
 - b. Allow no free-standing water on subgrade or soft or muddy spots when concrete is placed.

- C. Edge Forms and Screeds:
 - 1. Set accurately to produce designated elevations and contours of finished surface.
 - 2. Sufficiently strong to support vibrating screeds or roller pipe screeds, if required.
 - 3. Use strike off templates, or approved vibrating type screeds, to align concrete surfaces to contours of screed strips.
- D. Chemical Stain and Sealer
 - 1. Cure concrete for a minimum of 28 days prior to application.
 - 2. Apply chemical stained concrete material and sealer in accordance with manufacturer's instructions at locations indicated on Drawings.
 - 3. Ensure concrete is clean, sound and dry.
 - 4. Remove dirt, dust, debris, oil, grease, sealers, paint, coatings, adhesives, and other contaminates that could prevent chemical stain from penetrating concrete surface.

3.02 CONCRETE MIXING

- A. General:
 - Provide all concrete from a central plant conforming to Checklist for Certification of Ready Mixed Concrete Production Facilities of the NRMCA.
 - 2. Batch, mix, and transport in accordance with ASTM C94.
- B. Control of Admixtures:
 - 1. Charge admixtures into mixer as solutions.
 - a. Measure by means of an approved mechanical dispensing device.
 - b. Liquid considered a part of mixing water.
 - c. Admixtures that cannot be added in solution may be weighed or measured by volume if so recommended by manufacturer.
 - 2. Add separately, when two or more admixtures are used in concrete, to avoid possible interaction that might interfere with efficiency of either admixture, or adversely affect concrete.
 - 3. Complete addition of retarding admixtures within one minute after addition of water to cement has been completed, or prior to beginning of last three quarters of required mixing, whichever occurs first.
- C. Tempering and Control of Mixing Water:
 - 1. Mix concrete only in quantities for immediate use.
 - 2. Discard concrete which has set.
 - 3. Discharge concrete from ready mix trucks within time limit and drum revolutions stated in ASTM C94.

- 4. Addition of water at the jobsite:
 - a. See Specification Section 03 31 30 –Concrete, Materials, and Proportioning for specified water cement ratio and slump.
 - b. Do not exceed maximum specified water cement ratio or slump.
 - c. Incorporate water by additional mixing equal to at least half of total mixing required.
 - d. Perform strength test on any concrete to which water has been added at the jobsite.
 - 1) See Specification Section 03 05 05 Testing.

3.03 PLACING OF CONCRETE

- A. General:
 - 1. Comply with ACI 304R, ACI 304.2R and ACI 301.
 - 2. Deposit concrete:
 - a. Continuously to avoid cold joints.
 - b. In layers of 12 IN to 18 IN.
 - 3. Locate construction joints at locations approved by Project Representative.
 - a. Plan size of crews with due regard for effects of concrete temperature and atmosphere conditions to avoid unplanned cold joints.
 - 4. Place concrete at such a rate that concrete, which is being integrated with fresh concrete, is still workable.
 - 5. Do not deposit concrete which has partially hardened or has been contaminated by foreign materials.
 - 6. Spreaders:
 - a. Temporary: Remove as soon as concrete placing renders their function unnecessary.
 - b. Embedded:
 - 1) Obtain approval of Project Representative.
 - 2) Materials: Concrete or metal.
 - 3) Ends of metal spreaders coated with plastic coating 2 IN from each end.
 - 7. Deposit concrete as nearly as practicable in its final position to avoid segregation.
 - a. Maximum free fall: 4 FT.
 - b. Free fall exceeding 4 FT: Place concrete by means of hopper, elephant trunk or tremie pipe extending down to within 4 FT of surface placed upon.

- 8. Perform the following operations before bleeding water has an opportunity to collect on surface:
 - a. Spread.
 - b. Consolidate.
 - c. Straightedge.
 - d. Darby or bull float.
- B. Admixtures:
 - 1. All admixtures to be introduced at the batch plant in accordance with manufacturer's recommendations.

C. Cold Weather Concrete Placement:

- 1. Comply with ACI 306R.
- 2. Do not place concrete on substrates that are below 32 DegF or contain frozen material.
- 3. Maintain all materials, forms, reinforcement, subgrade and any other items which concrete will come in contact with free of frost, ice or snow at time of concrete placement.
- 4. Temperature of concrete when discharged at site:

	MINIMUM CONCRETE	MINIMUM CONCRETE
	TEMPERATURE, DEGF	TEMPERATURE, DEGF FOR
AIR	FOR SECTIONS WITH	SECTIONS WITH LEAST
TEMPERATUR	LEAST DIMENSION LESS	DIMENSION 12 IN OR
E DEGF	THAN 12 IN	GREATER
30 to 45	60	55
0 to 30	65	55
below 0	70	60

- 5. Heat subgrade, forms, and reinforcement so the temperature of the subgrade, forms, and reinforcement will be between 45 and 70 DegF, when temperature of surrounding air is 40 DegF or below at time concrete is placed.
 - a. Remove all frost from subgrade, forms and reinforcement before concrete is placed.
- 6. Combine water with aggregate in mixer before cement is added, if water or aggregate is heated above 90 DegF.
- 7. Do not mix cement with water or with mixtures of water and aggregate having a temperature greater than 90 DegF.
- 8. Do not place slabs on ground if temperature is below 40 DegF or if temperature surrounding the slab will be below 40 DegF before structure is enclosed and heated.
- D. Hot Weather Concrete Placement:
 - 1. Comply with ACI 305R.

- 2. Cool ingredients before mixing, or add flake ice or well crushed ice of a size that will melt completely during mixing for all or part of mixing water if high temperature, low slump, flash set, cold joints, or shrinkage cracks are encountered.
- 3. Temperature of concrete when placed:
 - a. Not to exceed 90 DegF.
 - b. Not so high as to cause:
 - 1) Shrinkage cracks.
 - 2) Difficulty in placement due to loss of slump.
 - 3) Flash set.
- 4. Temperature of forms and reinforcing when placing concrete:
 - a. Not to exceed 90 DegF.
 - b. May be reduced by spraying with water to cool below 90 DegF.
 - 1) Leave no standing water to contact concrete being placed.
- E. Consolidating:
 - 1. Consolidate in accordance with ACI 309R except as modified herein.
 - 2. Consolidate by vibration so that concrete is thoroughly worked around reinforcement, embedded items and into corners of forms.
 - a. Eliminate:
 - 1) Air or stone pockets.
 - 2) Honeycombing or pitting.
 - 3) Planes of weakness.
 - 3. Internal vibrators:
 - a. Minimum frequency of 8,000 vibrations per minute.
 - b. Insert and withdraw at points approximately 18 IN apart.
 - 1) Allow sufficient duration at each insertion to consolidate concrete but not sufficient to cause segregation.
 - c. Use in:
 - 1) Beams and girders of framed slabs.
 - 2) Columns and walls.
 - d. Size of vibrators shall be in accordance with ACI 309R, Table 5.1.5.
 - 4. Obtain consolidation of slabs with internal vibrators, vibrating screeds, roller pipe screeds, or other approved means.
 - 5. Do not use vibrators to transport concrete within forms.
 - 6. Provide spare vibrators on jobsite during all concrete placing operations.

- 7. Bring a full surface of mortar against form by vibration supplemented if necessary by spading to work coarse aggregate back from formed surface, where concrete is to have an as-cast finish.
- 8. Use suitable form vibrators located just below top surface of concrete, where internal vibrators cannot be used in areas of congested reinforcing.
- 9. Prevent construction equipment, construction operations, and personnel from introducing vibrations into freshly placed concrete after the concrete has been placed and consolidated.
- F. Handle concrete from mixer to place of final deposit by methods which will prevent segregation or loss of ingredients and in a manner which will assure that required quality of concrete is maintained.
 - 1. Use truck mixers, agitators, and non-agitating units in accordance with ASTM C94.
 - 2. Horizontal belt conveyors:
 - a. Mount at a slope which will not cause segregation or loss of ingredients.
 - b. Protect concrete against undue drying or rise in temperature.
 - c. Use an arrangement at discharge end to prevent segregation.
 - d. Do not allow mortar to adhere to return length of belt.
 - e. Discharge conveyor runs into equipment specially designed for spreading concrete.
 - 3. Metal or metal lined chutes:
 - a. Slope not exceeding 1 vertical to 2 horizontal and not less than 1 vertical to 3 horizontal.
 - b. Chutes more than 20 FT long and chutes not meeting slope requirements may be used provided they discharge into a hopper before distribution.
 - c. Provide end of each chute with a device to prevent segregation.
 - 4. Pumping or pneumatic conveying equipment:
 - a. Designed for concrete application and having adequate pumping capacity.
 - b. Control pneumatic placement so segregation is avoided in discharged concrete.
 - c. Loss of slump in pumping or pneumatic conveying equipment shall not exceed 1-1/2 IN.
 - d. Do not convey concrete through pipe made of aluminum or aluminum alloy.
 - e. Provide pumping equipment without Y sections.

- G. Placing of Concrete on Metal Deck:
 - 1. Prior to concrete placement, the metal deck shall be free of soil, debris, standing water, loose mill scale, and all other foreign matter.
 - 2. Care shall be exercised when placing concrete so that the deck will not be subject to construction loads or impact that exceed the design capacity of the deck.
 - 3. Concrete shall be placed in a uniform manner and spread toward the center of the deck span.
 - 4. If buggies are used to place concrete, runways shall be planked, and the buggies shall only operate on planking.
 - a. Planks shall be of adequate stiffness to transfer loads to the steel supports without damaging the deck.
 - 5. Deck damage caused by careless placement of concrete shall be repaired or replaced.

3.04 JOINTS AND EMBEDDED ITEMS

- A. Construction Joints General:
 - 1. Locate joints as indicated on Contract Drawings or as shown on approved Shop Drawings.
 - a. Where construction joint spacing shown on Drawings exceeds the joint spacing indicated in Paragraph B. below, submit proposed construction joint location in conformance with this Specification Section.
 - 2. Unplanned construction joints will not be allowed.
 - a. If concrete cannot be completely placed between planned construction joints, then it must be removed.
 - 3. In general, locate joints near middle of spans of slabs, beams and girders unless a beam intersects a girder at this point, in which case, offset joint in girder a distance equal to twice the width of the beam.
 - 4. Locate joints in walls and columns at underside of floors, slabs, beams, or girders, and at tops of foundations or floor slabs, unless shown otherwise.
 - a. At Contractor's option, beam pockets may be formed into concrete walls.
 - b. Size pockets to allow beam reinforcing to be placed as detailed on Drawings.
 - 5. Place beams, girders, column capitals and drop panels at same time as slabs.
 - 6. Make joints perpendicular to main reinforcement with all reinforcement continuous across joints.

- 7. Provide roughened construction joints at all construction joints unless indicated otherwise on Drawings.
 - a. Clean the previously hardened concrete interface and remove all laitance.
 - b. Intentionally roughen the interface to a full amplitude of 1/4 IN.
 - c. Provide recessed flat surface as required to install strip type waterstops.
- 8. Provide continuous keyways only where indicated on Drawings.
 - a. Construction joint keyways shall have the following dimensions, unless shown otherwise on Drawings or directed otherwise by Project Representative.
 - b. Construction joint keyways in walls, as indicated on Drawings.
 - c. Construction joint keyways in footings, foundations, base slabs, and structural or elevated slabs as indicated on Drawings.
- 9. Allow a minimum of 48 HRS before placement of adjoining concrete construction.
- B. Construction Joints Spacing:
 - 1. General Structures not intended to contain liquid:
 - a. Wall vertical construction joints:
 - 1) 80 FT maximum centers.
 - 2) At wall intersections, 30 FT maximum from corner.
 - b. Base slab, floor, and roof slab construction joints as indicated on Drawings.
 - 2. Structures intended to contain liquids:
 - a. Wall vertical construction joints:
 - 1) 30 FT maximum centers.
 - 2) At wall intersections, 15 FT maximum from corner.
 - b. Wall horizontal construction joints: 12 FT to 18 FT centers.
 - c. Walls that are thicker than 18 IN may be poured less than 30 FT tall in one (1) pour provided the following requirements are satisfied:
 - 1) A test wall of similar size, height and thickness will be poured to demonstrate the quality of the concrete work.
 - 2) The test wall will be located as a portion of a non-water bearing wall.
 - a) The test wall will include a waterstop at the bottom of the wall.
 - b) Alternatively, a separate test wall, not part of the final work, may be constructed.

- 3) The concrete placement and concrete quality of the test wall will be observed by the Project Representative.
 - a) Concrete will be judged on the following:
 - i Ability to keep bottom of the pour clean and free from trash and debris.
 - ii Ability to protect the waterstop from folding over due to the force of falling concrete.
 - iii Ability to properly consolidate all concrete in the wall pour, including below formed openings.
- 4) Project Representative will evaluate the Contractor's work and may recommend taller concrete wall pours if concrete quality is acceptable.
- 5) Preparation for all subsequent wall pours over 18 FT tall must be the same as the preparation of the test wall.
- 6) Should the quality of concrete work on subsequent wall pours be judged inadequate, the Contractor may be directed to limit wall pour heights to 18 FT as originally specified.
- 7) Should the quality of concrete work on the test wall be judged inadequate, additional test walls will not be observed and judged to allow pour heights greater that 18 FT unless allowed by Project Representative.
- d. Base slab, floor, and roof slab construction joints:
 - 1) Placements to be approximately square and not to exceed 2,000 SF.
 - 2) Maximum side dimension of a slab pour to be less than:
 - a) Twice the length of the short side.
 - b) 60 FT.
- C. Construction Joints Bonding:
 - 1. Obtain bond between concrete pours at construction joints by thoroughly cleaning and removing all laitance from construction joints.
 - a. Before new concrete is placed, all construction joints shall be coated with cement grout, or dampened.
 - 1) General: Use cement grout or dampening for all construction joints.
 - 2. Roughened construction joints:
 - a. Roughen the surface of the concrete to expose the aggregate uniformly

- b. Remove laitance, loosened particles of aggregate or damaged concrete at the surface, or at the Contractor's option, use an approved chemical retarder which delays but does not prevent setting of the surface of the mortar in accordance with the manufacturer's recommendations.
 - 1) Retarded mortar shall be removed within 24 HRS after placing to produce a clean exposed aggregate bonding surface.
- c. Cover the hardened concrete of horizontal joints with a coat of cement grout of similar proportions to the concrete, except substitute fine aggregate for coarse aggregate.
- d. Place 1 IN layer of grout in bottoms of wall or column lifts immediately before placing concrete.
 - 1) Vibrate grout and first layer of concrete simultaneously.
- e. Place fresh concrete before the grout has attained its initial set.
- 3. Other keyed construction joints:
 - a. Thoroughly clean construction joints and remove all laitance.
 - b. Dampen the hardened concrete (but do not saturate) immediately prior to placing of fresh concrete.
- D. Locate control joints in slabs on grade as indicated on Drawings.
 - 1. Time cutting properly with set of concrete, if saw cut joints are required or permitted.
 - a. Start cutting as soon as concrete has hardened sufficiently to prevent aggregates being dislodged by saw.
 - b. Complete before shrinkage stresses become sufficient to produce cracking.
- E. Expansion Joints:
 - 1. Do not permit reinforcement or other embedded metal items bonded to concrete (except smooth dowels bonded on only one side of joint) to extend continuously through an expansion joint.
 - 2. Use neoprene expansion joint fillers, unless noted otherwise on Drawings.
 - 3. Seal expansion joints as shown on Drawings.
 - a. See Specification Section 07 92 00 Joint Sealants for requirements.
- F. Waterstops:
 - 1. Preformed strip type:
 - a. Install on smooth surface of hardened concrete by use of nails, adhesive or other means as recommended by manufacturer to prevent movement of waterstop during placement of concrete.
 - b. Waterstop to be continuous with splices in accordance with manufacturer's instructions.

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- c. Use in joints against existing concrete and where indicated on Drawings.
- 2. PVC type:
 - a. Position waterstop accurately in forms.
 - b. Secure waterstops in correct position using hog rings or grommets spaced along the length of waterstop and tie wire to adjacent reinforcing.
 - c. Hold horizontal waterstops in place with continuous supports.
 - d. Install according to manufacturer's instructions.
 - 1) Do not displace reinforcement from required location.
 - e. Waterstops to be continuous.
 - f. Splice ends with perpendicular butt splice using electrical splicing iron in accordance with manufacturer's instructions.
 - g. Unless otherwise noted, use for all construction joints in new construction for all structures indicated on Drawings.
- G. Other Embedded Items:
 - 1. Place sleeves, inserts, anchors, and embedded items required for adjoining work or for its support, prior to initiating concreting.
 - 2. Do not place electrical conduit, drains, or pipes in or thru concrete slabs, walls, columns, foundations, beams or other structural members unless approved by Project Representative.
- H. Placing Embedded Items:
 - 1. Position expansion joint material, waterstops, and other embedded items accurately.
 - 2. Support against displacement.
 - 3. Fill voids in sleeves, inserts and anchor slots temporarily with readily removable material to prevent entry of concrete into voids.
 - 4. Provide adequate means for anchoring waterstop in concrete.
 - a. Provide means to prevent waterstops in the forms from being folded over by the concrete as it is placed.
 - b. Work concrete under the waterstops by hand, so as to avoid the formation of air and rock pockets, when placing roof and floor slab concrete around waterstops.

3.05 FINISHING

- A. See Specification Section 03 31 32 Concrete Finishing, and Repair of Surface Defects.
- B. Coordinate mixing and placing with finishing.

3.06 INSTALLATION OF GROUT

- A. Grout Schedule of Use:
 - 1. Sand cement grout:
 - a. General use.
 - 2. Non-shrinking non-metallic grout:
 - a. Filling form tie holes.
 - b. Under column and beam base plates.
 - c. Other uses indicated on the Drawings.
 - 3. Epoxy grout:
 - a. Patching cavities in concrete.
 - b. Other uses indicated on the Drawings.
- B. Grout Installation:
 - 1. Sand cement grout:
 - a. Cure grout by one of methods specified.
 - 2. Non-shrink non-metallic grout:
 - a. Clean concrete surface to receive grout.
 - b. Saturate concrete with water for 24 HRS prior to grouting.
 - c. Mix in a mechanical mixer.
 - d. Use no more water than necessary to produce flowable grout.
 - e. Place in accordance with manufacturer's instructions.
 - f. Provide under beam, column, and equipment base plates, in joints between precast concrete filter slabs, and in other locations indicated on the Drawings.
 - g. Completely fill all spaces and cavities below the top of base plates.
 - h. Provide forms where base plates and bed plates do not confine grout.
 - i. Where exposed to view, finish grout edges smooth.
 - j. Except where a slope is indicated on the Drawings, finish edges flush at the base plate, bed plate, member or piece of equipment.
 - k. Coat exposed edges of grout with cure or seal compound recommended by the grout manufacturer.
 - 3. Epoxy grout:
 - a. Mix and place in accordance with manufacturer's instructions.
 - b. Apply only to clean, dry, sound surface.
 - c. Obtain manufacturer's field technical assistance as required to assure proper placement.

3.07 INSTALLATION OF CHEMICAL STAIN AND SEALER

- A. Chemical Stain
 - 1. Examine concrete surfaces to receive chemical stain.
 - 2. Notify Project Representative of conditions that would adversely affect application or subsequent use.
 - 3. Do not begin preparation or application until unacceptable conditions are corrected.
 - 4. Remove chemical stain residue and clean surface in accordance with manufacturer's instructions.
- B. Sealer:
 - 1. Seal chemical stained concrete surface in accordance with manufacturer's instructions.
 - 2. Apply sealer uniformly over entire chemical stained concrete surface.
 - 3. Do not allow traffic on finished sealed surfaces for the following periods after application
 - a. Foot Traffic: Minimum of 24 HRS.
 - b. Vehicular Traffic: Minimum of 5 days.

3.08 CURING AND PROTECTION

- A. Protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury immediately after placement, and maintain with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement, hardening, and compressive strength gain.
 - 1. Comply with ACI 306R for cold-weather protection during curing.
 - 2. Comply with ACI 301 for hot-weather protection during curing.
- B. Apply one of the following curing procedures immediately after completion of placement and finishing, for concrete surfaces not in contact with forms.
 - 1. Ponding or continuous sprinkling for not less than seven (7) days.
 - 2. Application of absorptive mats or fabric kept continuously wet for not less than seven (7) days.
 - 3. Application of waterproof sheet materials, conforming to ASTM C171.
 - 4. Application of a curing compound conforming to ASTM C309.
 - a. Apply curing compound in accordance with manufacturer's recommendations immediately after any water sheen which may develop after finishing has disappeared from concrete surface.
 - b. Do not use on any surface against which additional concrete or other material is to be bonded unless it is proven that curing compound will not prevent bond.

- c. Where a vertical surface is cured with a curing compound, the vertical surface shall be covered with a minimum of two (2) coats of the curing compound.
 - 1) Apply the first coat of curing compound to a vertical surface immediately after form removal.
 - 2) The vertical concrete surface at the time of receiving the first coat shall be damp with no free water on the surface.
 - 3) Allow the preceding coat to completely dry prior to applying the next coat.
 - 4) A vertical surface: Any surface steeper than 1 vertical to 4 horizontal.
- d. Curing compounds used in water treatment plant construction shall be non-toxic and taste and odor free.
 - 1) Curing compound to be NSF approved and have a moisture loss of not more than 0.62 kg/SQ meter per ASTM C156.
 - a) Atlas Tech Products Atlas Quantum-Cure.
 - 2) Alternately, all tank surfaces shall be sand-blasted as required to remove non-NSF approved curing compound.
- C. Curing Concrete In Contact with Forms:
 - 1. Minimize moisture loss from and temperature gain of concrete placed in forms exposed to heating by sun by keeping forms wet and cool until they can be safely removed.
 - 2. After form removal, cure concrete until end of time prescribed.
 - a. Use one of methods listed above.
 - 3. Forms left in place shall not be used as a method of curing in hot weather.
 - 4. The term "hot weather," where used in these specifications, is defined in ACI 301.
 - 5. In hot weather, remove forms from vertical surfaces as soon as concrete has gained sufficient strength so that the formwork is no longer required to support the concrete.
- D. Continue curing for at least seven (7) days for all concrete except high early strength concrete for which period shall be at least three (3) days.
 - If one of curing procedures indicated above is used initially, it may be replaced by one of other procedures indicated any time after concrete is one (1) day old, provided concrete is not permitted to become surface dry during transition.
- E. Cold Weather:
 - 1. Follow recommendations of ACI 306R.
 - 2. Maintain temperature of concrete between 50 and 70 DegF for required curing period, when outdoor temperature is 40 DegF, or less.

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- 3. Use heating, covering, insulating, or housing of the concrete work to maintain required temperature without injury due to concentration of heat.
- 4. Do not use combustion heaters unless precautions are taken to prevent exposure of concrete to exhaust gases which contain carbon dioxide.
- 5. Interior slabs in areas intended to be heated shall be adequately protected so that frost does not develop in the supporting subgrade.
- F. Hot Weather:
 - 1. Follow recommendations of ACI 301.
 - 2. Make provision for cooling forms, reinforcement and concrete, windbreaks, shading, fog spraying, sprinkling, ponding, or wet covering with a light colored material.
 - 3. Provide protective measures as quickly as concrete hardening and finishing operations will allow.
- G. Rate of Temperature Change:
 - 1. Keep changes in temperature of air immediately adjacent to concrete as uniform as possible, during and immediately following curing period.
 - 2. Do not exceed a temperature change of 5 DegF in any 1 HR or 50 DegF in any 24 HR period.
- H. Protection from Mechanical Injury:
 - 1. Protect concrete from damaging mechanical disturbances, such as load stresses, heavy shock, and excessive vibration.
 - 2. Protect finished concrete surfaces from damage by construction equipment, materials, or methods, and by rain or running water.
 - 3. Do not load self supporting structures in such a way as to overstress concrete.
- I. Chemical Stained Concrete:
 - 1. Do not apply tape to finished sealed surface.
 - 2. Protect applied chemical stained concrete from damage during construction.

3.09 FIELD QUALITY CONTROL

- A. Tests in accordance with Specification Section 03 05 05 Testing.
 - 1. Perform a strength test on all concrete to which water or superplasticizer, above the amount stated in the approved concrete mix design, has been added.
 - a. Perform sampling after water or superplasticizer has been added and additional mixing has been performed.
- B. Field samples of fabricated waterstop fittings (crosses, tees, etc.) will be selected at random by the Project Representative for testing by a laboratory at the Owner's expense.
 - 1. When tested, they shall have a tensile strength across the joints equal to at least 600 psi.

END OF SECTION

SECTION 03 31 32 CONCRETE FINISHING AND REPAIR OF SURFACE DEFECTS

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes: This work consists of providing completed concrete surface finishes and repairing surface finishes of all defects.
 - 1. This work includes but is not limited to:
 - a. Structural Foundations/Footings.
 - b. Structural Slabs, girders, beams, and columns.
 - c. Structural walls, stem walls, and curbs.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Division 00 Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 01 General Requirements.
 - 3. Section 03 11 13 Formwork.
 - 4. Section 03 31 30 Concrete, Materials and Proportioning.
 - 5. Section 03 31 31 Concrete Mixing, Placing, Jointing and Curing.

1.02 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. American Concrete Institute (ACI):
 - a. 116R, Cement and Concrete Terminology.
 - b. 301, Specifications for Structural Concrete
 - 2. ASTM International (ASTM):
 - a. C150, Standard Specification for Portland Cement.
 - b. C309, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
 - c. C1315, Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete.
 - d. D4258, Standard Practice for Surface Cleaning Concrete for Coating.
 - e. D4259, Standard Practice for Abrading Concrete.
 - 3. The Society for Protective Coatings/NACE International (SSPC/NACE):
 - a. SP 13/NACE No. 6, Surface Preparation of Concrete.
 - 4. City of Bellevue (COB):
 - a. Transportation Department Design Manual, September 2011.

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- b. Storm and Surface Water Engineering Standards, January 2012.
- c. Sanitary Sewer Engineering Standards, January 2012.
- d. Water Engineering Standards, January 2011.
- B. Qualifications:
 - Subject to Project Representatives approval, applicator of acrylic epoxy surfacer/filler must be approved, in writing, by manufacturer.
 - 2. Manufacturer of acrylic epoxy surfacer/filler shall have minimum of five (5) years experience in manufacturing of same with documented performance history for similar installations.
 - 3. Installer/applicator of acrylic epoxy surfacer/filler shall have minimum of three (3) years experience installing similar coatings and shall be licensed or approved in writing by manufacturer to install/apply this product.
 - 4. Applicator of concrete sealer, hardener, densifier shall be factory trained and approved, in writing, by the manufacturer to apply the product.
 - a. Applicator shall have a minimum of five (5) years experience successfully applying materials specified.

DEFINITIONS 1.03

- A. Vertical Surface Defects:
 - 1. Any void in the face of the concrete deeper than 1/8 IN, such as:
 - a. Tie holes.
 - b. Air pockets (bug holes).
 - c. Honeycombs.
 - d. Rock holes.
 - 2. Scabbing:
 - a. Scabbing is defect in which parts of the form face, including release agent, adhere to concrete.
 - 3. Foreign material embedded in face of concrete.
 - 4. Fins 1/16 IN or more in height.
- B. Installer or Applicator:
 - 1. Installer or applicator is the person actually installing or applying the product in the field at the Project site.
 - 2. Installer and applicator are synonymous.
- C. Other words and terms used in this Specification Section are defined in ACI 116R.

1.04 **SUBMITTALS**

A. Submittal Procedures: See Section 01 33 00 - Submittal Procedures for requirements for the mechanics and administration of the submittal process.

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- B. Approval Submittals:
 - 1. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
- C. Quality Assurance Submittals:
 - 1. Certifications:
 - a. Certification of aggregate gradation.
 - b. Certification that products being used will not interfere with bonding of future floor or wall finishes.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Comply with manufacturer's recommendations and requirements for materials used.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. Chemical floor sealer (CS-1) (CS-3):
 - a. L&M Construction Chemicals, Inc. (www.Imcc.com).
 - b. Euclid Chemical Co. (*www.euclidchemical.com*).
 - c. Dayton Superior.(www.daytonsuperior.com).
 - d. Or approved equal.
 - 2. Bonding agents:
 - a. Euclid Chemical Co. (www.euclidchemical.com).
 - b. BASF Admixtures, Inc. (www.basf.com).
 - c. L&M Construction Chemicals, Inc.(www.Imcc.com).
 - d. Or approved equal.
 - 3. Chemical Resistant Epoxy Coating:
 - a. Dudick Inc. (<u>www.Dudick.com</u>)
 - b. ENGARD 460HS (www.ellispaint.com)
 - c. Or approved equal.
- B. Submit request for substitution in accordance with Specification Section 01 60 00 Product Requirements.

2.02 MATERIALS

- A. Chemical Floor Sealer CS-1:
 - 1. Colorless low VOC water-based solution containing acrylic copolymers.
 - a. ASTM C1315, Class B, minimum 30 percent solids.
 - b. ASTM C309, Type 1.
 - c. Non-yellowing UV resistant.
 - d. Capable of being painted after cured.
- B. Bonding Agent:
 - 1. For use only on concrete surfaces not receiving liquid water repellent coating:
 - a. High solids acrylic latex base liquid for interior or exterior application as a bonding agent to improve adhesion and mechanical properties of concrete patching mortars.
 - 2. For use only on concrete surface receiving liquid water repellent:
 - a. Non-acrylic base liquid for interior or exterior application as a bonding agent to improve adhesion and mechanical properties of concrete patching mortars.
- C. Cement:
 - 1. ASTM C150, Type II Portland for areas exposed to sewage.
 - 2. ASTM C150, Type II Portland elsewhere.
- D. Aggregate:
 - 1. Sand: Maximum size #30 mesh sieve.
 - 2. For exposed aggregate finish surfaces: Same as surrounding wall.
- E. Floor and Slab Treatments:
 - VOC Content: Liquid floor treatments shall have a VOC content of 200 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - 2. Penetrating Liquid Floor Treatment: Clear, chemically reactive, waterborne solution of inorganic silicate or Siliconate materials and proprietary components; odorless; that penetrates, hardens, and densifies concrete surfaces.
 - 3. Penetrating Liquid Floor Treatments for Polished Concrete Finish: Clear, waterborne solution of inorganic silicate or Siliconate materials and proprietary components; odorless; that penetrates, hardens, and is suitable for polished concrete surfaces.

- 4. Trowel applied chemical resistant lining system: 100% Solids, low odor, VOC compliant of local authorities having jurisdiction.
 - Trowel applied chemical resistant lining must be resistant to for a minimum 72hrs of immersion service without pitting, softening or swelling:
 - 1) Reactives (4.1, 4.2, 4.3).
 - 2) Acids.
 - 3) Lead Acid Batteries.
 - 4) Bases.
 - 5) Flammable (aerosol, liquid).
 - 6) Oil Based Paints & Paint Related.
 - 7) Auto Oil.
 - 8) Antifreeze.
 - 9) Oxidizer.
 - 10) Pesticides/Poison-liquid & Aerosol.
 - 11) Pesticides Solids.
 - 12) Alkaline Batteries.
 - 13) Fluorescent Tubes.
 - b. System Characteristics:
 - 1) Color and Pattern: As selected by Project Representative from Manufacturer's full range.
 - 2) Overall System Thickness: 3/16 IN.
 - 3) Epoxy.
 - 4) Formulation Description: 100 percent solids.
 - 5) Application Method: Troweled.
 - c. System Physical Characteristics:
 - 1) Compressive Strength: 5000-6550 PSI per ASTM C 579.
 - 2) Tensile Strength: 1500-1600 PSI per ASTM C 307.
 - 3) Flexural Modulus of Elasticity: 2200-2400 PSI per ASTM C 580.
 - 4) Taper Abrasion: 40mg. 60 mg. per ASTM D 4060.
 - 5) CS-17 Wheel: 1000 Revolutions.
 - 6) Volatile Organic Compounds(VOC) ASTM D-3960 0.
 - 7) Tensile Bond Strength Cohesive Failure ASTM D 4541 of Concrete.
- F. Water: Potable.

G. Non-Shrink Grout: See Specification Section 03 31 30 – Concrete, Materials, and Proportioning and Specification Section 03 31 31 - Concrete Mixing, Placing Jointing, and Curing.

2.03 MIXES

- A. Bonding Grout: One (1) part cement to one (1) part aggregate.
- B. Patching Mortar:
 - 1. One (1) part cement to two and one-half (2-1/2) parts aggregate by damp loose volume.
 - a. Substitute white Portland cement for a part of gray Portland cement to produce color matching surrounding concrete.

PART 3 – EXECUTION

3.01 PREPARATION

- A. For methods of curing, see Specification Section 03 31 31 Concrete Mixing, Placing Jointing, and Curing.
- B. Preparation of Bonding Grout Mixture:
 - 1. Mix cement and aggregate.
 - 2. Mix bonding agent and water together in separate container in accordance with manufacturer's instructions.
 - 3. Add bonding agent/water mixture to cement/aggregate mixture.
 - 4. Mix to consistency of thick cream.
 - 5. Bonding agent itself may be used as bonding grout if approved by manufacturer and Project Representative.
- C. Preparation of Patching Mortar Mixture:
 - 1. Mix cement and aggregate.
 - 2. Mix bonding agent and water together in separate container in accordance with manufacturer's instructions.
 - 3. Add only enough bonding agent/water mixture to cement/aggregate mixture to allow handling and placing.
 - 4. Let stand with frequent manipulation with a trowel, until mix has reached stiffest consistency to allow placement.
- D. Clean surfaces in accordance with ASTM D4258 to remove dust, dirt, form oil, grease, or other contaminants prior to abrasive blasting, chipping, grinding or wire brushing.
 - 1. Abrasive blast surfaces in accordance with ASTM D4259 and SSPC SP 13/NACE No. 6 to completely open defects down to sound concrete and remove laitance.
 - a. If additional chipping or wire brushing is necessary, make edges perpendicular to surface or slightly undercut.

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- b. No featheredges will be permitted.
- 2. Rinse surface with clean water and allow surface water to evaporate prior to repairing surface defects.
- E. Repairing Surface Defects:
 - 1. This method of repairing surface defects is to be used only on vertical concrete surfaces, in tanks containing water, surfaces to receive liquid water repellent and exterior surfaces.
 - 2. Fill and repair using patching mortar mix specified in Article 2.3.
 - a. Use non-shrink grout to fill tieholes as outlined in this Specification Section.
 - 3. If required by bonding agent manufacturer, etch surfaces with a muriatic acid solution followed by a thorough rinse with clean water.
 - a. Test concrete to determine pH level and continue flushing with clean water until surface pH is within acceptable limits.
 - 4. Dampen area to be patched and an area at least 6 IN wide surrounding it prior to application of bonding grout.
 - 5. Brush bonding grout into the surface after the surface water has evaporated.
 - 6. Allow bonding grout to set for period of time required by bonding agent manufacturer before applying premixed patching mortar.
 - 7. Fill tie holes with non-shrink non-metallic grout.
 - a. Where exposed to view and scheduled to receive concrete Finish #2 or #5, hold grout below surface of concrete and fill with patching mortar to match surrounding concrete.
 - 8. Fill all other defects with patching mortar.
 - a. Match color of surrounding wall.
 - b. Do not use acrylic bonding agent in patching mortar for filling defects in surfaces to be treated with liquid water repellent.
 - 9. Consolidate grout or mortar into place and strike off so as to leave patch slightly higher than surrounding surface.
 - 10. Leave undisturbed for at least 60 minutes before finishing level with surrounding surface.
 - a. Do not use metal tools in finishing a patch in a formed wall which will be exposed or coated with other materials.
 - 11. Keep areas damp in accordance with grout manufacturer or bonding agent manufacturer's directions.

3.02 INSTALLATION AND APPLICATION

- A. Do not repair surface defects or apply wall or floor finishes when temperature is or is expected to be below 50 DegF.
 - 1. If necessary, enclose and heat area to between 50 and 70 DegF during repair of surface defects and curing of patching material.
 - a. Use only clean fuel, indirect fired heating apparatus.
- B. Chemical Floor Sealer CS-1 Application:
 - 1. Apply to floor areas indicated on the Drawings in accordance with manufacturer's recommendations.
 - 2. Apply at rate recommended by manufacturer.
 - 3. After final coat of material is applied, remove surplus in accordance with manufacturer's recommendations.
 - 4. Do not apply sealer to floors scheduled to receive epoxy floor finish.
- C. Floor and Slab Treatments:
 - VOC Content: Liquid floor treatments shall have a VOC content of 200 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - 2. Penetrating Liquid Floor Treatment: Prepare, apply and finish penetrating liquid floor treatment according to manufacturer's written instructions.
 - a. Remove curing compounds, sealers, oil, dirt, laitance and other contaminants and complete surface repairs.
 - b. Do not apply to concrete that is less than 28 days old.
 - c. Apply liquid until surface is saturated, scrubbing into surface until a get forms; rewet and repeat brooming or scrubbing. Rinse with water. Remove excess material until surface is dry. Apply a second coat in a similar manner if surface is rough or porous.
 - 3. Polished Concrete Floor Treatment: Apply concrete finish system to cured and prepared slabs to match accepted mockup.
 - a. Machine grind floor surfaces to receive polished finish level and smooth.
 - b. Apply penetrating liquid floor treatment for polished concrete in polishing sequence and according to manufacturer's written instructions, allowing recommended drying time between successive coats.
 - c. Continue polishing with progressively finer grit diamond polishing pads to gloss level to match approved mockup.
 - d. Control and dispose of waste products produced by grinding and polishing operations.
 - e. Neutralize and clean polished floor surfaces.

- 4. Sealing Coat: Uniformly apply a continuous sealing coat of curing and sealing compound to hardened concrete by power spray or roller according to manufacturer's written instructions.
- D. Trowel applied chemical resistant lining system:
 - 1. Primer Application:
 - a. Properly mixed and catalyzed Primer, a 100 percent solids, moisture tolerant, deep penetrating epoxy primer, shall be roller applied to all concrete surfaces at 3-4 mils WFT.
 - b. 1 oz. chopped strand fiberglass mat shall be pressed into wet primer overlapping floor/wall joint and tops and corners of curbs. Saturate with properly mixed and catalyzed Primer.
 - c. The primer shall not be applied by spray or brush.
 - d. The primer shall not be applied when the relative humidity is greater than 90%.
 - e. The primer shall not be applied when the substrate temperature is less than 5°F above the dew point of the air in the work area.
 - f. The primer shall not be applied when concrete temperature is increasing and/or the concrete is outgassing.
 - g. The primer shall not be applied when temperature of the substrate and lining materials are higher than 110 DegF or less than 50 DegF.
 - h. The primer shall be mixed, applied and properly stored as described in product literature.
 - 2. Application of Trowel Applied Chemical Resistant Lining:
 - a. After the Primer is tack free, the application of properly mixed and catalyzed Trowel Applied Chemical Resistant Lining shall be trowel applied at a nominal 3/16 IN DFT.
 - b. The basecoat shall not be applied when the relative humidity is greater than 90 percent.
 - c. The basecoat shall not be applied when the substrate temperature is less than 5 DegF above the dew point of the air in the work area.
 - d. The basecoat shall not be applied when the concrete temperature is increasing and/or the concrete is outgassing.
 - e. The basecoat shall not be applied when the temperature of the substrate and lining materials are higher than 110 DegF or less than 50 DegF.
 - f. The basecoat shall be mixed, applied and properly stored as described in the manufacturer's literature.
 - g. After the basecoat is tack free, the application of properly mixed and catalyzed resin shall be trowel applied at a nominal 8-10 mil DFT.

- E. Concrete Finishes for Vertical Wall Surfaces:
 - 1. General: Give concrete surfaces finish as specified below after removal of formwork and repair of surface defects.
 - 2. Finish #1 As cast rough form finish:
 - a. Selected forming materials are not required.
 - b. Prepare surface in accordance with Article 3.1 and repair the following surface defects:
 - 1) Tie holes.
 - 2) Honeycombs deeper than 1/4 IN.
 - 3) Air pockets deeper than 1/4 IN.
 - 4) Rock holes deeper than 1/4 IN.
 - c. Chip or rub off fins exceeding 1/4 IN in height.
 - d. Use at unexposed surfaces such as foundations and backfilled surfaces of walls not to be waterproofed.
 - 3. Finish #2 As cast form finish:
 - a. Form facing material shall produce a smooth, hard, uniform texture.
 - 1) Use forms specified for surfaces exposed to view in accordance with Specification Section 03 11 13 Formwork.
 - b. Prepare surface in accordance with Article 3.1 and repair the following surface defects:
 - 1) Tie holes.
 - 2) Honeycombs deeper than 1/4 IN or larger than 1/4 IN DIA.
 - 3) Air pockets deeper than 1/4 IN or larger than 1/4 IN DIA.
 - 4) Rock holes deeper than 1/4 IN or larger than 1/4 IN DIA.
 - 5) Scabbing.
 - c. Chip or rub off fins exceeding 1/8 IN in height.
 - 1) Finish shall provide uniform color and texture.
 - d. Provide this finish for:
 - 1) Inside walls of wet wells, basins, clarifiers, trickling filters, and manholes, and pipe trenches.
 - 2) Walls being waterproofed and coated with some other material.
 - 3) Exposed surfaces not specified to receive another finish.
- F. Related Unformed Surfaces (Except Slabs):
 - 1. Strike smooth and level tops of walls or buttresses, horizontal offsets, and similar unformed surfaces occurring adjacent to formed surfaces after concrete is placed.

- 2. Float surface to a texture consistent with that of formed surfaces.
 - a. If more than one (1) finish occurs immediately adjacent to unformed surface, provide surface with most stringent formed surface requirement.
- Continue treatment uniformly across unformed surfaces.
- G. Concrete Finishes for Horizontal Slab Surfaces:
 - 1. General:
 - a. Tamp concrete to force coarse aggregate down from surface.
 - b. Screed with straightedge, eliminate high and low places, bring surface to required finish elevations; slope uniformly to drains.
 - c. Dusting of surface with dry cement or sand during finishing processes not permitted.
 - 2. Unspecified slab finish:
 - a. When type of finish is not indicated, use following finishes as applicable:
 - 1) Surfaces intended to receive bonded applied cementitious applications: Scratched finish.
 - 2) Surfaces intended to receive roofing or waterproofing membranes: Floated finish.
 - 3) Floors: Troweled finish.
 - 4) Garage floors and ramps: Broom or belt finish.
 - 5) Exterior slabs, sidewalks, platforms, steps and landings, and ramps, not covered by other finish materials: Broom or belt finish.
 - 6) All slabs to receive a floated finish before final finishing.
 - 3. Scratched slab finish: After concrete has been placed, consolidated, struck off, and leveled to a Class B tolerance, roughen surface with stiff brushes or rakes before final set.
 - 4. Floated finish:
 - a. After concrete has been placed, consolidated, struck off, and leveled, do no further work until ready for floating.
 - b. Begin floating when water sheen has disappeared and surface has stiffened sufficiently to permit operations.
 - 1) Use wood or cork float.
 - c. During or after first floating, check planeness of entire surface with a 10 FT straightedge applied at not less than two (2) different angles.
 - d. Cut down all high spots and fill all low spots to produce a surface with Class B tolerance throughout.
 - e. Refloat slab immediately to a uniform texture.

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- 5. Troweled finish:
 - a. Float finish surface to true, even plane.
 - b. Power trowel, and finally hand trowel.
 - c. First troweling after power troweling shall produce a smooth surface which is relatively free of defects, but which may still show some trowel marks.
 - d. Perform additional trowelings by hand after surface has hardened sufficiently.
 - e. Final trowel when a ringing sound is produced as trowel is moved over surface.
 - f. Thoroughly consolidate surface by hand troweling.
 - g. Leave finished surface essentially free of trowel marks, uniform in texture and appearance and plane to a Class A tolerance.
 - h. On surfaces intended to support floor coverings, remove any defects that would show through floor covering by grinding.
- 6. Broom or belt finish: Immediately after concrete has received a float finish as specified, give it a transverse scored texture by drawing a broom or burlap belt across surface.
- 7. Underside of concrete slab finish:
 - a. Match finish as specified for adjacent vertical surfaces.
 - b. If more than one (1) finish occurs immediately adjacent to underside of slab surface, provide surface with most stringent formed surface requirement.

3.03 FIELD QUALITY CONTROL

- A. Horizontal slab finishes will be accepted provided:
 - 1. Applicable specification requirements are satisfied.
 - 2. Water does not pond in areas sloped to drain.
 - 3. Gap between a 10 FT straightedge placed anywhere and the finished surface does not exceed:
 - a. Class A tolerance: 1/8 IN.
 - b. Class B tolerance: 1/4 IN.
 - c. Class C tolerance: 1/2 IN.
 - 4. Accumulated deviation from intended true plane of finished surface does not exceed 1/2 IN.
 - 5. Accuracy of floor finish does not adversely affect installation and operation of movable equipment, floor supported items, or items fitted to floor (doors, tracks, etc.).

- B. Unacceptable finishes shall be replaced or, if approved in writing by Project Representative, may be corrected provided strength and appearance are not adversely affected.
 - 1. High spots to be removed by grinding and/or low spots filled with a patching compound or other remedial measures to match adjacent surfaces.

3.04 PROTECTION

A. All horizontal slab surfaces receiving chemical floor sealer shall be kept free of traffic and loads for minimum of 72 HRS following installation of sealer.

END OF SECTION

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SECTION 03 35 00 CONCRETE SEALER

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Surface preparation.
 - 2. Application of clear, acrylic slip resistant concrete sealer and pigmented concrete sealer to concrete walls, concrete retaining walls, and concrete push walls in the Transfer Station, Administration Building, and HHW.

1.02 REFERENCES

A. ASTM C1315, Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete.

1.03 SUBMITTALS

- A. Submittal Procedures: See Section 01 33 00 Submittal Procedures for requirements for the mechanics and administration of the submittal process.
- B. Leadership in Energy and Environmental Design (LEED) Documentation: Submit the following in accordance with Section 01 81 30 – Sustainability Requirements.
 - MR 5 –Local Regional Materials: For products and materials required to comply with requirements for regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.
 - 2. EQ 4.2 Low-Emitting Materials; Paints & Coatings: Product Data for field-applied floor sealer including printed statement of VOC content.
- C. Approval Submittals:
 - 1. Manufacturer's product data and application instructions.
 - 2. Sample.
 - a. Submit a 1-quart wet sample, a drawdown color sample, and spectrophotometer or colorimeter readings taken in accordance with ASTM D 2244, for each batch. The calculated Delta E shall not exceed 1.0 deviation from the Commission Internationale de l'Eclairage (CIELAB) color measurement analysis method for each pigmented sealer color.

b. The 1-quart wet sample shall be submitted in the manufacturer's labeled container with product number, batch number, and size of batch. The companion drawdown color sample shall be labeled with the product number, batch number, and size of batch. Submit the specified samples and readings to the Project Representative. Begin applying pigmented sealer only after receiving the Project Representative's written approval of the pigmented sealer color samples.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.
- B. Store materials in a clean dry area in accordance with manufacturer's instructions.
- C. Keep product from freezing.
- D. Avoid direct contact with this product as it may cause irritation of the eyes and/or skin.
- E. Protect materials during handling and application to prevent damage or contamination.
- F. Do not mix with any compound containing solvent.

1.05 ENVIRONMENTAL REQUIREMENTS

- A. Do not apply product when air, surface, or material temperatures are expected to fall below 40 DegF within 4 HRS of expected application.
- B. Do not apply to frozen concrete.
- C. Do not use on dense or porous surface.

PART 2 – PRODUCTS

2.01 MANUFACTURER

Subject to compliance with the requirements of the Contract Documents, products of the following Manufacturers shall be incorporated into the Work of this Section:

- A. Clear, acrylic slip resistant concrete sealer:
 - 1. W. R. MEADOWS, INC. (<u>www.wrmeadows.com</u>).
 - 2. EVCO-Grip (www.euclidchemical.com).
 - 3. Or approved equal.
- B. Pigmented concrete sealer shall match color of Sherwin Williams SW 7052 "Gray Area":
 - 1. Sherwin Williams.
 - 2. Kelley Moore Paint.
 - 3. United Coatings.
 - 4. Rodda Paint.
 - 5. Or approved equal.

2.02 MATERIALS

- A. Clear, acrylic slip resistant concrete sealer Performance Based Specification: Acrylic concrete sealer shall be a water-base, non-yellowing, clear, slipresistant compound meeting the following requirements:
 - 1. ASTM C1315:
 - a. Ultraviolet Resistance: Class a, non-yellowing.
 - b. Chalk Resistance: No chalking.
 - c. Check/Peel Resistance: No deterioration.
 - 2. Dried film accepted by USDA.
 - 3. Meets the maximum VOC content limits of 100 g/L for Concrete Curing and Sealing Compounds.
- B. Special materials requirements for pigmented concrete sealer:
 - The pigmented sealer shall be a semi-opaque, colored toner containing only methyl methacrylate-ethyl acrylate copolymer resins, toning pigments suspended in solution at all times by a chemical suspension agent, and solvent. Toning pigments shall be laminar silicates, titanium dioxide, and inorganic oxides only. There shall be no settling or color variation. Tinting shall occur at the factory at the time of manufacture and placement in containers, prior to initial shipment. Use of vegetable or marine oils, paraffin materials, stearates, or organic pigments in any part of coating formulation shall not be permitted.
- C. Acceptable pigmented concrete sealer products include:
 - 1. Sherwin Williams SWD DOT Bridge and Highway Concrete Sealer.
 - 2. Kelly Moore Paint 1287 Envira-crete Acrylic Sealer/Stain.
 - 3. United Coatings Canyon Tone Stain.
 - 4. Rodda Paint Concrete Sealer/Stain.
 - 5. Or approved equal.

PART 3 – EXECUTION

3.01 EXAMINATION

- A. Examine surfaces to receive concrete sealer.
 - 1. Notify Project Representative if surfaces are not acceptable.
 - 2. Do not begin surface preparation or application until unacceptable conditions have been corrected.

3.02 SURFACE PREPARATION

- A. Protect adjacent surfaces not designated to receive sealer.
- B. Clean and prepare surfaces to receive sealer in accordance with manufacturer's instructions, ensuring that all stains, oil, grease, form release agents, dust and dirt is removed prior to application.
- C. Ensure surface is clean and free from all powdered release agent residue.
- D. Apply concrete sealer when concrete surface is clean and dry.

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E. Apply concrete sealer after concrete has cured for at least 28 days.

3.03 APPLICATION

- A. Apply pigmented sealer to wall surfaces shown in the Drawings.
- B. Apply sealer in accordance with manufacturer's instructions.
- C. Mix or agitate concrete sealer thoroughly avoiding excessive mixing.
- D. Apply a uniform film of clear, acrylic concrete sealer using a standard industrial-grade sprayer, sprayed with an 8001 tip that produces a flow of 1/10 of 1 GAL per minute.
 - 1. Alternatively, apply using a short nap roller.
- E. Apply a second coat at right angles to the first for added protection if required.
- F. The pigmented sealer shall be spray applied in accordance with the manufacturer's written instructions for application, air temperature required for sealer application and curing, qualification of applicator, rate of application, and number of coats to apply.
- G. Stir occasionally during application to ensure particles remain suspended.
- H. The final appearance of surfaces receiving pigmented concrete sealer shall have an even and uniform color acceptable to the Project Representative.

3.04 PROTECTION

A. Restrict foot traffic for at least 12 HRS.

END OF SECTION

SECTION 03 41 13 PRECAST CONCRETE HOLLOW CORE SLAB

PART 1 – GENERAL

1.01 SUMMARY

- A. Description:
 - 1. The Work described in this Section includes design, manufacturer, delivery, erection and installation of precast, prestressed hollow core slabs.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Division 00 Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 01 General Requirements.
 - 3. Section 03 09 00 Concrete.

1.02 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. American Concrete Institute (ACI):
 - a. 350-06 Code Requirements for Environmental Engineering
 - 2. City of Bellevue:
 - a. Development Services Handout B-1.
 - 1) Exception: 45,000 LB outrigger point load shall not be required.
 - 3. Building Code:
 - a. International Code Council (ICC):
 - International Building Code and associated standards, 2009 Edition including all amendments and as adopted by the City of Bellevue, referred to herein as Building Code.

1.03 SUBMITTALS

- A. Submittal Procedures: See Section 01 33 00 Submittal Procedures for requirements for the mechanics and administration of the submittal process.
- B. Approval Submittals:
 - The precast, prestressed hollow core slabs shall be designed by the Manufacturer for the spans, loading conditions and shapes specified on the Structural Drawings. Design calculations shall be submitted to the Project Representative for review and approval. Design submittals shall bear the stamp and signature of State of Washington Registered Professional Engineer experienced in precast, prestressed concrete.
 - 2. The Manufacturer shall submit Shop Drawings and Erection Drawings to the designer of record for review and approval. Drawings shall show number and size of prestressing strands, prestress force, block-outs, mark numbers, sections cut for manhole installation, and all other details necessary for the manufacture and installation of the hollow core slabs.

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PART 2 – PRODUCTS

2.01 TYPE OF PRODUCT

A. The precast, prestressed hollow core slabs shall be machine extruded, with continuous open cores, in a casting yard under closely controlled mixing, placing, and curing conditions. The slabs shall be furnished in nominal 4 FT - 0 IN widths, and sawn to lengths shown on the Drawings. Special slabs with narrower widths or manhole opening notches shall be designed and cut to proper dimensions by the Manufacturer. Hollow core slab soffits shall have a smooth steel-formed finish.

2.02 MATERIALS

- A. Concrete:
 - 1. Minimum compressive strength of 4000 psi at the time of detensioning, and 8000 psi at 28 days.
 - 2. Concrete compressive strength shall be determined with a calibrated rebound test hammer in accordance with ASTM C-805.
 - 3. Concrete mix shall be designed by the Manufacturer as required for proper operation of the production equipment.
- B. Cement: Comply with ASTM C150, Type I or III.
- C. Aggregates: Comply with ASTM C33 or C330.
- D. Reinforcing:
 - 1. Prestressing strands shall be 7-wire, uncoated high-tensile strength strand in conformance with ASTM A416.
- E. Slabs:
 - 1. Hollow core slabs shall have an average weight of no greater than 90 psf.
 - 2. Hollow core slabs shall be 12.5 IN in depth.
- F. Requirements of ASTM E329.

PART 3 – EXECUTION

3.01 QUALITY CONTROL

- A. The hollow core Manufacturer shall be a PCI-Certified Plant, with an established Quality Control Program to ensure close control of the materials and procedures used in production of the hollow core slabs.
- B. Each hollow core slab shall be inspected prior to delivery, and shall be clearly marked by the Quality Control Inspector as approved for use in construction.

END OF SECTION

SECTION 03 48 00 PRECAST CONCRETE VAULTS AND OIL WATER SEPARATORS

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Precast Concrete Vaults and Lids.
 - 2. Oil Water Separator Coalescing Plates.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Division 00 Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 01 General Requirements.
 - 3. Specification Section 03 05 05 Testing.
 - 4. Specification Section 03 21 00 Reinforcement.
 - 5. Specification Section 03 31 30 Concrete, Materials and Proportioning.
 - 6. Specification Section 03 31 31 Concrete Mixing, Placing, Jointing, and Curing.
 - 7. Specification Section 31 21 33 Trenching, Backfilling, and Compacting for Utilities.
 - 8. Specification Section 05 50 00 Metal Fabrications.

1.02 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. City of Bellevue (COB):
 - a. Sewer Engineering Standards, January 2012.
 - b. Water Engineering Standards, January 2012.
 - 2. Department of Ecology (DOE):
 - a. 2012 Stormwater Management Manual for Western Washington (SWMMWW).
 - 3. American Association of State Highway and Transportation Officials (AASHTO).
 - 4. ASTM International (ASTM):
 - a. C33, Standard Specification for Concrete Aggregates.
 - b. C150, Standard Specification for Portland Cement.
 - 5. Occupational Safety and Health Administration (OSHA).

- 6. Precast/Prestressed Concrete Institute (PCI):
 - a. MNL 116, Manual for Quality Control for Plants and Production of Precast and Prestressed Concrete Products.
 - b. PCI Design Handbook Precast and Prestressed Concrete.
- B. Qualifications:
 - 1. Certification: Contractor shall provide Certificates of Compliance with this specification for precast concrete vaults.
 - 2. Design of Vaults: Design of vaults shall be stamped and signed by a Structural Engineer licensed in the State of Washington.

1.03 SUBMITTALS

- A. Submittal Procedures: See Section 01 33 00 Submittal Procedures for requirements for the mechanics and administration of the submittal process.
- B. Leadership in Energy and Environmental Design (LEED[®]) Documentation: Submit the following in accordance with Section 01 81 30 – Sustainability Requirements:
 - 1. Completed LEED Materials Tracking Form.
- C. Approval Submittals:
 - 1. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 - 2. Shop Drawings and erection plans for precast units (including hollow core units by others and removable panels by A/E Representative), and supports showing:
 - a. Size and location of vault.
 - b. Size, configuration, location and quantity of reinforcing bars.
 - c. Size and location of openings verified by Contractor.
 - d. Size, number, and locations of embedded metal items and connections.
 - e. Required concrete strengths.
 - f. Identification of each unit using same standard marking numbers as used to mark actual units.
 - 3. Concrete mix design(s) including submittal information defined in Section 03 31 30 Concrete, Materials, Proportioning.
- D. Quality Assurance Submittals:
 - 1. Copies of source quality control tests.
 - 2. Certification of manufacturer's testing facility qualifications.

PART 2 – PRODUCTS

ACCEPTABLE MANUFACTURERS 2.01

- A. Oil/Water separators shall be in accordance with COB Engineering Standards Section D5-03.
- B. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. Precast Concrete Vaults:
 - a. Oldcastle Precast (basis of design).
 - b. H2 Pre-cast Inc.
 - c. Or approved equal.
 - 2. Oil Water Separator Coalescing Plates:
 - a. Facet MPak® Coalescing Plates.
 - b. Velcon
 - c. Or approved equal.

2.02 MATERIALS

- A. Oil/Water separators shall be in accordance with COB Engineering Standards Section D5-03.
- B. Cement:
 - 1. Comply with ASTM C150, Type I or III.
- C. Aggregates for Normal Weight Concrete for Removable Panels Only:
 - 1. ASTM C33 with coarse aggregate meeting the gradation for size 67 as stated in ASTM C33.
 - 2. Provide aggregates approved for bridge construction by the State Highway Department in the state where the precast units are fabricated or in the State of Washington.
 - 3. All fine aggregate to be natural not manufactured.
- D. Water:
 - 1. Potable, clean.
 - 2. Free of oils, acids, and organic matter.
- E. Maximum total chloride ion content contributed from all ingredients of concrete including water, aggregates, cement and admixtures measured as a weight percent of cement to not exceed 0.06 for prestressed concrete and 0.10 for all other precast concrete.
- F. Plates:
 - 1. Separator plates shall meet the following requirements:
 - a. Plates shall be inclined at 45 to 60 degrees from horizontal.

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- b. Plates shall be corrugated and the space between plates shall be no less than 1/2 IN.
- c. Plates shall be securely bundled in a pack that can be removed as a unit.
- d. The plate pack shall be a minimum of 6 IN from the vault floor
- G. Precast Concrete Vaults (Basis of Design):

VAULT TAG	SHEET	VAULT MODEL	LID MODEL
Grit Chamber	01C317	NA	NA
Hot Load Valve			
Vault	01C518	Oldcastle Precast Vault 777-LA	77-42C
Hot Load Holding		City of Bellevue S-30 (2,200 Gal	City of Bellevue S-30 (2,200
Tank	01C317	Capacity)	Gal Capacity)
Oil and Water			
Separator 101	01C317	Old Castle 816-B-CPS	816-T-CPS-HD
Oil and Water			
Separator 100	01C317	Old Castle 612-B-CPS	612-T-CPS-HD
		City of Bellevue Detail W-33 (6"	City of Bellevue Detail W-33
Domestic Meter	01C313	Meter Size)	(6" Meter Size)
		City of Bellevue Detail W-44 (6"	City of Bellevue Detail W-44
Domestic DCVA	01C313	Size)	(6" Size)
Irrigation DCVA	01C121	City of Bellevue Detail W-36 C	City of Bellevue Detail W-36
Irrigation Meter	01C121	City of Bellevue Detail W-36	City of Bellevue Detail W-36
-		City of Bellevue Detail W-44 (8"	City of Bellevue Detail W-44
DCVA 100	01C313	Size)	(8" Size)
		City of Bellevue Detail W-44 (8"	
DCVA 201	01C314	Size)	4484-T-42C
		City of Bellevue Detail W-45 (8"	City of Bellevue Detail W-45
Fire DCDA	01C313	Size)	(8" Size)
8" Water Meter			
100	01C313	City of Bellevue Detail W-34	City of Bellevue Detail W-34
8" Water Meter			
101	01C313	City of Bellevue Detail W-34	City of Bellevue Detail W-34

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Oil/Water separators shall be in accordance with COB Engineering Standards Section D5-03.
- B. All precast concrete vaults shall be installed in strict conformance with the manufacturer's written instruction, on a concrete foundation as shown on the Construction Documents. Vaults shall be installed plumb.
- C. Adhesive anchors for attaching ladders to walls shall be installed in accordance with the anchor manufacturer's written instruction.
- D. Separator plates shall fit within the oil/water separator vault as shown in the Drawings.

E. Any space between the edges of the plate packs and the vault walls should be filled to reduce short-circuiting around the plate pack. A solid, lightweight material such as plastic, polyethylene foam or equivalent installed per the manufacturer's recommendations is acceptable.

3.02 FIELD QUALITY CONTROL

- A. Employ and pay for services of equipment manufacturer's field service representative(s) to:
 - 1. Inspect equipment covered by these Specifications.
 - 2. Supervise adjustments and installation checks.
 - 3. Provide test equipment, tools, and instruments necessary to accomplish equipment testing.
 - 4. Conduct start-up of equipment and perform operational checks.
 - 5. Provide Project Representative with a written statement that manufacturer's equipment has been installed properly, has been started up, and is ready for operation by Owner's personnel.

END OF SECTION

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SECTION 05 12 00 STRUCTURAL STEEL

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Structural steel, including the fabrication and erection of framing and bracing members, including connections.
- B. Related Sections include but are not necessarily limited to:
 - 1. Division 00 Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 01 General Requirements.
 - 3. Section 05 21 10 Steel Joists.
 - 4. Section 05 30 00 Metal Deck.
 - 5. Section 05 50 00 Metal Fabrications.
 - 6. Section 05 52 05 Steel Railings.
 - 7. Section 09 91 00 Painting and Protective Coatings.

1.02 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. American Institute of Steel Construction (AISC):
 - a. 303, Code of Standard Practice for Steel Buildings and Bridges.
 - b. 325, Manual of Steel Construction.
 - c. 341, Seismic Provisions for Structural Steel Buildings.
 - d. 358, Prequalified Connections for Special and Intermediate Steel Moment Frames for Seismic Applications.
 - e. 360, Specifications for Structural Steel Buildings (referred to herein as AISC Specification).
 - 2. American Society of Civil Engineers (ASCE).
 - 3. American Society of Mechanical Engineers (ASME):
 - a. B18.22.1, Plain Washers.
 - 4. ASTM International (ASTM):
 - a. A2, Standard Specification for Carbon Steel Girder Rails of Plain, Grooved, and Guard Types.
 - b. A6, Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling.
 - c. A36, Standard Specification for Carbon Structural Steel.

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- d. A53, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
- e. A108, Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished.
- f. A153, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
- g. A307, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
- h. A325, Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
- i. A449, Standard Specification for Hex Cap Screws, Bolts and Studs, Steel, Heat Treated, 120/105/90 ksi Minimum Tensile Strength, General Use.
- j. A490, Standard Specification for Structural Bolts, Alloy Steel, Heat Treated, 150 ksi Minimum Tensile Strength.
- k. A496, Standard Specification for Steel Wire, Deformed, for Concrete Reinforcement.
- I. A500, Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
- m. A563, Standard Specification for Carbon and Alloy Steel Nuts.
- n. A572, Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel.
- o. A992, Standard Specification for Steel for Structural Shapes.
- p. F436, Standard Specification for Hardened Steel Washers.
- F593, Standard Specification for Stainless Steel Bolts, Hex Caps Screws and Studs.
- r. F959, Standard Specification for Compressible-Washer-Type Direct Tension Indicators for Use with Structural Fasteners.
- s. F1554, Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength.
- 5. American Welding Society (AWS):
 - a. A5.1, Specification for Carbon Steel Electrodes for Shielded Metal Arc Welding.
 - b. A5.5, Specification for Low-Alloy Steel Electrodes for Shielded Metal Arc Welding.
 - c. A5.17, Specification for Carbon Steel Electrodes and Fluxes for Submerged Arc Welding.
 - d. A5.18, Specification for Carbon Steel Electrodes and Rods for Gas Shielded Arc Welding.
 - e. A5.20, Specification for Carbon Steel Electrodes for Flux Cored Arc Welding.

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- f. A5.23, Specification for Low-Alloy Steel Electrodes and Fluxes for Submerged Arc Welding.
- g. A5.28, Specification for Low-Alloy Steel Electrodes and Rods for Gas Shielded Arc Welding.
- h. A5.29, Specification for Low-Alloy Steel Electrodes for Flux Cored Arc Welding.
- i. D1.1, Structural Welding Code Steel (referred herein as AWS Code).
- j. Steel stud connectors and their installation to comply with requirements of AWS Code.
- 6. Research Council on Structural Connections (RCSC):
 - a. Specification for Structural Joints Using ASTM A325 or A490 Bolts, referred to herein as Specification for Structural Joints.
- 7. Building Code:
 - a. International Code Council (ICC):
 - International Building Code and associated standards, 2009 Edition as amended by the State of Washington, and the City of Bellevue Amendments, referred to herein as Building Code.
- B. Qualifications:
 - 1. Steel fabricator:
 - a. A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category STD, with a minimum of 10 years experience in fabrication of structural steel and shall be certified under AISC Quality Certification Program Category CSE.
 - b. Use a Professional Engineer on fabrication staff.
 - 2. Steel erector:
 - a. A qualified installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector, Category CSE, with a minimum of 10 years of experience in erection of structural steel.
 - b. With an active and enforced quality assurance program in place, as described in the Building Code.
 - 3. Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1.03 SUBMITTALS

A. Submittal Procedures: See Section 01 33 00 – Product Requirements for requirements for the mechanics and administration of the submittal process.

- B. Leadership in Energy and Environmental Design (LEED) Documentation: Submit the following in accordance with Section 01 33 00 – Submittal Procedures:
 - 1. Product Data for MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content; include statement indicating costs for each product having recycled content.
 - 2. Product Data for MR 5: For products and materials required to comply with requirements for regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.
 - 3. Product information can be tracked using the LEED Materials Tracking Form provided to the Contractor.
- C. Approval Submittals:
 - 1. Fabrication and/or layout Drawings:
 - a. Prepare Shop Drawings under National Institute of Steel Detailing Quality Procedures Program certification.
 - b. Complete Shop Drawings for all of the work showing clearly all pieces, sizes, dimensions, details, connections materials and shop coatings.
 - 1) All Shop Drawings must be checked and signed "approved" before submittal.
 - 2) Show all cuts, copes, and holes.
 - 3) Indicate all shop and field bolts.
 - 4) Indicate all shop and field welds using AWS symbols.
 - 5) Be reviewed and sealed by a Professional Engineer retained by Contractor to verify conformance with design criteria stipulated in the Contract Documents.
 - c. Prepare complete Erection Drawings showing the location and marks of all pieces.
 - 1) Copies of up-to-date Erection Drawings shall accompany the Shop Drawings.
 - a) Use match marks on the erection drawings to indicate the sheet number on which each particular member is detailed.
 - d. Correct any incorrect or unacceptable material or fabrication due to incorrect detailing, shop work, or erection, without additional charge.
 - 2. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.

- c. Detailed supplemental Specification relating to load indicator washers or high-strength bolts - alternate design for approval of Project Representative (submitted at Contractor's option if desired by Contractor for use).
- d. Source and certification of quality for high-strength bolts, nuts and washers.
- D. Quality Assurance Submittals:
 - 1. Certifications:
 - a. Certificates of compliance with standards specified for all major components and fasteners incorporated into work.
 - b. Copies of current welding certificates for each welder assigned to perform welding indicating compliance with testing specified by AWS.
 - c. Welder qualification data and prequalified procedures.
 - 2. Test reports:
 - a. Certified copies of mill tests.
 - b. Manufacturer's load test and temperature sensitivity data for expansion anchor bolts and adhesive anchor bolts.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Handle and store steel members above ground on skids or other supports.1. Keep free of dirt and other foreign material and protect against corrosion.

1.05 DEFINITION

- A. Code: AISC 303, Code of Standard Practice for Steel Buildings and Bridges.
- B. Project Representative: May mean the Owner's Designated Representative for Construction as defined by the Building Code.
- C. Galvanizing: Hot-dipped galvanizing per ASTM A153 with minimum coating of 2.0 OZ of zinc per square foot of metal (average of specimens) unless noted otherwise or dictated by standard.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. High-strength bolts:
 - a. Bethlehem Steel Corporation.
 - b. Lewis Bolt & Nut Company.
 - c. Nucor Fasteners.
 - d. St. Louis Screw and Bolt Company.

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- e. Approved equal.
- 2. Load indicator washers for high-strength bolts:
 - a. Bethlehem Steel Corporation.
 - b. Mid-South Bolt and Screw Co., Inc.
 - c. J and M Turner, Inc.
 - d. Approved equal.
- 3. Alternate design high-strength bolts:
 - a. T. C. Bolt Corporation.
 - b. Construction Fastener Systems Division of Bristol Machine Company.
 - c. LeJuene Bolt Co.
 - d. Approved equal.
- 4. Headed studs and deformed bar anchors:
 - a. Nelson Stud Welding Division, TRW, Inc.
 - b. Stud Welding Products, Inc.
 - c. Approved equal.
- 5. Expansion anchor bolts:
 - a. Kwik Bolts by Hilti, Inc.
 - b. Strong-Bolt 2 by Simpson Strong-Tie.
 - c. Trubolt by ITW Ramset/Red Head.
 - d. Approved equal.
- 6. Adhesive anchors bolts:
 - a. HIT HY 150 MAX-SD Adhesive Anchor by Hilti.
 - b. HIT-RE 500-SD Adhesive Anchor by Hilti.
 - c. SET-XP Adhesive Anchor by Simpson Strong-Tie.
 - d. Approved equal.
- B. Submit request for substitution in accordance with Specification Section 01 60 00 – Product Requirements.

2.02 MATERIALS

- A. Recycled content of Steel Products: Post consumer recycled content plus one-half of preconsumer recycled shall not be less than 25 percent,
- B. Steel, Structural Shapes and Plate (unless noted otherwise on Drawings):
 1. All W-shapes, WT-shapes, and Soldier Piles: ASTM A992.
 - 2. All other plates and rolled shapes: ASTM A36.
- C. Plate and Bar: ASTM A36.

D. Pipe: ASTM A53, Grade B (Type E or S) (Fy=35).

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- E. Hollow Structural Sections (HSS):
 - 1. Round: ASTM A500, Grade B (Fy=42).
 - 2. Square or rectangular: ASTM A500, Grade B (Fy=46).
- F. High-Strength Bolts, Nuts and Washers, ASTM A325 with ASTM A563 nuts or ASTM A490 galvanized:
 - 1. High-strength bolts:
 - a. Provide two (2) ASTM F436 washers for all bolts.
 - b. Provide beveled washers at connections of sloped/tapered sections.
 - 2. High-strength bolts with load indicating devices, ASTM F959, Type 325.
 - a. Provide at Contractor's option and subject to approval of Project Representative.
 - 3. Alternate high-strength design:
 - a. Provide at Contractor's option and subject to approval of Project Representative.
- G. Bolts and Nuts, Unfinished: ASTM A307, Grade A.
- H. Washers, Plain (Unfinished Bolts): ASME B18.22.1, Type B.
- Welding Electrodes (AWS): As indicated on the Drawings.
 Comply with AWS requirements.
- J. Anchor Rods and Bolts:
 - 1. ASTM F1554, Grade as indicated on the drawings with weldability supplement S1, or ASTM A36 for threaded rods as indicated on the Drawings.
 - 2. ASTM A307, Grade A for headed bolts.
 - 3. ASTM F593 Type 304 or 316 stainless steel with matching nut and washer.
- K. Headed Studs and Deformed Bar Anchors:
 - 1. Studs: ASTM A108, complying with AWS Code Section 7, Type B; minimum yield strength 50,000 psi, minimum tensile strength 60,000 psi.
 - a. Uniform diameter.
 - b. Heads: Concentric and normal to shaft.
 - c. Weld end: Chamfered and solid flux.
 - 2. Deformed anchor bars:
 - a. ASTM A496, complying with AWS Code Section 7 Type C.
 - b. Minimum yield strength: 70,000 psi.
 - c. Minimum tensile strength: 80,000 psi.
 - d. Straight, unless indicated otherwise.
 - e. Solid flux.

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- 3. After welding, remove ceramic ferrules and maintain free from any substance which would interfere with function, or prevent bonding to concrete.
- L. Nonshrink Grout: See Section 03 31 30 Concrete, Materials, and Proportioning.
- M. Expansion Anchor Bolts and Adhesive Anchor Bolts for Fastening to Concrete:
 - 1. Use of expansion bolts requires approval by Project Representative.
 - 2. Stainless steel, Type 304 or 316, unless otherwise indicated on the Drawings.
 - 3. Provide minimum edge distance cover as recommended by manufacturer or as indicated on Drawings.

2.03 FABRICATION

- A. Comply with requirements of applicable Building Codes and AISC Specification with modifications and additional requirements specified herein.
 - 1. Identify high-strength steel material in fabricated members in accordance with ASTM A6.
- B. Minimize the amount of field welding.
 - 1. Shop assemble components into largest size possible commensurate with transportation and handling limitations.
 - 2. Shop connections: Bolted with high-strength bolts or welded.
- C. Connection Details:
 - 1. Connections not fully detailed on Drawings shall be designed by a Professional Engineer registered in the State of Washington, retained by Contractor, based on requirements of Contract Documents.
- D. Provide as a minimum, two (2) 3/4 IN DIA, high-strength bolts for all bolted connections, unless noted otherwise on Drawings.
- E. Provide bearing type connections for all bolted connections, unless specified otherwise or required to be slip-critical by the RCSC Specification for Structural Joints.
- F. One-sided or other types of eccentric connections not indicated will not be permitted without prior approval.
- G. Field Connections: Provide bolts for all field connections except where shown otherwise on the Drawings.
 - 1. Use high-strength bolts unless shown or specified otherwise.
 - 2. Use of high-strength bolts: Conform to RCSC Specification for Structural Joints.
 - 3. Unfinished bolts may be used for attaching stair treads to stringers.

- 4. If structural steel details (field welds versus shop welds, etc.) shown on design Drawings are not compatible with selected erection procedures, submit proposed modifications for review.
- 5. Connections to structural steel provided by others: Provide all connectors and coordinate location of bolt holes to match connection holes in steel provided by others.
- H. Accurately mill column end bearing surfaces to true plane.
- I. Fabricate and erect beams with non-specified camber in accordance with AISC Specification Chapter L1.
- J. Cut, drill, or punch holes at right angles to surface of metal.
 - 1. Do not make or enlarge holes by burning.
 - 2. Make holes clean cut, without torn or ragged edges.
 - 3. Remove outside burrs resulting from drilling or reaming operations with tool making 1/16 IN bevel.
 - 4. Provide holes in members to permit connection of work of other trades or contractors.
- K. Make allowance for draw in all cross bracing to provide small amount of initial tension in members.
- L. Make splices only where indicated or where approved.
- M. Wall Girts:
 - 1. Extend past columns and miter ends unless noted otherwise.
 - 2. Connect girts to each other at corners unless noted otherwise.
- N. Cope at 45 degrees, corners of stiffener plates at junction of member flanges with webs.
- O. Flame cut bevels for welds, provided such cutting is done automatically.1. Leave free of burrs and slag by grinding or planing the cut edges.
- P. Grind smooth all rough welds and sharp steel edges shall be ground to approximately 1/8 IN radius.
- Q. Tolerances (unless noted otherwise on Drawings):
 - 1. ASTM A6: When material received from the mill does not satisfy ASTM A6 tolerances for camber, profile, flatness or sweep, the Contractor is permitted to perform corrective work by the use of controlled heating, and mechanical straightening, subject to the limitations of the AISC Specification.
 - 2. Fabrication tolerance:
 - a. Member length:
 - 1) Both ends finished for contact bearing: 1/32 IN.
 - 2) Framed members:
 - a) 30 FT or less: 1/16 IN.

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- b) Over 30 FT: 1/8 IN.
- b. Member straightness:
 - 1) Compression members: 1/1000 of axial length between points laterally supported.
 - 2) Non-compression members: ASTM A6 tolerance for wide flange shapes.
- c. Specified member camber (except compression members):
 - 1) 50 FT or less: +1/2 IN.
 - 2) Over 50 FT: +1/2 IN (plus 1/8 IN per 10 FT over 50 FT).
 - 3) Members received from mill with 75 percent of specified camber require no further cambering.
 - 4) Beams/trusses without specified camber shall be fabricated so after erection, camber is upward.
 - 5) Camber shall be measured in fabrication shop in unstressed condition.
- d. At bolted splices, depth deviation shall be taken up by filler plates.
 - 1) At welded joints, adjust weld profile to conform to variation in depth.
 - 2) Slope weld surface per AWS requirements.
- e. Finished members shall be free from twists, bends and open joints.
 - 1) Sharp kinks, bends and deviation from the above tolerances are cause for rejection of material.

2.04 WELDING

- A. Comply with AWS Code, and other requirements indicated herein, for all welding, techniques of welding employed, appearance and quality of welds, and methods used to correct defective work.
 - 1. Qualify joint welding procedures or test in accordance with AWS qualification procedures.
- B. Test and qualify welders, welding operators and tackers in compliance with AWS Code for position and type of welding to which they will be assigned.
 - 1. Conduct tests in presence of approved testing agency.
 - 2. Certification within previous 12 months will be acceptable, provided samples of the welder's work are satisfactory.
- C. Before Starting Welding:
 - 1. Carefully plumb and align members in compliance with specified requirements.
 - 2. Fully tighten bolts.
 - 3. Comply with Section 5 of AWS Code for assembly and surface preparation.

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- 4. Preheat base metal to temperature stated in AWS Code.
 - a. When no preheat temperature is given in AWS Code and base metal is below 50 DegF, preheat base metal to at least 70 DegF.
 - b. Maintain temperature during welding.
 - c. Preheat surface of all base metal within distance from point of welding equal to thickness of thicker part being welded or 3 IN, whichever is greater, to specified preheat temperature.
 - d. Maintain this temperature during welding.
- 5. Each welder shall use identifying mark at welds.
- D. Make flange welds before making web welds.
- E. Where groove welds have back-up plates, make first three (3) passes with 1/8 IN round electrodes.
 - 1. Use backup plates in accordance with AWS Code, extending minimum of 1 IN either side of joint.
- F. Flame cut edges of stiffener plates at shop or field butt weld.1. Do not shear.
- G. Grind flush web fillets at webs notched to receive backup plates for flange groove welds.
- H. Low Hydrogen Electrodes: Dry and store electrodes in compliance with AWS Code.
- I. Do not perform welding when ambient temperature is lower than 0 DegF or where surfaces are wet or exposed to rain, snow, or high wind, or when welders are exposed to inclement conditions.
- J. Headed Studs and Deformed Bar Anchors:
 - 1. Automatically end welded in accordance with the AWS Code and manufacturer's recommendations.
 - 2. Fillet welding of headed studs and deformed bar anchors is not allowed unless approved by Project Representative.
- K. Test in-place studs in accordance with requirements of AWS Code to ensure satisfactory welding of studs to members.
 - 1. Replace studs failing this test.
- L. When headed stud-type shear connectors are to be applied, clean top surface of members to receive studs in shop to remove oil, scale, rust, dirt, and other materials injurious to satisfactory welding.
 - 1. Do not shop paint or galvanize metal surfaces to receive field applied studs.

2.05 SHOP COATING

A. All Structural Steel to be primed and painted in a controlled environment.

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- B. Refer to Section 09 91 00 Painting and Performance Coatings and coordinate shop primer, surface preparation and shop coating with field applied primers and coatings where specified.
- C. Provide suitable methods of handling and transporting painted steel to avoid damage to coating.
- D. Do not coat following surfaces:
 - 1. Machined surfaces, surfaces adjacent to field welds, and surfaces fully embedded in concrete.
 - 2. All other members for which no coating is specified.
 - Contact surfaces at bolted slip-critical connections, unless surface condition conforms to the RCSC Specification for Structural Joints, Part 3.b.
- E. Clean thoroughly all surfaces not coated before shipping.
 - 1. Remove loose mill scale, rust, dirt, oil and grease.
 - 2. Protect machined surfaces.

2.06 SOURCE QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform shop tests and inspections.
 - 1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.
- B. Bolted Connections: Inspect and test shop-bolted connections according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- C. Welded Connections: Visually inspect shop-welded connections according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
 - 1. Liquid Penetrant Inspection: ASTM E 165.
 - 2. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
 - 3. Ultrasonic Inspection: ASTM E 164.
 - 4. Radiographic Inspection: ASTM E 94.
- D. Prepare and submit inspection and test reports to Project Representative.
 - 1. Assist Project Representative to determine corrective measures necessary for defective work.

PART 3 – EXECUTION

3.01 GENERAL

- A. Contractor is solely responsible for safety.
 - 1. Construction means and methods and sequencing of work is the prerogative of the Contractor.
 - a. Take into consideration that full structural capacity of many structural members is not realized until structural assembly is complete; e.g., until slabs, decks, bracing or rigid connections are installed.
 - 2. Partially complete structural members shall not be loaded without an investigation by the Contractor.
 - 3. Until all elements of the permanent structure and lateral bracing system are complete, provide temporary bracing designed, furnished, and installed by the Contractor for the partially complete structure.
- B. Adequate temporary bracing to provide safety, stability and to resist all loads to which the partially complete structure may be subjected, including wind, construction activities, and operation of equipment is the responsibility of the Contractor.
 - 1. Use temporary guys, braces, shoring, connections, etc., necessary to maintain the structural framing plumb and in proper alignment until permanent connections are made, the succeeding work is in place, and temporary work is no longer necessary.
 - 2. Use temporary guys, bracing, shoring, and other work to prevent injury or damage to adjacent work or construction from stresses due to erection procedures and operation of erection equipment, construction loads, and wind.
 - Contractor shall be responsible for the design of the temporary bracing system and must consider the sequence and schedule of placement of such elements and effects of loads imposed on the structural steel members by partially or completely installed work, including work of all other trades.
 - a. If not obvious from experience or from the Drawings, the Contractor shall confer with the Project Representative to identify those structural steel element that must be complete before the temporary bracing system is removed.
 - 4. Remove and dispose of all temporary work and facilities off-site.
- C. Examine work-in-place on which specified work is in any way dependent to ensure that conditions are satisfactory for the installation of the work.
 - 1. Report defects in work-in-place which may influence satisfactory completion of the work.
 - 2. Absence of such notification will be construed as acceptance of work-inplace.

- D. Field Measurement:
 - 1. Take field measurements as necessary to verify or supplement dimensions indicated on the Drawings.
 - 2. Contractor responsible for the accurate fit of the work.
- E. Check the elevations of all finished footings or foundations and the location and alignment of all anchor bolts before starting erection.
 - 1. Notify Project Representative of any errors or deviations found by such checking.

3.02 ERECTION

- A. Framing member location tolerances after erection shall not exceed the frame tolerances listed above.
- B. Erect plumb and level; introduce temporary bracing required to support erection loads.
- C. Use light drifting necessary to draw holes together.1. Drifting to match unfair holes is not allowed.
- D. Welding:
 - 1. Conform to AWS D1.1 and requirements of this Specification.
 - 2. When joining two (2) sections of steel of different ASTM designations, welding techniques shall be in accordance with a qualified AWS D1.1 procedure.
- E. Shore existing members when unbolting of common connections is required.1. Use new bolts for rebolting connections.
- F. Clean stored material of all foreign matter accumulated during erection period.
- G. Clean bearing and contact surfaces before assembly.
- H. Set beam and column base and bearing plates accurately, as indicated, on nonshrink grout.
 - 1. Set and anchor each base plate to proper line and elevation.
 - 2. Use metal wedges, shims or setting nuts as required and tighten anchor bolts.
 - a. Use same metal as base plate.
 - b. Cut off protrusions of wedges and shims flush with edge of base plate.
 - 3. Fill sleeves around anchor bolts with nonshrink grout.
 - 4. Pack grout solidly between bottom of plate and bearing surface.
 - 5. Refer to Section 03 31 30 Concrete, Materials, and Proportioning for nonshrink grout requirements.
- I. Anchor Bolts:
 - 1. Anchor bolt location tolerance as required per AISC 303.

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- 2. Tie anchor bolts in position to embedded reinforcing steel using wire.
- 3. Welding or tack welding is prohibited.
- 4. Provide steel templates for locating anchor bolts.
- 5. Coat bolt threads and nuts with heavy coat of clean grease.
- J. Install high strength bolts with hardened washers.
 - 1. Install and tighten in accordance with the RCSC Specification for Structural Joints, Section 8.
 - 2. Coordinate installation with inspection.
 - a. Do not start installation until coordination with Testing Agency is complete.
 - 3. Bearing-type connections: High-strength bolts shall be tightened to snugtight condition.
 - 4. Slip-critical connections: Perform calibration testing for all methods of installation of high-strength bolts in accordance with the RCSC Specification for Structural Joints, Section 8(b).
 - a. Turn-of-nut tightening: Torque wrenches shall be used only by laboratory personnel.
 - b. Calibrated wrench tightening: Calibrate on a daily basis.
 - c. Direct tension indicator tightening: If previously approved by Project Representative.
 - d. Installation of alternate design bolts: If previously approved by Project Representative.
 - 5. In the event any bolt in a connection is found to be defective, check and retighten all bolts in the connection.
- K. Do not use gas cutting to correct fabrication errors.
 - 1. In case members do not fit or holes do not match, ream out the holes and insert the next larger size bolt.
 - a. If the connections require new holes, then drill new holes.
 - b. Make no such corrections without prior approval of the Project Representative.
 - 2. Burning of holes: Not permitted.
- L. Prior to making field connections to existing structural steel, remove completely all paint from existing steel which will be in contact with new steel and new welds.
- M. Tighten and leave in place erection bolts used in welded construction.
- N. Provide beveled washers to give full bearing to bolt head or nut where bolts are to be used on surfaces having slopes greater than 1 in 20 with a plane normal to bolt axis.

- O. After bolts are tightened, upset threads of A307 unfinished bolts and anchor bolts to prevent nuts from backing off.
- P. After erection, grind smooth all sharp surface irregularities resulting from field cutting or welding; power tool clean welds, bolts, washers and abrasions to shop coat removing all rust and foreign matter.
- Q. Expansion anchor bolts and adhesive anchor bolts:
 - 1. Minimum embedment as recommended by manufacturer or specified herein, whichever is larger.
 - 2. Notify Project Representative if required depth of embedment cannot be achieved at a particular bolt location.
 - 3. Follow manufacturer's recommendations for installation and torque.

3.03 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:
 - 1. Verify structural-steel materials and inspect steel frame joint details.
 - 2. Verify weld materials and inspect welds.
 - 3. Verify connection materials and inspect high-strength bolted connections.
- B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- C. Bolted Connections: Inspect and test bolted connections according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- D. Welded Connections: Visually inspect field welds according to AWS D1.1/D1.1M
 - In addition to visual inspection, test and inspect field welds according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
 - a. Liquid Penetrant Inspection: ASTM E 165.
 - b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
 - c. Ultrasonic Inspection: ASTM E 164.
 - d. Radiographic Inspection: ASTM E 94.
- E. Erected Frame Tolerance (Unless noted otherwise on the Drawings):
 - 1. Overall finished dimensions shall not exceed cumulative effect of rolling, fabrication and erection tolerance.
 - 2. Erection tolerances are defined relative to member working points and working lines as follows:
 - a. Actual centerline of top flange or surface at each end for horizontal members.

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- b. Actual center of member at each end for all other members.
- c. Other points may be used, providing they are based on these definitions.
- d. Working line is straight line connecting member working points.
- 3. Tolerances on position and alignment are as specified in the AISC 303, unless otherwise modified. "Adjustable items" such as lintels, wall supports, curb angles, window mullions and similar members shall be provided with adjustable connections to supporting structural frame.
- 4. Steel erector shall certify the location of erected structural steel is acceptable for plumbness, level and aligned within tolerances specified.
 - a. Such certification can be provided upon completion of any part of work and shall be done prior to start of work by other trades that may be supported, attached or applied to structural steel work.

3.04 CLEANING AND REPAIR OF SHOP PRIMER PAINT

- A. After erection, clean all steel of mud or other foreign materials, and repair any damage.
 - 1. Refer to Section 09 91 00- Painting and Protective Coatings for Touchup coating applications.

END OF SECTION

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SECTION 05 21 10 STEEL JOISTS

PART 1 – GENERAL

1.01 SUMMARY

- A. Furnish all labor, materials, tools, equipment, and services for Steel Joists, as indicated, in accordance with provisions of Contract Documents.
- B. Completely coordinate with work of other trades.

1.02 QUALITY ASSURANCE

- A. Fabrication standards for joists and accessories: Steel Joist Institute "Standard Specification and Load Tables" for open web, long span and deep long span steel joists; American Institute of Steel Construction (AISC)
 "Specifications for Design, Fabrication and Erection of Structural Steel for Buildings," (referred to as AISC Specifications).
- B. Standard for welders and welding work: AWS "Standard Qualification Procedure."
- C. Project Representative reserves the right to observe joists in manufacturer's shop during fabrication.
- D. Project Representative reserves the right to observe and require testing of joists welded in place.
 - 1. Remove and replace work found not to comply with the provisions of the Contract Documents.
- E. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to inspect field welds and bolted connections and to perform field tests and inspections and prepare test and inspection reports.

1.03 SUBMITTALS

- A. Submittal Procedures: See Section 01 33 00 Submittal Procedures for requirements for the mechanics and administration of the submittal process.
- B. Leadership in Energy and Environmental Design (LEED) Documentation: Submit the following in accordance with Section 01 81 30 – Sustainability Requirements:
 - 1. Product Data for MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content; include statement indicating costs for each product having recycled content.
 - 2. Product Data for MR 5: For products and materials required to comply with requirements for regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

- 3. Product Data for IEQ 4.2: For paints and coatings used inside the weatherproofing system, documentation including printed statement of VOC content.
- C. Approval Submittals:
 - 1. Shop Drawings:
 - a. Show complete details including layout, special connections, bridging, jointing and accessories.
 - 2. Engineering calculations indicating design moments, shears, and other forces sealed by registered Engineer, licensed to practice Structural Engineering in the State of Washington.
- D. Quality Assurance Submittals:
 - 1. Manufacturer's certification that steel joists comply with specified requirements and steel joist institutes standard load tables.
 - 2. Manufacturer's certification along with calculations that joists for special loads indicated on Drawings have been designed and are capable of supporting all design loads for the spans as shown on the Drawings.
 - a. Certification and calculations shall be submitted prior to or along with Shop Drawings.
 - b. Load combinations as specified by the building code. Where special loads only are shown, combine with typical loads or capacities for adjacent joists.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. Plastic laminate:
 - a. Vulcraft.
 - b. New Millennium.
 - c. Valley Joist.
 - d. Approved equal.
 - 2. Submit request for substitution in accordance with Specification Section 01 60 00 Product Requirements.

2.02 MATERIALS

- A. Steel: Comply with SJI and AISC Specifications.
- B. Unfinished threaded fasteners: ASTM-A307, Grade-A, regular hexagon type, low carbon steel, with ANSI-B27.2, Type B, carbon steel washers.
- C. High-strength threaded fasteners: ASTM-A325 or ASTM-A490 as required, heavy hexagon structural bolts with nuts and hardened washers.

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- D. Prime Paint: Comply with SJI and AISC except that asphalt type paint is not acceptable.
 - 1. Shop coat of red lead or rust-inhibitive paint standard with manufacturer.
 - 2. Comply with SSPC-15.
 - 3. Finish coat:
 - a. 1 coat, 4 mils, Series L69 Epoxoline (Polyamidoamine Epoxy) or Ellis Engard 460HS Epoxy

2.03 FABRICATION

A. Fabricate in accord with SJI and AISC Specifications and as follows:

- 1. Do not splice principal tension members. Use only full length pieces.
- 2. Make shop connections and splices using either arc or resistance welding. Do not shop bolt connections.
- 3. Design and fabricate for maximum deflection as indicated on Drawings.
- 4. Shop holes, field holes, and enlargement of holes will not be permitted unless approved by Project Representative.
- 5. Fabricate bearing ends to provide following minimum bearing unless otherwise indicated on Drawings.

BEARING MATERIAL	K SERIES	LH AND DLH SERIES
Steel	2-1/2 IN	6 IN

- B. Where special or concentrated loads are indicated, reinforce joist and develop details as necessary for support.
- C. Provide extended bottom chords where indicated on Drawings. Comply with SJI and AISC requirements and load tables.
- D. Provide extended top chords where indicated on Drawings. Comply with SJI and AISC requirements and load tables.
- E. Provide ceiling extensions in areas having ceilings attached directly to joist bottom chord.
 - 1. Provide either an extended bottom chord or a separate unit of sufficient strength to support ceiling construction.
 - 2. Extend ends to within 1/2 IN of wall surface.
- F. Remove loose scale, heavy rust, and other foreign materials from fabricated joists and accessories.
- G. Apply one shop coat of steel joist primer paint to steel joists and accessories, by spray, dipping, or other method to provide continuous dry paint film thickness of not less than 0.50 mil.

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PART 3 – EXECUTION

3.01 INSPECTION

- A. Examine areas and conditions under which steel joists are to be installed for conditions detrimental to proper and timely completion of work.
- B. Do not proceed with work until unsatisfactory conditions have been corrected.
- C. Do not start placement of steel joists until supporting work is in place and secured.

3.02 ERECTION

- A. Deliver, store and handle steel joists as recommended by SJI and AISC.
- B. Do not install joists damaged so that strength is impaired.
- C. Where not specifically indicated otherwise, place and secure steel joists in accord with SJI and AISC "Specifications" and as herein specified. Secure joists along column centerlines in accordance with OSHA standards for erection safety
- D. Field weld joists to supporting steel framework in accord with SJI and AISC -Specifications for type of joists used. Coordinate welding sequence and procedure with placing of joists.
- E. Place joists on supporting work, adjust and align in accurate location and spacing before permanently fastening.
 - 1. Provide end bearing and anchorages to secure joists to supporting members or walls in accord with SJI and AISC Specifications, unless otherwise indicated.
 - 2. When joists do not bear flush on supporting member or wall, take corrective measures to ensure full bearing, as directed by Project Representative.
- F. Provide bridging in accord with SJI and AISC Specifications, where not specifically indicated otherwise, except as modified herein.
 - 1. Provide horizontal or diagonal type bridging as indicated.
 - 2. Provide additional bridging at each line between exterior and first interior joist and then at every 12th joist space.
 - 3. Do not use sag rods as substitute for bridging.
- G. Completely install bridging immediately after erection, before loads are applied.
 - 1. Anchor ends of bridging lines at top and bottom chords where terminating at walls or beams.
 - 2. Provide bridging connections at top and bottom chords capable of safely resisting a force of 500 LBS, 1,000 LBS and 1,500 LBS for open web, long span and deep long span joists respectively.
- H. Do not overload joists.

- I. Remove or repair damaged joists or other work, to satisfaction of Project Representative.
- J. After installation, paint field bolt heads and nuts, welds and abraded or rusty surfaces on joists and steel supporting members.
 - 1. Wire brush surfaces and clean with solvent before painting.
 - 2. Use same type of paint as used for shop painting.

END OF SECTION

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SECTION 05 30 00 METAL DECK

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes: Manufactured metal roof deck.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Division 00 Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 01 General Requirements.
 - 3. Section 09 91 00 Painting and Protective Coatings.

1.02 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. American Iron and Steel Institute (AISI):
 - a. S100, Specification for the Design of Cold-Formed Steel Structural Members.
 - 2. ASTM International (ASTM):
 - a. A36, Standard Specification for Carbon Structural Steel.
 - A653, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - c. A780, Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
 - d. A924, Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
 - e. A1008, Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable.
 - f. D746, Standard Test Method for Brittleness Temperature of Plastics and Elastomers by Impact.
 - g. D1056, Standard Specification for Flexible Cellular Materials-Sponge or Expanded Rubber.
 - 3. American Welding Society (AWS):
 - a. D1.1, Structural Welding Code Steel.
 - b. D1.3, Structural Welding Code Sheet Steel.
 - 4. Steel Deck Institute (SDI):
 - a. 31, Design Manual for Composite Decks, Form Decks and Roof Decks.

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- 5. Underwriters Laboratories, Inc. (UL):
 - a. Fire Resistance Directory.
- 6. FM Global (FM):
 - a. Use assemblies listed in the on-line data base RoofNav application at <u>www.roofnav.com</u>.
- B. Qualifications:
 - 1. Manufacturer:
 - a. Member of SDI.
 - b. Structural design of manufactured deck shall be prepared by a qualified professional engineer retained by the manufacturer.
 - 2. Welding work:
 - a. Qualify welding processes, operations, and operators in accordance with requirements of AWS D1.1 and AWS D1.3.
 - b. Welding operators to have been qualified during the 12 month period prior to commencement of welding, and be experienced in welding light gage metal.
 - 3. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.

1.03 SUBMITTALS

- A. Submittal Procedures: See Section 01 33 00 Submittal Procedures for requirements for the mechanics and administration of the submittal process.
- B. Leadership in Energy and Environmental Design (LEED) Documentation: Submit the following in accordance with Section 01 81 30 – Sustainability Requirements:
 - 1. Product Data for MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content; include statement indicating costs for each product having recycled content.
 - 2. Product Data for MR 5: For products and materials required to comply with requirements for regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.
 - 3. Product Data for IEQ 4.2: For paints and coatings used inside the weatherproofing system, documentation including printed statement of VOC content.
- C. Approval Submittals:
 - 1. Fabrication and/or layout Drawings:
 - a. Detailed Shop Drawings showing the following:
 - 1) Complete framing and erection layouts.

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- 2) Location, length, type, cross section, thickness, and markings of metal deck units.
 - a) Size and location of openings.
 - b) Accessories and reinforcing.
- 3) Shop applied coatings.
- Details and gages of accessories and miscellaneous items showing sump pans, cant strips, ridge and valley plates, closure strips and insulation supports.
- 5) Welding procedures for installation including size, number, type and location of all welds required to install deck units.
- 6) Correct fitting of members and accessories.
- 7) Size and location of all openings in deck and all conditions requiring closure panels and supplementary framing.
- 8) Shop Drawings shall not be reproductions of the Contract Drawings.
- 2. Product technical data including:
 - a. Metal deck manufacturer's specifications and installation instructions.
 - b. Manufacturer's specifications and installation instructions for:
 - 1) Welds and welding procedure.
 - 2) Galvanizing repair paint.
 - 3) Screws.
 - 4) Joint sealing compound.
 - c. Manufacturer's load tables for deck to be furnished on this project, including:
 - 1) Allowable gravity load for metal roof deck.
 - 2) Allowable diaphragm shear values for metal roof deck.
 - 3) Allowable superimposed load for metal deck.
 - 4) Allowable unshored span lengths for form deck.
- D. Quality Assurance Submittals:
 - 1. Manufacturers certification that metal deck complies with specified requirements:
 - a. Manufacturer member of SDI.
 - b. Deck material, manufacturing, and shop testing and inspection are in accordance with SDI requirements.
 - 2. Test reports.

- E. FM Global:
 - 1. Approval of the Roof Assembly by the Owner's insurance underwriter, FM Global is required.
 - a. The Roof Assembly shall have an FM Global Assembly Number.
 - 1) Proposed Roof Assemblies based on the Contractor's or Manufacturer's statement of equivalency will not be accepted.
 - b. Products and Components of the Roof Assembly shall be FM Global approved components and shall be listed under the same FM Global Assembly Number.
 - 1) Substitutions of products from one approved FM Global Roof Assembly to another are not allowed.
 - 2. Submit detailed installation plans and material submittals and a Roof Nav Contractor Package to FM Global for review prior to ordering materials.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle metal deck as recommended by SDI.
 - 1. Exercise care to avoid damage to deck.
- B. Protect materials from rusting, denting or crushing.
 - 1. Store metal deck on project site off the ground with one end elevated to provide drainage and protected from the elements with a waterproof covering, ventilated to avoid condensation.
 - 2. Prevent rust, deterioration and accumulation of foreign material.

1.05 PROJECT CONDITIONS

- A. Do not overload supporting members.
 - 1. Until the entire assembly is complete, the structural elements may not be stable or capable of supporting code or stated design loads.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. 1-1/2 IN and 3IN deep metal roof deck:
 - a. Vulcraft.
 - b. Verco Decking, Inc.
 - c. United Steel Deck, Inc.
 - d. Consolidated Systems, Inc., Metal Dek Group.
 - e. New Millennium Building Systems.
 - f. Approved equal.

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2.02 METAL ROOF DECK

- A. Design of the metal deck to be supplied to have been checked by the SDI and found to conform to the standard specifications and load tables.
 - 1. The allowable superimposed live uniform loading per square foot for metal roof deck supplied for the spans indicated shall equal or exceed the allowable superimposed live uniform load per square foot for the same spans as indicated in the SDI latest tables.
 - 2. Maximum deflection: Less than 1/240 of span under live load.
- B. Use deck configurations complying with SDI 31and as indicated.
 - 1. Painted deck: ASTM A1008.
 - 2. Galvanized deck: ASTM A653 with ASTM A924 G60 zinc coating.
- C. Metal Roof Deck, 1-1/2 IN Deep:
 - 1. Rib type, sheet steel, minimum GA as indicated on Drawings.
 - Wide rib deck: Depth 1-1/2 IN, ribs spaced approximately 6 IN OC; width of rib opening at top surface maximum 2-1/2 IN; width of bottom rib surface minimum 1-3/4 IN.
- D. Metal Roof Deck, 3 IN Deep:
 - 1. Rib type, sheet steel, minimum GA as indicated on Drawings.
 - Deep rib deck: Depth 3 IN, ribs spaced approximately 8 IN OC; width of rib opening at top surface maximum 2-3/4 IN; width of bottom rib surface minimum 1-1/2 IN.
- E. The Roof Assembly shall meet FM Global requirements pertaining to the roof slope, wind pressures and other conditions particular to the Project.

2.03 FABRICATION

A. Standard Deck Profiles:

			TOP SURFACE	MINIMUM
		RIB	MAXIMUM RIB	BOTTOM OF
DEPTH	TYPE	SPACING	OPENING	RIB WIDTH
1-1/2 IN	Roof Deck - Wide Rib ('B')	6 IN	2-1/2IN	1-3/4 IN
3 IN	Roof Deck ('N')	8 IN	2-3/4 IN	1-1/2 IN

- B. Minimum Deck Thickness:
 - 1. Where gage of metal is indicated, provide the following:
 - a. Minimum uncoated decimal thickness:

GAG	DESIGN
Е	THICKNESS
22	0.0295 IN
20	0.0358 IN
18	0.0474 IN
16	0.0598 IN

- b. The delivered thickness of the uncoated steel shall not be less than 95 percent of the design thickness.
- 2. The steel used shall have a minimum yield stress of 33 ksi.

C. Fabrication:

- 1. Fabricate deck units in lengths to span three or more support spacings with flush, telescoped or nested 2 IN end laps.
 - a. End laps shall occur on supporting members.
 - b. Provide deck units having overlapping male and female type side laps or joints to provide positive vertical and lateral alignment of adjacent deck units.

2.04 ACCESSORIES

- A. Metal Closure Strips:
 - 1. Form to configuration required to provide tight-fitting closures at open ends and sides of deck.
 - 2. Minimum thickness before galvanizing: 0.0358 IN (20 GA).
- B. Ridge and Valley Plates:
 - 1. Minimum width: 4-1/2 IN.
 - 2. Bend to provide tight-fitting closure with deck units.
 - 3. Provide plates in 10 FT length where possible.
 - 4. Minimum thickness before galvanizing: 0.0747 IN (14 GA).
- C. Roof Sump Pans:
 - 1. Fabricate from a single piece of galvanized sheet steel with level bottoms and sloping sides to direct water flow to drain.
 - 2. Provide sump pans of adequate size to receive roof drains with bearing flanges minimum 3 IN wide.
 - 3. Recess pans not less than 1-1/2 IN below roof deck surface, unless otherwise indicated or required by deck configuration.
 - 4. Minimum thickness before galvanizing: 0.0747 IN (14 GA).

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- D. Cant Strips:
 - 1. Bend cant strips to form 45 degree slope not less than 5 IN wide, with top and bottom flanges not less than 3 IN wide.
 - 2. Minimum thickness before galvanizing: 0.0358 IN (20 GA).
- E. Insulation supports.
- F. Venting: Slotted openings in bottom flutes in accordance with manufacturer's standards.
- G. Metal Closures and Pour Stops: Form to configuration required to provide mortar-tight closures at open sides and ends of deck.
- H. Primer Paint Required for Metal Deck: Deck manufacturer's baked on, rustinhibitive paint applied to chemically cleaned and phosphate chemically treated metal surfaces.
- I. Galvanized coating for metal deck accessories shall conform to ASTM A924 G60 zinc coating.
- J. Galvanized Repair Paint: Comply with Specification Section 09 91 00 Painting and Protective Coatings and ASTM A780 for repair of damaged galvanized surfaces.
- K. Screws:
 - 1. Self-drilling, self-tapping, #12 size minimum hex washer head sheet metal screws unless noted otherwise on Drawings.
- L. Miscellaneous Steel Shapes: Comply with ASTM A36.
- M. Sheet Metal Accessories: Same material and finish as deck members.
- N. Flexible Closure Strips for Deck:
 - 1. Vulcanized, closed cell expanded chloroprene elastomer, complying with ASTM D1056, Grade SCE 41.
 - 2. Brittleness temperature: -40 DegF, ASTM D746.
 - 3. Flammability resistance: "Self-extinguishing."
 - 4. Install with adhesive in accordance with manufacturer's instructions.
 - a. Ensure complete closure.

PART 3 – EXECUTION

3.01 PREPARATION

- A. Examine areas and conditions under which metal deck is to be installed for conditions detrimental to proper and timely completion of work.
- B. Do not proceed with work until unsatisfactory conditions have been corrected.
- C. Do not start placement of metal deck until supporting work is in place and secured.

- D. Deck will be subject to rejection if:
 - 1. Metal deck units do not comply with requirements of SDI specifications and requirements herein.
 - 2. Metal deck is improperly manufactured, painted or installed.
 - 3. Metal deck is damaged so that strength is impaired.
 - 4. Metal deck is not installed as indicated on Drawings.

3.02 INSTALLATION

- A. Install roof deck units and accessories as indicated, in accordance with SDI 31, manufacturer's recommendations, final approved Shop Drawings and as specified herein.
 - 1. Furnish manufacturer's standard accessories as needed to complete the deck installation.
- B. Locate deck bundles to prevent overloading of structure.
- C. Do not overload metal deck or supporting members:
 - 1. Contractor is solely responsible for safety, construction means, methods and sequencing of the Work.
 - 2. Until the entire assembly is complete, the structural elements may not be stable or capable of supporting code or stated design loads.
 - 3. Use care to assure deck construction loads are less than the recommendation of the SDI 31, except where temporary shoring is installed.
- D. Place each deck unit on supporting structural frame, adjust to final position, accurately align with ends bearing on supporting members.
 - 1. Lap roof deck units at ends no less than 2 IN.
 - 2. Interlock units at sides without stretching, contracting, or deforming.
 - 3. Place deck units flat and square and secure to framing without warp or excessive deflection.
 - 4. Place units in accurate and close alignment for entire length of run and with close registration of flutes of one unit with those of abutting unit.
- E. Plug weld sizes specified are effective fusion diameter of welds.
 - 1. Weld metal shall penetrate all layers of deck material and have good fusion to supporting members.
 - 2. Do not burn through deck.
- F. Prevent overtorquing of screw fasteners by using a tool with a depth limiting nosepiece and a clutch.
- G. Fastening of 1-1/2 IN Deep Metal Roof Deck:
 - 1. Secure deck units to supporting frame and side laps as indicated on the Drawings:

- H. Fastening of 3 IN Deep Metal Roof Deck:
 - 1. Secure deck units to supporting frame and side laps as indicated on the Drawings.
- I. Remove and replace deck which is structurally weak or unsound or which has burn holes due to improper welding or damage which Project Representative declares defective.
- J. Cut and fit deck units and accessories around other work projecting through or adjacent to decking.
 - 1. Make cutting and fitting neat, square and trim.
 - a. Cut deck by mechanical means, not by burning.
 - 2. Neatly and accurately install reinforcing at all openings except:
 - a. Circular openings less than 6 IN DIA.
 - b. Rectangular openings having no side dimension greater than 6 IN.
 - 3. Reinforce openings that have not been framed between 6 IN and 12 IN with 12 GA flat steel sheet 6 IN greater in each dimension than opening.
 - a. Place sheet around opening and fusion weld to top surface of deck at each corner and midway along each side.
- K. Install insulation supports for support of roof insulation.
 - 1. Provide where top surface of roof deck does not occur adjacent to edge and openings as required to completely support roof insulation.
 - 2. Weld into position.
- L. Install metal closure strips at all open uncovered ends and edges of roof deck, and in voids between deck and other construction.
 - 1. Weld into position to provide a complete decking installation.
 - 2. Provide flexible closure strips instead of metal closures, at Contractor's option and when approved by Project Representative wherever their use will ensure complete closure.
 - a. Install with elastomeric type adhesive in accordance with written directions and recommendations of manufacturers of closure strips and adhesives.
- M. Ridge and Valley Plates:
 - 1. Weld ridge and valley plates to top surface of roof deck.
 - 2. Lap end joints not less than 3 IN with laps in direction of water flow.
- N. Roof Sump Pans:
 - 1. Place over openings in roof deck.
 - 2. Weld to top deck surface.
 - a. Space welds maximum 12 IN OC with at least one weld at each corner and each side midway between each corner.
 - 3. Cut opening in bottom of roof sump to accommodate drain size indicated.

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- O. Cant Strips:
 - 1. Weld cant strips to top surface of roof deck at 12 IN OC.
 - 2. Lap end joints not less than 3 IN.
- P. Install metal closures to close all openings and gaps between form deck and other construction, at objects projecting through deck, at locations where deck changes direction, and at open ends of deck units where deck units terminate.
 - 1. Weld into position to provide a complete installation.
- Q. Install pour stops continuous around the perimeter:
 - 1. Locate so that the slab terminates beyond the perimeter support centerline a distance as indicated on the Contract Drawings.
 - 2. Weld into position adequately to resist forces due to placement and finishing of concrete and in accordance with manufacturer's recommendations.
- R. Clean and Touch Up:
 - 1. Remove all surplus materials and debris from surface of deck after installation.
 - 2. Repair damaged galvanized surfaces in accordance with Specification Section 09 91 00 Painting and Protective Coatings.

3.03 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections
- B. Remove and replace defective or damaged deck units.
- C. Testing:
 - 1. The following test shall be made in the presence of the Testing Agency employed on the project on the first deck panel to be installed.
 - 2. Place one (1) end of panel over a perimeter support and attach it only to that support with two (2) welds as specified 6 IN apart.
 - 3. The opposite end of the panel shall be moved in plane parallel to the span of the panel until shear distress is noted in the weld.
 - 4. The welds shall be of sufficient quality to cause local distortions in the panel around the welds and show good perimeter contact between the welds and the panel.
 - 5. When the results of this test are satisfactory and approved by the Testing Agency, the remainder of the deck may be installed using the same weld rod size and type, amperage setting, and procedures used in the tested deck.

- 6. The remainder of the welds shall be visually inspected.
 - a. When in the opinion of the Project Representative or the Testing Agency any weld is of poor quality, an additional weld shall be provided adjacent to the rejected weld.
 - b. It shall be a sufficient distance away from the rejected weld so that the new weld will be done on sound, unburned deck.

END OF SECTION

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SECTION 05 40 00 COLD FORMED METAL FRAMING

PART 1 – GENERAL

1.01 SCOPE

- A. Furnish and install cold-formed, light gauge structural metal (steel) framing where and as shown on Structural Drawings.
- B. Make all required connections by welding and screw fastening (remove erection screws after welding is complete).
- C. Provide bridging, blocking, bracing and backup framing members for finish construction as shown or required.

1.02 QUALITY ASSURANCE

- A. Governing Codes: International Building Code and associated standards, 2009 Edition as amended by the State of Washington, and the City of Bellevue Amendments, referred to herein as Building Code.
- B. Product Tests: Mill certificates or data from a qualified independent testing agency.
- C. Welding Qualifications: Qualify procedures and personnel according to AWS D1.3/D1.3M, "Structural Welding Code Sheet Steel."
- D. Comply with AISI S100 "North American Specification for the Design of Cold-Formed Steel Structural Members."

1.03 SUBMITTALS

- A. Submittal Procedures: See Section 01 33 00 Submittal Procedures for requirements for the mechanics and administration of the submittal process.
- B. Leadership in Energy and Environmental Design (LEED) Documentation: Submit the following in accordance with Section 01 81 30 – Sustainability Requirements:
 - MR 4 Recycled Content: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content; include statement indicating costs for each product having recycled content.
 - MR 5 –Local Regional Materials: For products and materials required to comply with requirements for regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

- C. Approval Submittals:
 - 1. Shop Drawings: Submit Shop Drawings showing layout, dimensions, material types, shapes and gages and connection details including those adjacent to work.

PART 2 – MATERIALS

2.01 FRAMING MEMBERS

- A. Units shall consist of standard structural elements of sizes and gauges shown on the Drawings with screw-prepared knurled flanges, and accessory sections such as runners, cap plates, blocking, bridging and lintel members as indicated on the Drawings.
 - 1. Members shall be designed according to the AISI Cold-Formed Steel Design Manual, unless indicated otherwise on the Drawings.

2.02 METAL SPECIFICATIONS

- A. For framing sections on exterior exposures, materials shall be galvanized, conforming to ASTM A653.
 - 1. For sections on interior exposures, materials may be as-rolled uncoated strip, factory prime-coated, conforming to ASTM A1011.
 - Accessories: Fasteners shall be self-drilling, self-tapping screw of adequate suitable sizes, cadmium plated hardened steel, used in accordance with manufacturer's instructions and with approved compatible tools.
 - a. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - a) Hilti.
 - b) TEKS as manufactured by ITW.
 - c) Or approved equal.
 - b. Minimum size, 10 x 24, No. 3 Point, Type AA.
- B. Welding Electrodes: Conform to AWS Code D1.3, SMAW Electrode Classification E70XX.

PART 3 – EXECUTION

3.01 EXAMINATION OF CONDITIONS

A. Contractor shall inspect the sites of the work as prepared to receive coldformed metal fabrications and report promptly to the Project Representative any existing conditions which may be unsuitable to receive the work of this Section, and shall not proceed until indicated corrections have been made. He shall field verify all conditions and dimensions affecting his work.

3.02 FABRICATION

- A. Wall materials may be prefabricated components assembled into assemblies of suitable size for transport to the site and erected, or he may fabricate and erect the members entirely at the site on the basis of his own preference, as agreed with the Project Representative.
- B. Prefabricated panels, if used shall be squared and braced during transport, handling and erection to assure their dimensional correctness.
- Framing components shall be accurately cut square to bearings and connection interfaces, or as required for fitting angular connections.
 Members shall be secured in place until final connections have been made.
- D. Studs shall fit squarely into top and bottom track members, for full bearing against the webs of the track members. Employ suitable slip-fit connections for conditions where deflections from overhead construction must be accommodated in a manner acceptable to the Project Representative.
- E. Structural connections of similar materials shall be made by welding. Connections to dissimilar materials shall be made with screws, clips or bolts as shown. Connections made with screws shall have at least two (2) screws at each connection. Isolate interfaces of dissimilar metals will preformed neoprene washers or pads, or a heavy coating of a suitable material having dielectric properties such as coal-tar enamel, epoxy resin or similar materials.

3.03 ERECTING AXIAL LOAD-BEARING MEMBERS

- A. Tracks shall be of the same gauge as the framing members into which they are framed.
- B. Bottom tracks shall be accurately and securely fastened to the supporting construction. If variations in the receiving surfaces occur, tracks shall be supported by full-size shims or by setting in a high strength grout bed to provide level, full bearing.
- C. Structural connections of structural framing shall be made by welding in accordance with AWS D1.3, "Structural Welding Code for Sheet Steel". Minimum length of a weld segment shall be 1-1/4 IN.
- D. At intersecting or abutting track joints, abutting ends of tracks shall be securely anchored to a common structural element, or they shall be securely mechanically spliced.
- E. All elements shall be full, single length members. No splices are permitted.
- F. Bracing shall be installed at locations where indicated on drawings for resistance to shear forces for frame stability and to resist lateral loads. Bracing shall be as shown on the Drawings and securely connected at ends and at each intersecting member.

3.04 TOLERANCES

A. Maximum allowable, 1/8 IN in 5 FT for plumb, level and line, non-cumulative.

3.05 FIELD TOUCH-UP

A. Touch up all abrasions, burned areas and damaged areas in shop-primed coatings or galvanized coatings, using a similar primer as used in manufacture, and a zinc rich primer for galvanized metal.

END OF SECTION

SECTION 05 50 00 METAL FABRICATIONS

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes:
 - Custom fabricated metal items and certain manufactured units not otherwise indicated to be supplied under work of other Specification Sections.
 - 2. Design of all temporary bracing not indicated on Drawings.
 - 3. Design of systems and components, including but not limited to:
 - a. Landings.
 - b. Ladders.
 - c. Gratings.
 - d. Loadout Covers.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Division 00 Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 01 General Requirements.
 - 3. Division 03 Concrete.
 - 4. Section 05 12 00 Structural Steel.
 - 5. Section 05 51 00 Metal Stairs.
 - 6. Section 09 91 00 Painting and Protective Coatings.

1.02 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. Aluminum Association (AA):
 - a. ADM 1, Aluminum Design Manual.
 - 2. American Association of State Highway and Transportation Officials (AASHTO):
 - a. HB, Standard Specifications for Highway Bridges.
 - 3. American Institute of Steel Construction (AISC):
 - a. 325, Manual of Steel Construction Allowable Stress Design (ASD).
 - b. 360, Specifications for Structural Steel Buildings (referred to herein as AISC Specification).
 - 4. American National Standards Institute (ANSI):
 - a. A14.3, Ladders Fixed Safety Requirements.

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- 5. ASTM International (ASTM):
 - a. A6, Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling.
 - b. A36, Standard Specification for Carbon Structural Steel.
 - c. A47, Standard Specification for Ferritic Malleable Iron Castings.
 - d. A48, Standard Specification for Gray Iron Castings.
 - e. A53, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
 - f. A108, Standard Specification for Steel Bar, Carbon and Alloy, Cold Finished.
 - g. A123, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - h. A153, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - i. A197, Standard Specification for Cupola Malleable Iron.
 - j. A269, Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
 - k. A276, Standard Specification for Stainless Steel Bars and Shapes.
 - I. A307, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
 - m. A312, Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes.
 - n. A325, Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
 - o. A496, Standard Specification for Steel Wire, Deformed, for Concrete Reinforcement.
 - p. A500, Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
 - q. A501, Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
 - r. A536, Standard Specification for Ductile Iron Castings.
 - s. A554, Standard Specification for Welded Stainless Steel Mechanical Tubing.
 - t. A572, Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel.
 - u. A666, Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
 - v. A668, Standard Specification for Steel Forgings, Carbon and Alloy, for General Industrial Use.

- w. A780, Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
- x. A786, Standard Specification for Hot-Rolled Carbon, Low-Alloy, High-Strength Low-Alloy, and Alloy Steel Floor Plates.
- y. A967, Standard Specification for Chemical Passivation Treatments for Stainless Steel Parts.
- z. A992, Standard Specification for Steel for Structural Shapes.
- aa. A1064, Standard Specification for Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.
- bb. B26, Standard Specification for Aluminum-Alloy Sand Castings.
- cc. B209, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
- dd. B221, Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
- ee. B308, Standard Specification for Aluminum-Alloy 6061-T6 Standard Structural Profiles.
- ff. B429, Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube.
- gg. B632, Standard Specification for Aluminum-Alloy Rolled Tread Plate.
- hh. F467, Standard Specification for Nonferrous Nuts for General Use.
- ii. F468, Standard Specification for Nonferrous Bolts, Hex Cap Screws, and Studs for General Use.
- jj. F593, Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
- kk. F1554, Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength.
- American Welding Society (AWS):
 - a. A5.1, Specification for Carbon Steel Electrodes for Shielded Metal Arc Welding.
 - b. D1.1, Structural Welding Code Steel.
 - c. D1.2, Structural Welding Code Aluminum.
- 7. National Association of Architectural Metal Manufacturers (NAAMM):
 - a. AMP 510, Metal Stairs Manual.
 - b. AMP 555, Code of Standard Practice for the Architectural Metal Industry (Including Miscellaneous Iron).
 - c. MBG 531, Metal Bar Grating Manual.
- 8. Occupational Safety and Health Administration (OSHA):
 - a. 29 CFR 1910, Occupational Safety and Health Standards, referred to herein as OSHA Standards.

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- 9. Building Code:
 - a. International Code Council (ICC):
 - International Building Code and associated standards, 2009 Edition as amended by the State of Washington, and the City of Bellevue Amendments, referred to herein as Building Code.
- B. Qualifications:
 - 1. Qualify welding procedures and welding operators in accordance with AWS.
 - 2. Fabricator shall have minimum of 10 years experience in fabrication of metal items specified.
 - 3. Project Engineer for Contractor-designed systems and components:
 - a. Professional Structural Engineer licensed in the State of Washington.

1.03 DEFINITIONS

- A. Installer or Applicator:
 - 1. Installer or applicator is the person actually installing or applying the product in the field at the Project site.
 - 2. Installer and applicator are synonymous.
- B. Hardware: As defined in ASTM A153.
- C. Galvanizing: Hot-dip galvanizing per ASTM A123 or ASTM A153 with minimum coating of 2.0 OZ of zinc per square foot of metal (average of specimens) unless noted otherwise or dictated by standard.

1.04 SUBMITTALS

- A. Submittal Procedures: See Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
- B. Leadership in Energy and Environmental Design (LEED[®]) Documentation: Submit the following in accordance with Section 01 81 30 – Sustainability Requirements:
 - Product Data for MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content; include statement indicating costs for each product having recycled content.
 - 2. Product Data for MR 5: For products and materials required to comply with requirements for regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.
 - 3. Product Data for IEQ 4.2: For paints and coatings used inside the weatherproofing system, documentation including printed statement of VOC content.

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- C. Approval Submittals:
 - 1. Fabrication and/or layout Drawings and details:
 - a. Submit Drawings for all fabrications and assemblies.
 - 1) Include Erection Drawings, Plans, Sections, details and connection details.
 - b. Identify materials of construction, shop coatings and third party accessories.
 - 2. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 - c. Provide manufacturer's standard allowable load tables for the following:
 - 1) Grating and checkered plate.
 - 2) Expansion anchor bolts.
 - 3) Adhesive anchor bolts.
 - 4) Castings, trench covers and accessories.
 - 3. Contractor designed systems and components, including but not limited to, stairs, landings and ladders:
 - a. Certification that manufactured units meet all design loads specified.
 - b. Shop Drawings and engineering design calculations:
 - 1) Indicate design live loads.
 - 2) Sealed by a Professional Structural Engineer.
 - 3) Project Representative will review for general compliance with Contract Documents.
 - 4. Certification of welders and welding processes.
 - a. Indicate compliance with AWS.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and handle fabrications to avoid damage.
- B. Store above ground on skids or other supports to keep items free of dirt and other foreign debris and to protect against corrosion.
PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. Abrasive stair nosings (embedded in concrete stairs):
 - a. American Safety Tread (www.americansafetytread.com).
 - b. Balco (www.balcousa.com).
 - c. Barry Pattern & Foundry Co, Inc (www.barrycraft.com).
 - d. Approved equal.
 - 2. Headed studs and deformed bar anchors:
 - a. Nelson Stud Welding Div., TRW Inc. (www.nelsonstud.com).
 - b. Stud Welding Products, Inc. (www.studweldprod.com).
 - c. Approved equal.
 - 3. Expansion anchor bolts:
 - a. Hilti Inc. (www.hilti.com).
 - b. ITW Ramset/Red Head (www.ramset-redhead.com).
 - c. Simpson Strongtie (www.strongtie.com).
 - d. Approved equal.
 - 4. Epoxy adhesive anchor bolts:
 - a. Hilti Inc.(www.hilti.com).
 - b. ITW Ramset/Red Head (www.ramset-redhead.com).
 - c. Simpson Strongtie (www.strongtie.com).
 - d. Approved equal.
 - 5. Castings, trench covers and accessories:
 - a. Neenah Foundry Co.(www.nfco.com).
 - b. Deeter Foundry Co.(www.deeter.com).
 - c. Barry Pattern & Foundry Co, Inc (www.barrycraft.com).
 - d. McKinley Iron Works (www.mckinleyironworks.com).
 - e. Approved equal.
 - 6. Steel ladders:
 - a. Balco (www.balcousa.com).
 - b. fsIndustries (www.fsindustries.com).
 - c. Cotterman Co. (www.cotterman.com).
 - d. Approved equal.

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- 7. Galvanizing repair paint:
 - a. Clearco Products Co., Inc. (www.clearcoproducts.com).
 - b. ZRC Products.(www.zrcworldwide.com).
 - c. Approved equal.
- B. Submit request for substitution in accordance with Specification Section 01 60 00.

2.02 MATERIALS

A. Steel:

- 1. Structural:
 - a. W-shapes and WT-shapes: ASTM A992, Grade 50.
 - b. All other plates and rolled sections: ASTM A36.
- 2. Pipe: ASTM A53, Types E or S, Grade B or ASTM A501.
- 3. Structural tubing:
 - a. ASTM A500, Grade B (46 ksi minimum yield).
- 4. Bolts, nuts and washers, high strength:
 - a. ASTM A325.
 - b. Provide two (2) washers with all bolts.
- 5. Bolts and nuts:
 - a. ASTM A307, Grade A.
- 6. Welding electrodes: AWS D1.1, E70 Series.
- 7. Steel forgings: ASTM A668.
- B. Iron:
 - 1. Ductile iron: ASTM A536.
 - 2. Gray cast iron: ASTM A48 (minimum 30,000 psi tensile strength).
 - 3. Malleable iron: ASTM A47, ASTM A197.
- C. Stainless Steel:
 - 1. Minimum yield strength of 30,000 psi and minimum tensile strength of 75,000 psi.
 - a. Bars, shapes: ASTM A276, Type 304.
 - b. Tubing and pipe: ASTM A269, ASTM A312 or ASTM A554, Type 304 or 316.
 - c. Strip, plate and flat bars: ASTM A666, Type 304 or 316, Grade A.
 - d. Bolts and nuts: ASTM F593, Type 303, 304 or 316.

- 2. Minimum yield strength of 25,000 psi and minimum tensile strength of 70,000 psi.
 - a. Strip, plate and flat bar for welded connections, ASTM A666, Type 304L or 316L.
- 3. Welding electrodes: In accordance with AWS for metal alloy being welded.
- D. Aluminum:
 - 1. Alloy 6061-T6, 32,000 psi tensile yield strength minimum.
 - a. ASTM B221 and ASTM B308 for shapes including beams, channels, angles, tees and zees.
 - b. Weir plates, baffles and deflector plates, ASTM B209.
 - 2. Alloy 6063-T5 or T6, 15,000 psi tensile yield strength minimum.
 - a. ASTM B221 and ASTM B429 for bars, rods, wires, pipes and tubes.
 - 3. ASTM B26 for castings.
 - 4. ASTM F468, alloy 2024 T4 for bolts.
 - 5. ASTM F467, alloy 2024 T4 for nuts.
 - 6. Electrodes for welding aluminum: AWS D1.2, filler alloy 4043 or 5356.
- E. Washers: Same material and alloy as found in accompanying bolts and nuts.
- F. Embedded Anchor Bolts:
 - 1. Building anchor bolts:
 - a. ASTM F1554, Grade as indicated on Drawings with weldability supplement S1 or ASTM A36 for threaded rods galvanized.
 - b. ASTM A307, Grade A for headed bolts galvanized.
 - 2. All other anchor bolts: Type 304 or 316 stainless steel with matching nut and washer.
- G. Expansion Anchor Bolts and Adhesive Anchor Bolts:
 - 1. Stainless steel, Type 304, 314 or 316.
 - 2. Provide minimum edge distance cover and spacing as recommended by manufacturer, or as indicated on Drawings whichever is larger.
 - a. Minimum embedment as recommended by manufacturer or eight (8) diameters of bolt, whichever is larger.
 - b. Notify Project Representative if required depth of embedment cannot be achieved at a particular anchor bolt location.
 - c. Follow manufacturer's recommendations for installation and torque.
- H. Headed Studs: ASTM A108 with a minimum yield strength of 50,000 psi and a minimum tensile strength of 60,000 psi.
- I. Deformed Bar Anchors: ASTM A496 or ASTM A1064 with a minimum yield strength of 70,000 psi and a minimum tensile strength of 80,000 psi.

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- J. Iron and Steel Hardware: Galvanized in accordance with ASTM A153 when required to be galvanized.
- K. Galvanizing Repair Paint:
 - 1. High zinc dust content paint for regalvanizing welds and abrasions.
 - 2. ASTM A780.
 - 3. Zinc content: Minimum 92 percent in dry film.
 - 4. ZRC "ZRC Cold Galvanizing" or Clearco "High Performance Zinc Spray."
- L. Dissimilar Materials Protection: See Specification Section 09 91 00.

2.03 MANUFACTURED UNITS

- A. Steel Ladders:
 - 1. Rails:
 - a. Maximum 3 x 2 IN heavy-duty rectangular tubing or channel, with minimum thickness of 0.125 IN or 1-1/2 IN nominal diameter schedule 80 pipe.
 - b. Spacing: Nominal 18 IN from centerline of rails except at top.
 - 1) Minimum clear distance between rails to be 16 IN.
 - c. Brackets for wall supported units: Provide 3/8 x 2-1/2 IN x length required angle brackets welded to side rails with punched holes for 3/4 IN bolts.
 - 1) Maximum spacing: 4 FT OC.
 - d. For floor supported units provide 3/8 x 2-1/2 x 4 IN rectangular bracket or 3/8 x 6 x 6 IN square plate welded to rails with punched holes for 3/4 IN bolts.
 - 1) Provide wall brackets on floor supported units if vertical run is over 4 FT.
 - 2. Rungs:
 - a. Minimum 1 IN DIA or 1 IN square extruded, with integral serrated nonslip finish on all sides.
 - b. Shop or field-applied grit tape and cap type non-slip finish is not acceptable.
 - 3. Minimum distance from centerline of rung to wall or any obstruction: 7 IN.
 - 4. Rung spacing:
 - a. Uniform, 12 IN.
 - b. Top rung shall be level with landing or platform.
 - c. Spacing of bottom rung from grade or platform may vary but shall not exceed 14 IN.

- 5. As a minimum, design ladder in accordance with OSHA Standards, ANSI A14.3, and applicable Building Codes.
 - a. Ladders shall be designed to support a minimum concentrated live load of 200 LBS.
 - b. Maximum allowable stresses per AISC Specification and AA ADM 1.
 - c. Maximum lateral deflection: Side rail span/240 when lateral load of 100 LBS is applied at any location.
- 6. Construction:
 - a. Fully welded type.
 - b. All welds to be full penetration welds, where applicable.
 - c. All ladders of a particular material shall have consistent construction and material shapes and sizes unless detailed otherwise on the Drawings.
 - d. Provide cap at top and bottom of side rails.
 - e. Rungs shall not extend beyond the outside face of the siderail.
 - f. The side rails of through ladder extension shall extend 42 IN above the top rung or landing and shall flare out on each side to provide a clearance of 24 IN centerline to centerline of rails.
- 7. Finish: Mill.
- B. Bollards:
 - 1. Steel pipe size per plan, ASTM A53.
 - a. Galvanized.
 - 2. Refer to Section 10 80 00 for Bumper Post Sleeves
- C. Steel Checkered Plate:
 - 1. Conform to ASTM A786.
 - a. Diamond pattern: No.3 (large) or No.4 (medium).
 - b. Use one (1) pattern throughout Project.
 - c. Material: 36 ksi minimum yield strength.
 - 2. Design live load:
 - a. 100 psf, uniform load.
 - b. 300 LBS concentrated load on 4 IN square area.
 - c. All components to be adequate for the uniform load or the concentrated load, whichever requires the stronger component.
 - d. Maximum deflection: 1/300 of span under a superimposed live load of 50 psf.
 - 3. Reinforce as necessary with steel angles.

- 4. Plate sections:
 - a. Maximum 3 FT wide.
 - b. Minimum 1/4 IN thick.
 - c. Maximum 100 LBS per section if required to be removable.
- 5. Provide joints at center of all openings unless shown otherwise.
 - a. Reinforce joints and openings with additional angles to provide required load carrying capacity.
- 6. Unless shown otherwise, frame for opening with steel checkered plate cover:
 - a. Steel support angles:
 - 1) $3 \times 2 \times 1/4$ IN minimum size with long leg vertical.
 - 2) 5/8 IN DIA adhesive anchor bolts spaced at maximum of 24 IN OC along each side with not less than two (2) anchor bolts per side.
 - b. Steel concrete insert seats:
 - 1) $2 \times 2 \times 1/4$ IN minimum size.
 - 2) Auto-welded studs or strap anchors, ASTM A108 at 18 IN OC with not less than two (2) studs or anchors per side.
 - c. Drill and tap frame to receive 3/8 IN DIA steel cap screws at not more than 24 IN OC with not less than two (2) screws per side.
- 7. Provide galvanized checkered plate and edge supports.
- D. Aluminum Grating:
 - 1. NAAMM MBG 531.
 - Bearing bars: Rectangular, 1-1/2 x 3/16 IN at 1-3/16 IN OC spacing OR Ibar, 1-1/2 IN deep with minimum 1/16 IN thick bar and minimum 1/4 IN flange width at 1-3/16 IN OC spacing.
 - 3. Cross bars:
 - a. Welded, swaged or pressure locked to bearing bars:
 - b. Maximum 4 IN/OC spacing.
 - 4. Top edges of bars: Grooved or serrated.
 - 5. Finish: Mill.
 - 6. Clips and bolts: Stainless steel.
 - 7. Seat angles: Aluminum.
- E. Steel Grating:
 - 1. NAAMM MBG 531.
 - 2. Bearing bars:
 - a. Rectangular 1-1/2 x 3/16 IN unless shown otherwise on Drawings.
 - b. Maximum 1-3/16 IN OC spacing.

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- 3. Cross bars:
 - a. Welded, swagged or pressure locked to bearing bars.
 - b. Maximum 4 IN OC spacing.
- 4. Top edges of bars: Serrated or grooved.
- 5. Removable grating sections: Not wider than 3 FT and not more than 100 LBS.
- 6. Finish:
 - a. Galvanized.
 - b. Clips and bolts: Galvanized.
 - c. Seat angles: Galvanized steel.
- 7. Ends and perimeter edges: Banded.
- 8. Openings through grating: Reinforced to provide required load carrying capacity and banded with 4 IN high toe plate.
- 9. Provide joints at openings between individual grating sections.
- F. Heavy-Duty Castings, Trench Covers, and Accessories:
 - 1. Prefabricated, cast iron ASTM A48 or ductile iron ASTM A536.
 - 2. Design load: AASHTO HS-20 wheel loading for indicated span.
 - 3. Machine horizontal mating surfaces.
- G. Access Cover:
 - 1. Tank type manhole frame and solid lid: ASTM A48 or ASTM A536, cast iron.
 - 2. Unless shown otherwise, design of cover shall be such that top of frame extends several inches above slab to prevent surface water from entering tank.
 - 3. Equip lid with four (4) stainless steel screws to secure lid to frame.
- H. Loose Lintels:
 - 1. Steel, ASTM A36 or ASTM A572 Grade 50, sizes as indicated on Drawings.
 - 2. Hot-dip galvanized per ASTM A123.

2.04 FABRICATION

- A. Verify field conditions and dimensions prior to fabrication.
- B. Form materials to shapes indicated with straight lines, true angles, and smooth curves.
 - 1. Grind smooth all rough welds and sharp edges.
 - a. Round all corners to approximately 1/32 1/16 IN nominal radius.

- C. Provide drilled or punched holes with smooth edges.
 - 1. Punch or drill for field connections and for attachment of work by other trades.
- D. Weld Permanent Shop Connections:
 - 1. Welds to be continuous fillet type unless indicated otherwise.
 - 2. Full penetration butt weld at bends in stair stringers and ladder side rails.
 - 3. Weld structural steel in accordance with AWS D1.1 using Series E70 electrodes conforming to AWS A5.1.
 - 4. Weld aluminum in accordance with AWS D1.2.
 - 5. All headed studs to be welded using automatically timed stud welding equipment.
 - 6. Grind smooth welds that will be exposed.
- E. Conceal fastenings where practicable.
- F. Fabricate work in shop in as large assemblies as is practicable.
- G. Tolerances:
 - 1. Rolling:
 - a. ASTM A6.
 - b. When material received from the mill does not satisfy ASTM A6 tolerances for camber, profile, flatness, or sweep, the Contractor is permitted to perform corrective work by the use of controlled heating and mechanical straightening, subject to the limitations of the AISC Specifications.
 - 2. Fabrication tolerance:
 - a. Member length:
 - 1) Both ends finished for contact bearing: 1/32 IN.
 - 2) Framed members:
 - a) 30 FT or less: 1/16 IN.
 - b) Over 30 FT: 1/8 IN.
 - b. Member straightness:
 - 1) Compression members: 1/1000 of axial length between points laterally supported.
 - 2) Non-compression members: ASTM A6 tolerance for wide flange shapes.
 - c. Specified member camber (except compression members):
 - 1) 50 FT or less: Minus 0/plus 1/2 IN.
 - 2) Over 50 FT: Minus 0/plus 1/2 IN (plus 1/8 IN per 10 FT over 50 FT).

- 3) Members received from mill with 75 percent of specified camber require no further cambering.
- 4) Beams/trusses without specified camber shall be fabricated so after erection, camber is upward.
- 5) Camber shall be measured in fabrication shop in unstressed condition.
- d. At bolted splices, depth deviation shall be taken up by filler plates.
 - 1) At welded joints, adjust weld profile to conform to variation in depth.
 - 2) Slope weld surface per AWS requirements.
- e. Finished members shall be free from twists, bends and open joints.
 - 1) Sharp kinks, bends and deviation from above tolerances are cause for rejection of material.
- H. Fabricate grating, checkered plate, stairs, ladders and accessories using aluminum galvanized steel unless shown otherwise on Drawings.
 - 1. Finish:
 - a. Mill, unless noted otherwise.
 - b. Coat surfaces in contact with dissimilar materials.
 - 1) See Specification Section 09 91 00.
- I. Fabricate grating in accordance with NAAMM MBG 531.
 - 1. Maximum tolerance for difference in depth between grating depth and seat or support angle depth: 1/8 IN.
 - 2. Distance between edge of grating and face of embedded seat angle or face of wall or other structural member: 1/4 IN.
 - a. Tolerance: NAAMM MBG 531.
 - 3. Removable sections: Not wider than 3 FT and not more than 100 LBS.
 - 4. Ends and perimeter edges: Banded.
 - a. Provide full depth banding unless noted otherwise.
 - b. Banding at trenches and sumps to be 1/4 IN less than grating depth to allow for drainage.
 - 5. Openings through grating: Reinforced to provide required load carrying capacity and banded with 4 IN high toe plate.
 - 6. Provide joints at openings between individual grating sections.
 - 7. Fabricate grating so that bearing bars and cross bars in adjacent sections are aligned.
- J. Fabricate checkered plate and miscellaneous metals in accordance with NAAMM AMP 555.
 - 1. Workmanship: Class 2 unless noted otherwise.

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K. See Specification Section 09 91 00 for preparation and painting of ferrous metals and other surfaces.

2.05 SOURCE QUALITY CONTROL

- A. Surface Preparation:
 - 1. Refer to Specification Section 09 91 00 for surface preparation requirements.
- B. Shop Applied Paint Coating Application:1. Refer to Specification Section 09 91 00 for painting requirements.
- C. Meet structural requirements of Specification Section 05 12 00 for inspection and testing items of structural nature.

PART 3 – EXECUTION

3.01 PREPARATION

- A. Provide items to be built into other construction in time to allow their installation.
 - 1. If such items are not provided in time for installation, cut in and install.
- B. Prior to installation, inspect and verify condition of substrate.
- C. Correct surface defects or conditions which may interfere with or prevent a satisfactory installation.
 - 1. Field welding aluminum is not permitted unless approved in writing by Project Representative.

3.02 INSTALLATION

- A. Set metal work level, true to line, plumb.
 - 1. Shim and grout as necessary.
- B. Bolt Field Connections: Where practicable, conceal fastenings.
- C. Grind welds smooth where field welding is required.
- D. Field cutting grating or checkered plate to correct fabrication errors is not acceptable.
 - 1. Replace entire section.
- E. Remove all burrs and radius all sharp edges and corners of miscellaneous plates, angles, framing system elements, etc.
- F. Unless noted or specified otherwise:
 - 1. Connect steel members to steel members with 3/4 IN DIA ASTM A325 high strength bolts.
 - 2. Connect aluminum to aluminum with 3/4 IN DIA aluminum bolts.

- 3. Connect aluminum to structural steel using 3/4 IN DIA stainless steel bolts.
 - a. Provide dissimilar metals protection.
- 4. Connect aluminum and steel members to concrete and masonry using stainless steel expansion anchor bolts or adhesive anchor bolts unless shown otherwise.
 - a. Provide dissimilar materials protection.
- 5. Provide washers for all bolted connections.
- 6. Where exposed, bolts shall extend a maximum of 3/4 IN and a minimum of 1/2 IN above the top nut.
 - a. If bolts are cut off to required maximum height, threads must be dressed to allow nuts to be removed without damage to the bolt or the nuts.
- G. Install and tighten ASTM A325 high-strength bolts in accordance with the AISC 325, Allowable Stress Design (ASD).
 - 1. Provide hardened washers for all ASTM A325 bolts.
 - a. Provide the hardened washer under the element (nut or bolt head) turned in tightening.
- H. After bolts are tightened, upset threads of ASTM A307 unfinished bolts or anchor bolts to prevent nuts from backing off.
- I. Secure metal to wood with lag screws of adequate size with appropriate washers.
- J. Do not field splice fabricated items unless said items exceed standard shipping length or change of direction requires splicing.
 - 1. Provide full penetration welded splices where continuity is required.
- K. Provide each fabricated item complete with attachment devices as indicated or required to install.
- L. Anchor such that work will not be distorted nor fasteners overstressed from expansion and contraction.
- M. Set beam and column base plates accurately on nonshrink grout as indicated on Drawings.
 - 1. See Division 03 Specification Sections for non-shrink grout.
 - 2. Set and anchor each base plate to proper line and elevation.
 - a. Use metal wedges, shims, or setting nuts for leveling and plumbing columns and beams.
 - 1) Wedges, shims and setting nuts to be of same metal as base plate they support.
 - 2) Tighten nuts on anchor bolts.

- b. Fill space between bearing surface and bottom of base plate with nonshrink grout.
 - 1) Fill space until voids are completely filled and base plates are fully bedded on wedges, shims, and grout.
- c. Do not remove wedges or shims.
 - 1) Where they protrude, cut off flush with edge of base plate.
- d. Fill sleeves around anchor bolts solid with non-shrink grout.
- N. Tie anchor bolts in position to embedded reinforcing steel using wire.
 - 1. Tack welding prohibited.
 - a. Coat bolt threads and nuts with heavy coat of clean grease.
 - 2. Anchor bolt location tolerance:
 - a. 1/16 IN.
 - b. Provide steel templates for all column anchor bolts.
- O. Install bollards in concrete as detailed.
 - 1. Fill pipe with concrete and round off at top.
- P. Provide abrasive stair nosings in each tread and landing of all concrete stairs and at each concrete stair landing having metal stair structure attaching to the concrete landing.
 - 1. Center stair nosings in stair width.
 - 2. Coordinate nosings with railing vertical posts.
 - a. Maintain 2 IN clear between end of nosing and edge of railing base plate.
- Q. Accurately locate and place frames for openings before casting into floor slab so top of plate is flush with surface of finished floor.
 - 1. Keep screw holes clean and ready to receive screws.
- R. Attach grating to end and intermediate supports with grating saddle clips and bolts.
 - 1. Maximum spacing: 2 FT OC with minimum of two (2) per side.
 - 2. Attach individual units of aluminum grating together with clips at 2 FT OC maximum with a minimum of two (2) clips per side.
- S. Coat aluminum surfaces in contact with dissimilar materials in accordance with Specification Section 09 91 00.
- T. Repair damaged galvanized surfaces in accordance with ASTM A780.1. Prepare damaged surfaces by abrasive blasting or power sanding.
 - 2. Apply galvanizing repair paint to minimum 6 mils DFT in accordance with manufacturer's instructions.

- U. Anchor ladder to concrete structure with minimum 3/4 IN stainless steel expansion anchor bolts with minimum 6 IN embedment, or as indicated on Drawings.
 - 1. When anchoring into cavity wall construction, provide minimum 6 IN embedment into concrete or masonry back-up wall.
 - a. At each anchor location, provide sleeve between back face of veneer and cavity face of concrete or masonry back-up wall.
 - b. Cut cavity insulation as required and seal around sleeve.
 - 1) Sleeve to be 1 IN DIA schedule 40 stainless steel tubing, TP-304L, ASTM A269.
 - a) Minimum wall thickness to be .065 IN.
 - 2) Continuously weld 4 x 4 x 1/4 IN Type 304 stainless steel, ASTM A666 flange onto each end of pipe.
 - a) Drill 1 IN hole in flange to match pipe.
 - b) Attach sleeve to concrete or masonry back-up with 1/4 IN selftapping concrete anchors.
 - 3) Grout solid, area around bolt where bolt penetrates veneer.
 - 4) Accurately locate sleeves to align with bolt locations on ladder.
 - 2. When anchoring into masonry, fill masonry cores with grout at anchor locations and each masonry core within 8 IN of anchor.
- V. Anchor ladder to metal stud walls using minimum 1/2 IN stainless steel bolts, nuts and washers.
 - 1. Verify that stud wall has been provided with adequate backing to accept ladder anchors.

3.03 CLEANING

- A. After erection, installation or application, clean all miscellaneous metal fabrication surfaces of all dirt, weld slag and other foreign matter.
- B. Provide surface acceptable to receive field applied paint coatings specified in Specification Section 09 91 00.

END OF SECTION

SECTION 05 51 00 METAL STAIRS

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Industrial-type stairs with steel grating treads.
 - 2. Steel tube railings attached to metal stairs.
 - 3. Steel tube handrails attached to walls adjacent to metal stairs.
- B. See Section 05 52 05 Steel Railings for pipe and tube railings not attached to metal stairs or to walls adjacent to metal stairs.

1.02 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design metal stairs, including comprehensive engineering analysis by a qualified licensed Professional Engineer, using performance requirements and design criteria indicated in the Contract Documents.
- B. Structural Performance of Stairs: Metal stairs shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated.
 - 1. Building Code:
 - a. International Code Council (ICC):
 - International Building Code and associated standards, 2009 Edition as amended by the State of Washington, and the City of Bellevue Amendments, referred to herein as Building Code.
 - 2. Uniform Load: 100 LBF/SQ FT.
 - 3. Concentrated Load: 300 LBF/FT applied on an area of 4 SQ IN.
 - 4. Uniform and concentrated loads need not be assumed to act concurrently.
 - 5. Stair Framing: Capable of withstanding stresses resulting from railing loads in addition to loads specified above.
 - 6. Limit deflection of treads, platforms, and framing members to L/240 or 1/4 IN, whichever is less.
- C. Structural Performance of Railings: Railings shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated.
 - 1. Handrails and Top Rails of Guards:
 - a. Uniform load of 50 LBF/FT applied in any direction.
 - b. Concentrated load of 200 LBF/FT applied in any direction.

- c. Uniform and concentrated loads need not be assumed to act concurrently.
- D. Seismic Performance: Metal stairs shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 - 1. Component Importance Factor is 1.5.

1.03 SUBMITTALS

- A. Submittal Procedures: See Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
- B. Leadership in Energy and Environmental Design (LEED[®]) Documentation: Submit the following in accordance with Section 01 81 30 – Sustainability Requirements:
 - Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content."Laboratory Test Reports for Credit IEQ 4 IN Subparagraph below applies to LEED for Schools.
 - 2. Product Data for Credit MR 5 Local and Regional Materials: For products and materials required to comply with requirements for regional and point of extraction, harvest or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.
 - 3. Product Data for IEQ 4.2: For paints and coatings used inside the weatherproofing system, documentation including printed statement of VOC content.
- C. Approval Submittals:
 - 1. Product Data: For metal stairs.
 - 2. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
 - 3. Delegated-Design Submittal: For installed products indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified licensed Professional Engineer responsible for their preparation.

1.04 QUALITY ASSURANCE

- A. NAAMM Stair Standard: Comply with "Recommended Voluntary Minimum Standards for Fixed Metal Stairs" in NAAMM AMP 510, "Metal Stairs Manual," for class of stair designated, unless more stringent requirements are indicated.
 - 1. Industrial-Type Stairs: Industrial class.

PART 2 – PRODUCTS

2.01 METALS

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For components exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.
- B. Steel Plates, Shapes, and Bars: ASTM A 36.
- C. Usually allow fabricator to use either type of tubing in first paragraph below unless Structural Engineer of record has designed railings.
- D. Steel Tubing: ASTM A 500.
- E. Rolled-Steel Floor Plate: ASTM A 786, rolled from plate complying with ASTM A 36 or ASTM A 283, Grade C or D.
- F. Steel Bars for Grating Treads: ASTM A 36 or steel strip, ASTM A 1011 or ASTM A 1018.
- G. Wire Rod for Grating Crossbars: ASTM A 510.

2.02 FABRICATION, GENERAL

- A. Provide complete stair assemblies, including metal framing, hangers, struts, railings, clips, brackets, bearing plates, and other components necessary to support and anchor stairs and platforms on supporting structure.
 - 1. Join components by welding unless otherwise indicated.
 - 2. Use connections that maintain structural value of joined pieces.
 - 3. Fabricate treads and platforms of exterior stairs so finished walking surfaces slope to drain.
- B. Preassembled Stairs: Assemble stairs in shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations.
- C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges. Remove sharp or rough areas on exposed surfaces.
- D. Form bent-metal corners to smallest radius possible without impairing work.
- E. Weld connections 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. Weld exposed corners and seams continuously unless otherwise indicated.
 - 5. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Type 4 welds: Good quality, uniform undressed weld with minimal splatter.

- F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Locate joints where least conspicuous.
- G. Fabricate joints that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

2.03 STEEL-FRAMED STAIRS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Alfab, Inc. (www.alfabinc.com).
 - 2. American Stair, Inc. (www.americanstair.com).
 - 3. Sharon Companies Ltd. (The). (/www.sharonstair.com).
 - 4. Approved equal.
- B. Stair Framing:
 - 1. Fabricate stringers of steel tubes.
 - a. Provide steel plate closures at exposed ends of steel tubes.
 - 2. Construct platforms of steel tube headers and miscellaneous framing members as needed to comply with performance requirements.
 - 3. Place columns where indicated on Drawings.
 - 4. If using bolts, fabricate and join so bolts are not exposed on finished surfaces.
- C. Metal-Pan Stairs: Form risers, subtread pans, and subplatforms to configurations shown from steel sheet of thickness needed to comply with performance requirements but not less than 0.067 IN.
 - 1. At Contractor's option, provide stair assemblies with metal-pan subtreads filled with reinforced concrete during fabrication.
 - 2. Provide epoxy-resin-filled treads, reinforced with glass fibers, with slipresistant, abrasive surface.
- D. Metal Bar-Grating Stairs: Comply with NAAMM MBG 531, "Metal Bar Grating Manual."
 - 1. Fabricate treads and platforms from steel grating with 1-1/4 x 3/16 IN bearing bars at 15/16 IN OC and crossbars at 4 IN OC.
 - 2. Fabricate grating treads with rolled-steel floor plate nosing and with steel angle or steel plate carrier at each end for stringer connections. Secure treads to stringers with bolts.

2.04 STAIR RAILINGS

- A. Steel Tube Railings: Fabricate railings to comply with requirements indicated for design, dimensions, details, finish, and member sizes, including wall thickness of tube, post spacings, and anchorage, but not less than that needed to withstand indicated loads.
 - 1. Rails and Posts: 1-1/2 IN top and bottom pipe rails, as indicated on Drawings and 1-1/2 IN vertical posts.

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- 2. Perforated Metal Infill: Perforated metal panels with pattern horizontal per plans.
- B. Welded Connections: Fabricate railings with welded connections. Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
 - Finish welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Type 4 welds: good quality, uniform undressed weld with minimal splatter.
- C. Form changes in direction of railings by bending or by inserting prefabricated elbow fittings.
- D. Form curves by bending members in jigs to produce uniform curvature without buckling.
- E. Close exposed ends of railing members with prefabricated end fittings.
- F. Provide wall returns at ends of wall-mounted handrails.
- G. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, end closures, flanges, miscellaneous fittings, and anchors for interconnecting components and for attaching to other work.
 - 1. Connect posts to stair framing by direct welding.
- H. Fillers: Provide fillers made from steel plate, or other suitably crush-resistant material, to transfer wall bracket loads through wall finishes. Size fillers to suit wall finish thicknesses.

2.05 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish metal stairs after assembly.
- C. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153 for steel and iron hardware and with ASTM A 123 for other steel and iron products.
- D. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
- E. Apply shop primer to uncoated surfaces of metal stair components. Comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal stairs. Set units accurately in location, alignment, and elevation, measured from established lines and levels and free of rack.

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- B. Install metal stairs by welding stair framing to steel structure or to weld plates cast into concrete unless otherwise indicated.
- C. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication.
- D. Field Welding: Comply with requirements for welding in "Fabrication, General" Article.

3.02 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION

SECTION 05 52 05 STEEL RAILINGS

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes: The Work consists of furnishing and installing handrails, stair rail, and guardrail where shown in the Drawings or where designated by the Project Representative.
- B. Related Sections include but are not necessarily limited to:
 - 1. Division 00 Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 01 General Requirements.
 - 3. Section 05 50 00 Metal Fabrications.
 - 4. Section 09 91 00 Painting and Protective Coatings.

1.02 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. City of Bellevue:
 - a. Transportation Department Design Manual 2011.
 - 2. ASTM International (ASTM):
 - a. A36, Standard Specification for Carbon Structural Steel.
 - b. A53, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
 - c. A123, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - d. A153, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - e. A501, Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
 - f. A780, Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
 - 3. American Welding Society (AWS):
 - a. D1.1, Structural Welding Code Steel.
 - 4. National Association of Architectural Metal Manufacturers (NAAMM):
 - a. AMP 521, Pipe Railing Systems Manual.

- 5. U.S. Department of Justice, Architectural and Transportation Barriers Compliance Board (Access Board):
 - a. Americans with Disabilities Act (ADA):
 - 1) Accessibility Guidelines for Buildings and Facilities (ADAAG).
- 6. Occupational Safety and Health Administration (OSHA):
 - a. 29 CFR 1910, Occupational Safety and Health Standards, referred to herein as OSHA Standards.
- 7. Building Code:
 - a. International Code Council (ICC):
 - International Building Code and associated standards, 2009 Edition as amended by the State of Washington, and the City of Bellevue Amendments, referred to herein as Building Code.
- B. Qualify welding procedures and welding operators in accordance with AWS.

1.03 DEFINITIONS

- A. Hardware: As defined in ASTM A153.
- B. Galvanizing: Hot-dip galvanizing per ASTM A123 or ASTM A153 with minimum coating of 2.0 OZ of zinc per square foot of metal (average of specimens) unless noted otherwise or dictated by standard.
- C. Guardrail: A system of barrier components located near the open sides of elevated roadways, parking areas, retaining walls or other structures for the purpose of minimizing the possibility of an accidental fall from the drive or parking area to the lower level.
- D. Handrail: A railing provided for grasping with the hand for support.
- E. Railing: A generic term referring to guardrail, handrail and/or stair rails.
- F. Stair Rail: A guardrail, installed at the open side of stairways with either a handrail mounted to the inside face of the guardrail, or where allowed by applicable codes, with the top rail mounted at handrail height and serving the function of a handrail.

1.04 SUBMITTALS

- A. Submittal Procedures: See Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
- B. Leadership in Energy and Environmental Design (LEED) Documentation: Submit the following in accordance with Section 01 81 30 – Sustainability Requirements:
 - 1. Product Data for MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content; include statement indicating costs for each product having recycled content.

- 2. Product Data for MR 5: For products and materials required to comply with requirements for regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.
- 3. Product Data for IEQ 4.2: For paints and coatings used inside the weatherproofing system, documentation including printed statement of VOC content.
- C. Approval Submittals:
 - 1. Fabrication and/or layout Drawings.
 - a. Plan showing profile, location, section and details of each railing, and type and details of anchorage system.
 - b. Location and type of expansion joints.
 - c. Materials of construction including shop-applied coatings.
 - 2. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 - 3. Certification of welders and welding procedures indicating compliance with AWS.
 - 4. Certification that railings have been designed and fabricated to meet the loading requirements specified.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver and handle railings to preclude damage.
- B. Store railings on skids, keep free of dirt and other foreign matter which will damage railings or finish and protect from corrosion.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. Galvanizing repair paint:
 - a. ZRC Worldwide.
 - b. CRC Industries.
 - c. Aervoe Industries, Inc.
 - d. Or approved equal.
- B. Submit request for substitution in accordance with Specification Section 01 60 00.

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2.02 MATERIALS

- A. City of Bellevue:
 - 1. Transportation Department Design Manual 2011.
- B. Pipe: ASTM A53, Types E or S, Grade B, or ASTM A501.
- C. Steel Sheet, Bar (Pickets) and Plate: ASTM A36.
- D. Galvanizing Repair Paint:
 - 1. High zinc dust content paint for regalvanizing welds and abrasions.
 - 2. Dried film shall contain not less than 95 percent zinc dust by weight.
- E. Expansion and Adhesive Anchors: See Specification Section 05 50 00.
- F. Welding Electrodes: AWS D1.1, E70 Series.

2.03 FABRICATION

- A. General:
 - 1. Verify field conditions and dimensions prior to fabrication.
 - 2. For fabrication of items which will be exposed to view, use only materials which are smooth and free of surface blemishes including pitting, seam marks, roller marks, rolled trade names and roughness.
 - a. Remove blemishes by grinding and buffing or by welding and grinding, prior to cleaning, treating and application of surface finishes.
 - 3. Form exposed work with smooth, short radius bends, accurate angles and straight edges.
 - a. Ease exposed edges to a radius of approximately 1/32 IN.
 - b. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
 - 4. Form exposed connections with flush, smooth, hairline joints, using galvanized steel splice locks to splice sections together or by welding.
 - 5. Provide for anchorage of type indicated on the Drawings or as required by field conditions.
 - a. Drill or punch holes with smooth edges.
 - 6. Design railing and anchorage system in accordance with NAAMM AMP 521 to withstand loading as required by Building Code.
 - 7. Custom fabricate pipe railings to dimensions and profiles indicated.
 - a. Fabricate handrails mounted to walls or guardrail vertical posts using 1-1/4 IN nominal diameter Schedule 40 pipe.
 - b. Fabricate all guardrail top rails using 1-1/2 IN nominal diameter Schedule 40 pipe.

- c. Fabricate all guardrail vertical posts using 1-1/2 IN nominal diameter Schedule 80 pipe.
 - 1) Parking Area Guardrails (Beam Guardrail):
 - a) City of Bellevue:
 - i Transportation Department Design Manual 2011.
- All intermediate rails including walking surface guardrails shall be fabricated using minimum 1-1/2 IN nominal diameter Schedule 40 pipe.
 - 1) Where details are not indicated, set horizontal rails and vertical pickets to requirements of the Building Code or OSHA Standards whichever requires the more restrictive design.
- e. Space vertical posts as required by loading requirements but not more than 4 FT OC.
- f. Space handrail brackets as required by loading requirements but not more than 4 FT OC.
- g. Base plate for vertical guardrail posts mounted to top of concrete surface:
 - 1) 3/8 x 6 x 6 IN square plate welded to the vertical post.
 - 2) Predrilled to accept four (4) anchors.
- h. Base plate for vertical guardrail post mounted to metal structure:
 - 1) $3/8 \times 2 \cdot 1/2 \times 8$ IN plate welded to the vertical post.
 - 2) Predrilled to accept two (2) fasteners.
- i. Mounting bracket for vertical guardrail post mounted to vertical concrete surface or web of metal structural member:
 - 1) Pair of 3/8 IN angles or bent plates welded to vertical posts.
 - 2) Predrilled to accept two (2) fasteners each.
- j. Provide 1/4 x 4 IN high toe boards at elevated walkways and platforms, where indicated on the Drawings or required by OSHA Standards.
 - 1) Clearance between bottom of toe board and walking surface shall not exceed 1/4 IN.
- 8. Fit exposed ends of guardrails and handrails with solid terminations.
 - a. Return ends of handrails to wall but do not attach to wall.
- 9. Preassemble items in shop to greatest extent possible to minimize field splicing and assembly of units at project site.
- B. Finish: Galvanized after fabrication.
- C. Welded Railing Fabrication:
 - 1. All welding to be continuous in accordance with AWS D1.1.
 - a. All welded railing joints shall have full penetration welds.

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- 2. All exposed welds to be ground and buffed smooth and flush to match and blend with adjoining surfaces.
 - a. NAAMM AMP 521, Type 2.
- 3. No ragged edges, surface defects, or undercutting of adjoining surfaces will be accepted.
- D. Install weeps to drain moisture from hollow sections of railing at exterior locations and in high humidity areas.
 - 1. Drill 1/4 IN weep hole in railings closed at bottom:
 - a. 1 IN above walkway surface at bottom of posts.
 - 1) 1 IN above solid rod at removable railing sections.
 - b. At low point of intermediate rails.
 - c. Drill hole prior to galvanizing.
 - d. Do not drill weep holes:
 - 1) In bottom of base plate.
- E. Expansion Joints:
 - 1. Joints to be designed to allow expansion and contraction of railing and still meet design loads required.
 - a. Top rail splices and expansion joints shall be located within 8 IN of post or other support.
 - b. Where railings span building expansion joints; provide a railing expansion joint in the span crossing the building expansion joint.
 - 2. Provide expansion joints in any continuous run exceeding 20 FT in length.
 - a. Space expansion joints at not more than 40 FT OC.
 - 3. Provide minimum 0.10 IN of expansion joint for each 20 FT length of top rail for each 25 DegF differential between installation temperature and maximum design temperature.
 - a. Maximum expansion joint width at time of installation shall not exceed 3/8 IN.
 - 1) Provide additional expansion joints as required to limit expansion joint width.
 - 4. Provide slip-joint with internal sleeve.
 - a. Extend slip joint min 2 IN beyond joint at maximum design width.
 - b. Fasten internal sleeve securely to one side
 - 1) Provide allen-head set screw located in bottom of rail.
 - 2) Rivets or exposed screw heads are not acceptable.

PART 3 – EXECUTION

3.01 PREPARATION

- A. Prior to installation, inspect and verify condition of substrate.
- B. Correct surface defects or conditions which may interfere with or prevent a satisfactory installation.

3.02 INSTALLATION

- A. Install handrails and guardrails and beam guardrail to meet loading requirements of the Building Code and:
 - a. City of Bellevue:
 - 1) Transportation Department Design Manual 2011.
- B. Install products in accordance with NAAMM AMP 521 and manufacturer's instructions.
- C. Set work accurately in location, alignment and elevation; plumb, level, and true.
 - 1. Measure from established lines and items which are to be built into concrete, masonry or similar construction.
- D. Align railings prior to securing in place to assure proper matching at butting and expansion joints and correct alignment throughout their length.
 1. Provide shims as required.
- E. Install proper sized expansion joints based on temperature at time of installation and differential coefficient of expansion of materials in all railings as recommended by manufacturer.
 - 1. Lubricate expansion joint splice bar for smooth movement of railing sections.
- F. Provide removable railing sections where indicated on Drawings.
- G. Attach handrails to walls or guardrails with brackets designed for condition.
 - 1. Provide brackets which provide a minimum 1-1/2 IN clearance between handrail and nearest obstruction.
 - a. Handrails shall not project more than 4-1/2 IN into required stairway width.
 - 2. Anchor handrail brackets to concrete or masonry walls with 1/2 IN stainless steel adhesive anchors and stainless steel hex head bolts.
- H. Anchor railings to concrete with minimum 1/2 IN stainless steel adhesive anchors with stainless steel bolts, nuts and washers unless noted otherwise in the Contract documents.
 - 1. Where exposed, bolts shall extend minimum 1/2 IN and maximum 3/4 IN above the top nut.
 - a. If bolts are cut off to required height, threads must be dressed to allow nuts to be removed without damage to the bolt or the nut.

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- b. Bevel the top of the bolt after cutting to provide a smooth surface.
- I. Anchor railings to metal structure with minimum 3/4 IN stainless steel bolts, nuts and washers.
- J. Repair damaged galvanized surfaces in accordance with ASTM A780.
 - 1. Properly prepare surface in accordance with galvanizing repair paint manufacturer's recommendations.
 - 2. Apply minimum 6 mils DFT of galvanizing repair paint in accordance with manufacturer's recommendations.
- K. Prepare and paint railings in accordance with Specification Section 09 91 00.
- L. Provide railings as required for stair construction identified in Specification Section 05 51 00.

END OF SECTION

SECTION 05 82 50 ROOF WALK GRATINGS

PART 1 – GENERAL

1.01 SUMMARY

A. Furnish and install roof walk gratings as indicated on the Drawings.

1.02 SUBMITTALS

- A. Submittal Procedures: See Section 01 33 00 Submittal Procedures for requirements for the mechanics and administration of the submittal process.
- B. Leadership in Energy and Environmental Design (LEED[®]) Documentation: Submit the following in accordance with Section 01 81 30 – Sustainability Requirements.
 - 1. Product Data for MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content; include statement indicating costs for each product having recycled content.
- C. Approval Submittals:
 - 1. Product Data: Submit manufacturer's product literature and installation instructions.
 - 2. Samples:
 - a. General: Tag, identify and provide statement regarding use for all fasteners, anchor clips, closures and sealants.
 - b. Manufacturer's installation instructions.
- D. Closeout Submittals:
 - Extended Warranty: Provide two executed copies of the Extended Warranty required by this Section in accordance with the provisions of Section 01 78 00 – Closeout Procedures.

1.03 EXTENDED WARRANTY

- A. In accordance with the provisions of Section 01 78 00 Closeout Procedures, provide an Extended Warranty for the Work of this Section:
 - 1. Warranty period for Work of this Section is five (5) years commencing on the date of Substantial Completion.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. Walkways by:
 - a. R & S Manufacturing and Sales Company (www.mssales.com).
 - b. United Interlock Grating Co. (www.unistrutohio.com).
 - c. PHP Systems/Design (<u>www.phpsd.com</u>).
 - d. Or Approved Equal.
- B. Submit request for substitution in accordance with Specification Section 01 60 00 Product Requirements.

2.02 ROOF WALK GRATINGS

- A. Roof walks shall consist of walkways consisting of planks, support stands, rib clip bolts, and protective pads that rest between the support stand and the roof surface.
 - 1. Comply with Metal plank grating, non-slip requirement, of Federal Specifications RR-G-1602.
- B. Galvanize anchor bolts, grating fasteners, washers, and parts or devices necessary for proper installation, unless indicated otherwise.
- C. Rooftop walkway gratings shall be not less than 2 FT wide, not lighter than 14 gage, ASTM A525, G90, steel with slip resistant surface.
 - 1. Furnish all brackets, connectors and other accessories.
 - 2. Support gratings at minimum 5 FT intervals on hard rubber pads in accordance with manufacturer's instructions.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Install roof top walk ways as recommended by the manufacturer.
 - 1. Fasteners, anchoring devices, hardware, accessories, and other components shall be provided as required for a complete installation.
- B. Properly set pads bearing fully on the roof surface, without piercing or rupturing the roof membrane.
 - 1. The walk ways shall have flush joints to ensure that the footing will be stable and will not be susceptible to tripping hazards.

END OF SECTION

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SECTION 06 10 00 ROUGH CARPENTRY

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes: Rough carpentry.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Division 00 Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 01 General Requirements.
 - 3. Section 05 50 00 Metal Fabrications.

1.02 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. APA The Engineered Wood Association (APA):
 - a. PRP-108, Performance Standards and Qualification Policy for Structural Use Panels.
 - b. U450E, Storage and Handling of APA Trademarked Panels.
 - c. Y510T, Plywood Design Specification.
 - 2. ASTM International (ASTM):
 - a. D2898, Standard Practice for Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing.
 - b. D4442, Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Base Materials.
 - c. D4444, Standard Test Method for Laboratory Standardization and Calibration of Hand-Held Moisture Meters.
 - d. E84, Standard Test Method for Surface Burning Characteristics of Building Materials.
 - 3. American Wood Protection Association (AWPA):
 - a. Book of Standards.
 - b. Use Category System.
 - 4. Environmental Protection Agency (EPA).
 - 5. National Institute of Standards and Technology (NIST):
 - a. PS-1, Construction and Industrial Plywood.
 - b. PS-2, Performance Standard for Wood-Based Structural-Use Panels.
 - c. PS-20, American Softwood Lumber Standard.

- 6. Underwriters Laboratories, Inc. (UL):
 - a. 723, Standard for Test for Surface Burning Characteristics of Building Materials.
- 7. Building Code:
 - a. International Code Council (ICC):
 - International Building Code and associated standards, 2009 Edition as amended by the State of Washington, and the City of Bellevue Amendments, referred to herein as Building Code.
- B. Qualifications:
 - 1. Wood Treatment Plant: AWPA M3.
 - 2. Treated Wood Inspection: AWPA M2.
- C. Environmental Criteria:
 - 1. Forest Certification: Certification of wood Certified Well-Managed Forests, in accordance with Forest Stewardship Council Guidelines.
 - a. Scientific Certification Systems (SCS).
 - 2. For the following wood products, provide materials produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC 1.2, "Principles and Criteria."
 - 3. South Coast Air Quality Management District (SCAQMD): Comply with requirements of Rule 1168 Adhesive Applications.
 - 4. Provide wood composite products that do not contain added ureaformaldehyde.
- D. Miscellaneous:
 - 1. Factory marking:
 - a. Lumber:
 - 1) Identify type, grade, moisture content, inspection service, producing mill, and other qualities specified.
 - 2) Marking may be omitted, as allowed by Building Code, if certificate of inspection is provided for each shipment.

1.03 SUBMITTALS

- A. Submittal Procedures: See Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
- B. Leadership in Energy and Environmental Design (LEED[®]) Documentation: Submit the following in accordance with Section 01 81 30 – Sustainability Requirements:
 - 1. Product Data for MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content; include statement indicating costs for each product having recycled content.

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- 2. Product Data for MR 5: For products and materials required to comply with requirements for regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.
- 3. Product Data for IEQ 4.1: For adhesives and sealants used inside the weatherproofing system, documentation including printed statement of VOC content.
- 4. Product Data for IEQ 4.4: For composite wood and agrifiber products used inside the weatherproofing system, documentation including printed statement that product contains no added urea-formaldehyde resins/ Laminating adhesives used to fabricate on site and shop-applied composite wood and agrifiber assemblies must no contain urea-formaldehyde resins.
- 5. LEED Materials Tracking Form: Form to be provided in an electronic format to the Contractor to record LEED materials used on the project.
- C. Approval Submittals:
 - 1. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions for all products specified.
 - 2. Documentation of treatment of preservative and fire retardant treated material in accordance with standards referenced.
 - 3. Product Data: Unless otherwise indicated, submit the following for each type of product provided under work of this Section:
 - a. Recycled Content:
 - 1) Engineered Wood Products:
 - a) Indicate recycled content; indicate percentage of preconsumer and post-consumer recycled content per unit of product.
 - b) Indicate relative dollar value of recycled content product to total dollar value of product included in project.
 - c) If recycled content product is part of an assembly, indicate the percentage of recycled content product in the assembly by weight.
 - d) If recycled content product is part of an assembly, indicate relative dollar value of recycled content product to total dollar value of assembly.
 - 2) Salvaged Lumber: Provide documentation certifying products are from salvaged lumber sources.
 - 3) Recovered Lumber: Provide documentation certifying products are from recovered lumber sources.

- b. Local/Regional Materials:
 - Sourcing location(s): Indicate location of extraction, harvesting, and recovery; indicate distance between extraction, harvesting, and recovery and the project site.
 - Manufacturing location(s): Indicate location of manufacturing facility; indicate distance between manufacturing facility and the project site.
 - 3) Product Value: Indicate dollar value of product containing local/regional materials; include materials cost only.
 - Product Component(s) Value: Where product components are sourced or manufactured in separate locations, provide location information for each component. Indicate the percentage by weight of each component per unit of product.
- c. VOC data:
 - 1) Adhesives:
 - a) Submit manufacturer's product data for adhesives. Indicate VOC limits of the product. Submit MSDS highlighting VOC limits.
 - b) Submit Green Seal Certification to GS-36 and description of the basis for certification.
 - c) Submit manufacturer's certification that products comply with SCAQMD #1168.
 - Engineered Wood Products: Provide documentation that composite wood and agrifiber products contain no added ureaformaldehyde resins.
 - a) ANSI A208.1 1999, Particleboard.
 - b) ANSI A208.2 2002, Medium Density Fiberboard (MDF) for Interior Applications.
- 4. Samples: Roof underlayment.
- D. Quality Assurance Submittals:
 - 1. Letter of Certification(s) for Sustainable Forestry:
 - a. Sustainable Forestry Board: Provide letter of certification signed by lumber supplier. Indicate compliance with the Sustainable Forestry Board's "Sustainable Forestry Initiative" (SFI) and identify certifying organization.
 - b. Submit SFI certification numbers; identify each certified product on a line-item basis.
 - 2. Certifications:
 - a. Chemicals used in treatment process are registered with and approved by EPA.
 - b. Moisture content of material prior to treatment: 25 percent maximum.

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1.04 DELIVERY AND STORAGE

- A. Delivery, storage and handling of untreated wood products:
 - 1. Lumber: As recommended by the grading agency indicated on the grade stamp.
 - 2. Plywood: APA U450E.
- B. Delivery, storage, handling and disposal of treated wood products: AWPA M4.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the manufacturers listed in the applicable Articles below are acceptable.
- B. Submit request for substitution in accordance with Specification Section 01 60 00.

2.02 MATERIALS

- A. General:
 - 1. Lumber (for framing, blocking, nailers, furring, grounds and similar members):
 - a. NIST PS-20.
 - b. Species:
 - 1) Treated material: As indicated in the appropriate AWPA Standard and as required to achieve UL rating listed herein.
 - c. Grade:
 - 1) For nominal sizes up to and including 2 x 4: Standard and better.
 - 2) For nominal sizes up to 2 IN thick and wider than 4 IN: #2 and better.
 - 2. Moisture content:
 - a. Kiln-dry, ASTM D4442 and ASTM D4444.
 - b. Lumber, 19 percent maximum.
 - c. Wood structural panels plywood, 15 percent maximum.
- B. Preservative Treated Material:
 - 1. Moisture content:
 - a. Prior to treatment: 25 percent.
 - b. Kiln-dry after treatment (KDAT), ASTM D4442 and ASTM D4444:

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- 1) Lumber: 19 percent maximum.
- 2) Plywood: 18 percent maximum.
- 2. Preservative:
 - a. Waterborne, AWPA P5.
 - b. As indicated in the appropriate AWPA commodity standards.
- 3. Pressure-treat material in accordance with AWPA C1 and the following:
 - a. Lumber: C2, C15.
 - b. Plywood: C9.
- 4. Wherever practicable, material to be treated shall be manufactured in its final form prior to treatment.
- C. Fire-Retardant Treated Material (FRTM):
 - 1. Acceptable manufacturer:
 - a. Hoover Treated Wood Products, Inc.:
 - 1) Interior: "Pyro-Guard".
 - 2) Exterior: "Exterior Fire-X".
 - b. Western Wood Preserving Co.; (<u>www.westernwoodpreserving.com</u>)
 - 1) Fire PRO.
 - c. Or approved equal.
 - 2. Maximum moisture content:
 - a. Prior to treatment: 25 percent.
 - b. Kiln-dry after treatment (KDAT), ASTM D4442 and ASTM D4444:
 - 1) Lumber: 19 percent (KDAT).
 - 2) Plywood: 15 percent (KD-15).
 - 3. Fire-retardant preservative:
 - a. Provide protection against decay:
 - 1) EPA registered for use as a wood preservative.
 - b. Shall not bleed-through or adversely affect bond of any finish.
 - 4. Pressure-treat material in accordance with AWPA C1 and the following:
 - a. Lumber: C20.
 - b. Plywood: C27.
 - 5. UL Classified:
 - a. FR-S, UL 723.
 - b. Exterior: No increase in classification when subjected to the Standard Rain Test, ASTM D2898.
 - c. Provide UL mark on each piece of FRTM.

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- 6. Maximum flame spread rating: 25, ASTM E84.
- 7. Wherever practicable, material to be treated shall be manufactured in its final form prior to treatment.
- D. Fasteners and Anchors:
 - 1. Proper type, size, material, and finish for application.
 - 2. Nuts, bolts and washers: See Specification Section 05 50 00.
 - 3. Expansion anchors: See Specification Section 05 50 00.
 - 4. Adhesive anchors: See Specification Section 05 50 00.

PART 3 – EXECUTION

3.01 PREPARATION

- A. Verify measurements, dimensions, and shop drawing details before proceeding.
- B. Coordinate location of studs, nailers, blocking, grounds and similar supports for attached work.
- C. Eliminate sharp projections which would puncture roofing, flashing or underlayment material.

3.02 ERECTION AND INSTALLATION

- A. General:
 - 1. Provide treated material in accordance with appropriate AWPA standard for intended end use.
 - 2. Provide preservative treated material for all wood used:
 - a. Outside building.
 - b. Below grade.
 - 3. Provide fire-retardant treated material for all wood used:
 - a. Inside building.
 - b. Within exterior building walls including parapets.
 - c. In roof construction.
 - d. For roofing nailers.
- B. Attach work securely by anchoring and fastening as indicated or required to support applied loading.
 - 1. Provide washers under bolt heads and nuts.
 - 2. Fasten plywood in accordance with APA recommendations.
 - 3. Use galvanized nails and fasteners unless indicated otherwise.
 - a. When anchoring treated wood material use appropriately treated fasteners for corrosion protection against the chemicals used in the wood treatment process.

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- 4. Use common wire nails or screws for general work.
- 5. Use fasteners of size that will not penetrate members where opposite side will be exposed to view or receive finish materials.
- 6. Install fasteners without splitting of wood; predrill as required.
- 7. Do not drive threaded friction type fasteners.
- 8. Tighten bolts and lag screws at installation and retighten as required.
- C. Set work to required levels and lines, plumb, true.
 - 1. Shim as required.
 - 2. Cut and fit accurately.
- D. Provide wood grounds, nailers, or blocking where required for attachment of other work and surface applied items.
 - 1. Form to shapes indicated or required.
 - a. Field treat cuts and holes in preservative and fire-retardant treated material in accordance with AWPA M4 and manufacturer's published recommendations.
 - 1) FRTM lumber:
 - a) Do not rip or mill.
 - b) Cross-cutting and drilling are allowable in accordance with manufacturer's recommendations and UL requirements.
 - c) Resurfacing, planing or fabrication of special shapes or profiles shall be done prior to treatment.
 - 2) FRTM plywood:
 - a) Cross-cutting, ripping and drilling are allowable in accordance with manufacturer's recommendations and UL requirements.
 - 3) Light sanding as permitted by UL to remove raised grain or prepare for finishing is allowable.
 - 2. Grounds:
 - a. Dressed, key beveled lumber minimum 1-1/2 IN wide of thickness required to bring face of ground even with finish material.
 - b. Remove temporary grounds when no longer required.
 - 3. Install roofing nailers as indicated:
 - a. Install per roofing manufacturer's recommendations.
 - b. Match height of nailers to insulation.
 - c. Anchor nailers to resist force of 75 PLF unless required otherwise by roofing manufacturer.
 - 1) Metal decking attachment:

- Attach base nailer to metal roof deck using self-tapping stainless steel sheet metal screws (STSMS) with plate washers or with minimum 3/8 IN Type 304 stainless steel hex head bolts with nuts and washers.
- b) Countersink heads of bolts flush with top of nailer.
- c) Provide size and spacing of STSMS as required to meet loading criteria specified.
- d) Provide spacing of minimum 3/8 IN hex head bolts as required to meet loading criteria specified.
- 2) Concrete decking attachment:
 - Attach base nailer to concrete roof deck using minimum 3/8 IN stainless steel adhesive anchors with minimum 3 IN embedment.
 - b) Countersink heads of bolts flush with top of nailer.
 - c) Provide spacing of minimum 3/8 IN stainless steel adhesive anchors as required to meet loading criteria specified.
- d. Provide 1/2 IN vent spaces between lengths of nailers.
- e. Install nailers over vapor retarder where indicated.
- E. Install wood furring plumb and level with closure strips at all edges and openings.
- F. When wood has been exposed to moisture allow to completely dry out prior to covering with additional wood or another material.
- G. Correct or replace wood which shows bowing, warping or twisting to provide a straight, plumb and level substrate for applications of other materials.

END OF SECTION

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SECTION 06 16 00 SHEATHING

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Wall sheathing.
 - 2. Sheathing joint and penetration treatment.
- B. Related Sections include but are not necessarily limited to:
 - 1. Division 00 Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 01 General Requirements.
 - 3. Section 07 92 00 Joint Sealants.

1.02 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. American National Standards Institute/American Hardboard Association (ANSI/AHA):
 - a. A135.4, Basic Hardboard.
 - 2. ASTM International (ASTM):
 - a. A153, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - b. C834, Standard Specification for Latex Sealants.
 - c. C1177, Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
 - d. C1280-12a Standard Specification for Application of Exterior Gypsum Panel Products for Use as Sheathing.
 - e. E84, Standard Test Method for Surface Burning Characteristics of Building Materials.
 - f. E119, Standard Test Methods for Fire Tests of Building Construction and Materials.
 - 3. Gypsum Association (GA):
 - a. GA-253, Application of Gypsum Sheathing.
 - 4. Environmental Protection Agengy (EPA):
 - a. 40 CFR 59, National Volatile Organic Compound Emission Standards for Architectural Coatings.

- 5. Building Code:
 - a. International Code Council (ICC):
 - International Building Code and associated standards, 2009 Edition as amended by the State of Washington, and the City of Bellevue Amendments, referred to herein as Building Code.

1.03 SUBMITTALS

- A. Submittal Procedures: See Section 01 33 00 Submittal Procedures for requirements for the mechanics and administration of the submittal process.
- B. Leadership in Energy and Environmental Design (LEED[®]) Documentation: Submit the following in accordance with Section 01 81 30 – Sustainability Requirements:
 - 1. Product Data for MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content; include statement indicating costs for each product having recycled content.
 - 2. Product Data for IEQ 4.1: For adhesives and sealants used inside the weatherproofing system, documentation including printed statement of VOC content.
 - 3. Product Data for IEQ 4.2: For paints and coatings used inside the weatherproofing system, documentation including printed statement of VOC content.
 - 4. LEED Materials Tracking Form: Form to be provided in an electronic format to the Contractor to record LEED materials used on the project.
- C. Approval Submittals:
 - 1. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions for all products specified.
 - 2. Fire-Test-Response Characteristics: For assemblies with fire-resistance ratings, provide materials and construction identical to those of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.
 - a. Fire-Resistance Ratings: Indicated by design designations from UL's Fire Resistance Directory.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. Gypsum Sheathing:

- a. Dens Glas by Georgia- Pacific (www.gp.com/build).
- b. Gold Bond e²xp National Gypsum (*www.nationalgypsum.com*).
- c. SECUROCK by U.S. Gypsum Co. (<u>www.usg.com</u>).
- d. Approved equal.

2.02 MATERIALS

- A. Glass-Mat Gypsum Wall Sheathing: ASTM C 1177.
 - 1. Type and Thickness: Regular, 1/2 IN thick.
- B. Fasteners:
 - 1. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
 - a. For wall sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A 153.
- C. Sealant for Glass-Mat Gypsum Sheathing: Silicone emulsion sealant complying with ASTM C 834, compatible with sheathing tape and sheathing and recommended by tape and sheathing manufacturers for use with glass-fiber sheathing tape and for covering exposed fasteners.
 - 1. Sheathing Tape: Self-adhering glass-fiber tape, minimum 2 IN wide, 10 by 10 or 10 by 20 threads/IN, of type recommended by sheathing and tape manufacturers for use with silicone emulsion sealant in sealing joints in glass-mat gypsum sheathing and with a history of successful in-service use.

PART 3 – EXECUTION

3.01 INSTALLATION, GENERAL

- A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
 - 1. Arrange joints so that pieces do not span between fewer than three (3) support members.
- B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.
- C. Securely attach to substrate by fastening as indicated, complying with the following:
 - 1. NES NER-272 for power-driven fasteners.
 - 2. Table 2304.9.1, "Fastening Schedule," in ICC's "International Building Code."
- D. Coordinate wall sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.

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E. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

3.02 GYPSUM SHEATHING INSTALLATION

- A. Comply with GA-253 and with manufacturer's written instructions.
 - 1. Fasten gypsum sheathing to cold-formed metal framing with screws.
 - 2. Use maximum lengths possible to minimize number of joints.
 - 3. Install boards with a 3/8 IN gap where non-load-bearing construction abuts structural elements.
 - 4. Install boards with a 1/4 IN gap where they abut masonry or similar materials that might retain moisture, to prevent wicking.
 - 5. Apply glass-fiber sheathing tape to glass-mat gypsum sheathing joints and apply and trowel silicone emulsion sealant to embed entire face of tape in sealant.
 - a. Apply sealant to exposed fasteners with a trowel so fasteners are completely covered.
 - b. Seal other penetrations and openings.

END OF SECTION

SECTION 06 41 00 ARCHITECTURAL CABINETWORK

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Architectural cabinetwork
 - 2. Solid Surface Material countertops.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Division 00 Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 01 General Requirements.
 - 3. Section 07 92 00 Joint Sealants.

1.02 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. Americans with Disability Act (ADA):
 - a. Americans with Disability Act Accessibility Guidelines (ADAAG).
 - 2. American National Standards Institute (ANSI):
 - a. A161.2, Decorative Laminate Countertops, Performance Standards for Fabricated High Pressure.
 - b. A208.1, Particleboard.
 - c. A208.2, Medium Density Fiberboard.
 - 3. American National Standards Institute/American Hardboard Association (ANSI/AHA):
 - a. A135.4, Basic Hardboard.
 - 4. ASTM International (ASTM):
 - a. D4442, Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Base Materials.
 - b. D4444, Standard Test Method for Laboratory Standardization and Calibration of Hand-Held Moisture Meters.
 - c. E84, Standard Test Method for Surface Burning Characteristics of Building Materials.
 - Architectural Woodwork Institute (AWI) Architectural Woodwork Manufacturers' Association of Canada (AWMAC), Woodwork Institute (WI):
 - a. Architectural Woodwork Standards:
 - 1) Standing and Running Trim.

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- 6. American Wood Protection Association (AWPA):
 - a. Book of Standards.
 - b. Use Category System.
- 7. Forestry Certification: Provide architectural woodwork produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC 1.2, "Principles and Criteria".
- 8. Hardwood Plywood and Veneer Association (HPVA):
 - a. HP-1, Standard for Hardwood and Decorative Plywood.
- 9. National Electrical Manufacturers Association (NEMA):
 - a. LD 3, High-Pressure Decorative Laminates (HPDL).
- 10. Certification:
 - a. Provide a Woodwork Institute Certified Compliance Label or an Architectural Woodwork Institute Label on the first page of the shop drawings.
 - b. Before delivery to the job site Provide a Woodwork Institute Certified Compliance Program (CCP) Certificate of Compliance or an Architectural Woodwork Institute Quality Certification Program (QCP) Certificate itemizing the products being provided, and certifying that they meet the requirements of the AWS for the grade(s) specified and of the plans and specifications.
 - c. On completion of installation provide a Woodwork Institute CCP Certificate of Compliance or an AWI QCP Certificate indicating the products installed, and certifying that installation meets the requirements of the AWS for the grade(s) specified.
 - d. The Fees charged by the associations for their certification programs are the responsibility of the millwork manufacturer and installer, and shall be included in their bids.
- B. Qualifications:
 - Fabricator shall have minimum of 10 years experience in design and fabrication of architectural cabinetwork with minimum of three (3) successfully completed projects with similar scope in the last two (2) years.
 - 2. Installer shall have a minimum of 10 years experience in installation of architectural cabinetwork with minimum of three (3) successfully completed projects with similar scope in the last two (2) years.
 - 3. Solid Surface Material fabricator shall be licensed or approved in writing by the Solid Surface Material Manufacturer.
- C. Miscellaneous:
 - 1. Construction details, fastening, tolerances and workmanship: AWI premium grade standards with exceptions indicated.

1.03 **DEFINITIONS**

- A. Architectural Cabinetwork: Millwork.
- B. Exposed Surfaces:
 - 1. All surfaces visible when doors and drawers are closed, inside of doors, and:
 - a. Door and drawer fronts and their edges.
 - b. Exposed end.
 - c. Countertop and backsplash and their exposed edges.
 - d. Face frame (if used).
 - e. Interior of open cabinets.
 - f. Toe strip not to be covered by separate base.
 - g. Wall mounted adjustable shelves.
 - h. Bottom of wall case over 4 FT above floor.
 - i. Top of wall and tall cases below 6 FT above floor.
- C. Concealed Surfaces:
 - 1. Surfaces not visible after installation, and:
 - a. Web frames.
 - b. Dust panels.
- D. Semi-Exposed Surfaces: All other surfaces not exposed or concealed.

1.04 SYSTEM DESCRIPTION

A. Fabricated cabinets including all hardware, countertops, and finishing thereof.

1.05 SUBMITTALS

- A. Submittal Procedures: See Section 01 33 00 Submittal Procedures for requirements for the mechanics and administration of the submittal process.
- B. Leadership in Energy and Environmental Design (LEED[®]) Documentation: Submit the following in accordance with Section 01 81 30 – Sustainability Requirements:
 - 1. Product Data for MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content; include statement indicating costs for each product having recycled content.
 - 2. Product Data for MR 7: Provide architectural woodwork produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC 1.2, "Principles and Criteria".

- 3. Product Data: For hardboard, medium-density fiberboard, particleboard, plywood, high-pressure decorative laminate, adhesive for bonding plastic laminate, thermoset decorative overlay, solid-surfacing material, fire-retardant-treated materials, cabinet hardware and accessories, handrail brackets, and finishing materials and processes.
 - a. Include data for Low VOC content.
 - b. No wood-bonding agent used shall contain urea formaldehyde.
 - c. Include evidence that mill is certified for chain-of-custody by an FSCaccredited certification body.
- 4. Product Data for IEQ 4.1: For adhesives and sealants used inside the weatherproofing system, documentation including printed statement of VOC content.
- 5. Product Data for IEQ 4.2: For paints and coatings used inside the weatherproofing system, documentation including printed statement of VOC content.
- 6. Product Data for IEQ 4.4: For all composite wood and agrifiber products, documentation provided that no urea formaldehyde was used.
- 7. LEED Materials Tracking Form: Form to be provided in an electronic format to the Contractor to record LEED materials used on the project.
- C. Approval Submittals:
 - 1. Manufacturer's installation instructions.
 - 2. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 - 3. Shop Drawings and details showing compliance with this Specification.
 - 4. Samples:
 - a. Color and finish samples for Project Representative's selection.
 - b. Plastic laminate color and finish samples for Project Representative's selection.
 - c. Solid Surface Materials for Project Representative's selection.
 - d. Decorative Veneer Panel: sample flitches for Project Representative's selection.
 - e. PVC edging: Manufacturer's complete line of color samples.
- D. Quality Assurance Submittals:
 - 1. Certifications:
 - a. FSC certification of wood products.
 - b. Solid Surface Material fabricator's letter of authorization from material manufacturer.

- c. Test reports.
- 2. Millwork fabricator experience qualifications.
- 3. Listing of millwork fabricators projects within last two (2) years with similar scope.
- 4. Installer experience qualifications.
- E. Closeout Submittals:
 - Extended Warranty: Provide two executed copies of the Extended Warranty required by this Section in accordance with the provisions of Section 01 78 00 – Closeout Procedures.

1.06 EXTENDED WARRANTY

- A. In accordance with the provisions of Section 01 78 00 Closeout Procedures, provide an Extended Warranty for the Work of this Section:
 - 1. The warranty period for solid surface material countertops is five (5) years commencing on the date of Substantial Completion.
 - 2. The warranty period for architectural cabinetwork is five (5) years commencing on the date of Substantial Completion.
 - 3. Solid Surface Material manufacturer's standard 10 year warranty.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver all millwork items and countertops to the Project Site and store in the area in which items will be installed.
 - 1. Building areas to receive millwork items shall be enclosed, weathertight and conditioned to a relative humidity between 25 percent and 55 percent before, during and after installation.
 - 2. Remove any plastic packaging or wrapping from millwork upon delivery to Project Site.
 - 3. Protect stored items from damage with vapor-permeable covering during storage.
 - 4. Allow material to acclimate to the surrounding environment a minimum of 96 HRS prior to installation.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. Plastic laminate:
 - a. Formica Corp (www.formica.com).
 - b. Nevamar Corp (www.nevamar.com).
 - c. Wilsonart International (<u>www.wilsonart.com</u>).

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- d. Or approved equal.
- 2. Paper Composite:
 - a. Richlite Company (<u>www.richlite.com</u>).
 - b. Ecotop (<u>www.kiptech.com</u>).
 - c. Paperstone (<u>www.paperstoneproducts.com</u>).
 - d. Or approved equal.
- 3. Cabinet hardware:
 - a. Ives. (www.iveshardware.com).
 - b. Knape & Vogt. (www.knapeandvogt.com).
 - c. Rockford Process Control, Inc. (www.rockfordprocess.com/hardware).
 - d. Stanley. (www.stanleyhardware.com).
 - e. Or approved equal.
- 4. Shelf and hanger rod:
 - a. Knape & Vogt.(www.knapeandvogt.com).
 - b. Stanley. (<u>www.stanleyhardware.com</u>).
 - c. Or approved equal
- 5. Solid Surface Material:
 - a. Avonite. (www.avonitesurfaces.com).
 - b. Dupont[™] Corian (www2.dupont.com).
 - c. Formica Corp.(www.formica.com).
 - d. Wilsonart International. (www.wilsonart.com).
 - e. Or approved equal.
- 6. Sealants: See Section 07 92 00.
- B. Submit request for substitution in accordance with Specification Section 01 60 00 Product Requirements.

2.02 MATERIALS

- A. Plastic Laminate:
 - 1. NEMA LD 3 high-pressure laminate, matte finish.
 - 2. All other exposed surfaces: Grade GP28, 0.028 IN thick.
 - 3. Semi-exposed backer sheet: Grade CL20, 0.020 IN thick; color to match plastic overlay.
 - 4. Concealed backer sheet: Grade BK20, 0.020 IN thick.

- B. Paper Composite Sheets: Cellulose or hemp-fiber paper heat pressed with phenolic resin; color consistent throughout thickness.
 - 1. Surface Burning Characteristics: Flame spread 30, maximum; smoke developed 30, maximum; when tested in accordance with ASTM E 84.
 - 2. Density: 75.84 LBS/CF.
 - 3. Water Absorption: 0.36 percent for 1 IN thickness, unsealed material, 24 hour fully submerged test.
 - 4. Specific Gravity: 1.213.
 - 5. Thermal Properties:
 - a. Coefficient of Thermal Expansion, X Direction: 5.2 microinches per inch DegF (9.4 microns per mm DegC).
 - b. Coefficient of Thermal Expansion, Y Direction: 12.8 microinches per inch degree F (23.0 microns per mm DegC).
 - Coefficient of Thermal Expansion, Z Direction: 45.9 microinches per inch DegF (82.7 microns per mm degree C), for span of 73.5 IN (1.87 m).
 - d. Thermal Conductivity: 0.00051 Cal cm/sq cm sec DegC.
 - 6. Tensile Strength:
 - a. X Direction: 19,200 psi (132.4 MPa).
 - b. Y Direction: 13,100 psi (90.3 MPa).
 - 7. Compressive Strength:
 - a. X Direction: 18,400 psi (126.9 MPa); 7.09 percent strain at failure.
 - b. Y Direction: 15,900 psi (109.6 MPa); 7.15 percent strain at failure.
 - c. Z Direction: 30,000 psi (206.8 MPa); 20 percent strain at failure.
 - 8. Flexural Strength, Face in Tension:
 - a. X Direction: 22,000 psi (151.7 MPa).
 - b. Y Direction: 17,300 psi (119.3 MPa).
 - 9. Flexural Strength, Edge in Tension:
 - a. X Direction: 20,400 psi (140.6 MPa).
 - b. Y Direction: 16,100 psi (111.0 MPa).
 - 10. Izod Impact, Face Impact:
 - a. X Direction: 2.48 FT LB/IN of width (0.046 J/m of width).
 - b. Y Direction: 1.46 FT LB/IN of width (0.027 J/m of width).
 - 11. Izod Impact, Edge Impact:
 - a. X Direction: 0.68 FT LB/IN of width (0.013 J/m of width).
 - b. Y Direction: 0.62 FT LB/IN of width (0.012 J/m of width).

- C. Particleboard:
 - 1. Three-ply, medium density industrial particleboard.
 - 2. ANSI A208.1: Grade M-2 or M-3.
 - 3. Density: 45 pcf minimum.
 - 4. Particleboard used for countertops:
 - a. ANSI 208.1 Grade 155 MR-50.
 - b. Moisture resistant.
- D. Fiberboard:
 - 1. Medium density wood fiberboard. Made with adhesives containing no urea formaldehyde resin.
 - 2. ANSI A208.2 Grade 130.
- E. Hardboard:
 - 1. Tempered, smooth on both sides.
 - 2. ANSI/AHA A135.4: Class 1, S2S.
- F. Hardwood Plywood:
 - 1. Species: Maple.
 - 2. Plain sliced.
 - 3. Veneer or particle core.
 - 4. HPVA HP-1, Grade A Made with adhesive containing no urea formaldehyde resin.
 - 5. Hardwood plywood for drawer boxes:
 - a. Species: Alder or Birch.
 - b. HPVA HP-1, Grade A. Made with adhesive containing no urea formaldehyde resin
 - c. States Industries "Appleply".
- G. Plywood: Softwood plywood, A grade.
 - 1. Comply with DOC PS 1, U.S. Product Standard for Construction and Industrial Plywood.
- H. Decorative Veneer Panel:
 - 1. Species: Western Red Cedar.
 - 2. Grade: Clear No. 1.
 - 3. Quarter Sawn Grain.
 - 4. Clear penetrating oil finish.
- I. Hardwood:
 - 1. Solid, S4S.
 - 2. AWI Section 300 custom grade, Grade II, for exposed surfaces.

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- 3. Exposed: Species to match veneer plywood unless noted otherwise on Drawings.
- 4. Other locations: Any sound dry hardwood.
- J. PVC Edging:
 - 1. Polyvinyl chloride edge banding, machine applied and trimmed:
 - a. Hot melt glue per PVC manufacturer's recommendations.
 - b. T-edging will not be allowed.
- K. Preservative Treated Lumber:
 - 1. Preservative: Waterborne, AWPA P5.
 - 2. Moisture content:
 - a. Prior to treatment: 25 percent.
 - b. Kiln-dry after treatment (KDAT), ASTM D4442, ASTM D4444: 19 percent maximum.
 - 3. Pressure treat material in accordance with AWPA C1, C2, C15 and C31.
- L. Solid Surface Material:
 - 1. Homogeneous non-porous, polymeric material.
 - a. ICPA/ANSI SS-1.
 - b. NSF 51 approved.
 - 2. Flammability: Class 1.
 - 3. Joint adhesive: Manufacturer's recommended adhesive.
 - 4. Manufacturer's standard 10 year warranty.
- M. Sealant:
 - 1. Silicone.
 - 2. See Section 07 92 00 Joint Sealants.

2.03 FABRICATION

- A. General:
 - 1. Grade AWS Premium Grade.
 - 2. Cabinetwork: Custom shop or factory built casework, complete with all hardware, accessories, countertops and bases in sizes and configurations indicated.
 - 3. Style: Reveal overlay doors and drawer fronts overlapping case body with uniform reveal at all edges.
 - 4. Case body:
 - a. All joints glued.
 - b. Top and bottom (and fixed horizontals):
 - 1) Doweled at approximately 2-1/2 IN OC.

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- c. Back: Dadoed into top, sides, and bottom.
- d. Fixed small compartment dividers: Dadoed.
- 5. Drawers (with subfront):
 - a. All joints glued.
 - b. All corners:
 - 1) Dovetailed or doweled.
 - c. Bottom: Dadoed into all four sides.
 - d. Front: Screwed onto subfront.
 - e. Top edges of drawer box rounded.
- 6. Countertops Assemblies: Surfaced with paper composite sheet:
 - a. Flat sheet Thickness: 1/2 IN minimum.
 - b. Finish on Exposed Surfaces: Matte, with field-applied surface sealer.
 - c. Color: As selected from manufacturer's standard selection by Project Representative.
 - d. Backsplash: Same sheet material as countertops:
 - 1) Secure to countertop with concealed fasteners and contact surfaces set in waterproof glue.
 - 2) Height: 4 IN.
 - 3) Color: Same as top.
- 7. Wall-Mounted Counters: Provide skirts, aprons, brackets and braces as indicated on drawings. Finish to match countertop.
- 8. Solid Surface Material countertops:
 - a. Use maximum size sheet to eliminate joints.
 - b. Joints shall be not closer than 24 IN to sinks or other cut-outs.
 - c. Ease all exposed edges.
 - d. 1/2 IN thick built up to 1-1/4 IN at exposed edges.
 - e. Backsplashes:
 - 1) Same material and thickness as countertop.
 - 2) 4 IN high.
 - 3) Provide wherever top abuts wall.
- 9. PVC edging:
 - a. Thickness:
 - 1) Case body: 1 mm.
 - 2) Door and drawer edges: 1 mm.

- b. Color:
 - 1) Match adjacent plastic laminate.
- 10. Use no blocking or fasteners in exposed or semi-exposed locations.
- B. Hardware:
 - 1. General:
 - a. Provide handles, pulls, latches, locks, and other operating devices in accordance with the ADAAG.
 - 2. Hardware for hinged doors:
 - a. Hinges:
 - 1) Frameless Concealed Hinges (European Type):
 - a) BHMA A156.9, B0161.
 - b) 170 degrees of opening.
 - 2) For doors up to 48 IN high: Two (2) hinges.
 - 3) For doors over 48 IN high: Three (3) hinges.
 - 4) Finish:
 - a) Stainless steel, BHMA 630.
 - b. Catch:
 - 1) Heavy duty, roller catch.
 - 2) Case and strike: Wrought steel.
 - 3) Roller: Rubber.
 - 4) lves 338.
 - 5) Finish: Bright nickel plated, clear coated.
 - 3. Hardware for drawers:
 - a. Slides: KV 8400 series; 100 LB capacity, precision steel ball bearings, positive closing and pull out stops, drawer removable without use of tools; telescoping full extension slides, epoxy-coated with white finish.
 - b. Lock: Provide where indicated.
 - c. For file drawers: Label holder and file hanger frame.
 - 4. Pulls:
 - a. Steel wire.
 - b. 4 IN centers.
 - c. 5/16 IN (8 mm) DIA.
 - d. Provide two (2) on drawers over 18 IN wide.
 - e. Finish:
 - 1) Powder coated.

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- 2) Color: To be selected by Project Representative.
- 5. Locks:
 - a. Pin tumbler cylinder cam locks.
 - b. Material: Brass.
 - c. Finish: Chrome plated, US 26D.
 - d. National C8100 series.
 - e. Provide two (2) keys for each lock.
 - f. Master key as directed.
- 6. Shelf supports (drilled hole type):
 - a. 5 mm holes drilled at 32 mm OC.
 - b. Shelf clips:
 - 1) Injection molded plastic.
 - 2) Two (2) 5 mm pins to interface with drilled holes.
 - 3) Anti-tip feature: Designed to retain either 3/4 IN or 1 IN thick shelf.
 - 4) Color: White.
 - 5) KV 339/340.
- 7. Shelf supports (for wall-mounted shelves):
 - a. Standards:
 - 1) Slotted steel.
 - 2) KV 80.
 - b. Shelf brackets:
 - 1) Boltless, steel for shelf depths indicated.
 - 2) KV 180.
 - c. Finish:
 - 1) Electroplated.

Color: Anochrome. Grey.

- C. Plastic Laminate Casework Fabrication:
 - 1. Finishes for non-fire-rated cabinets:
 - a. All exposed surfaces: Plastic laminate.
 - b. All semi-exposed surfaces: Low pressure thermally fused overlay (melamine).
 - 2. Edges:
 - a. Edges of case body members: 1 mm PVC.
 - b. All other exposed and semi-exposed edges: 1 mm PVC.

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- 3. Case body members (except backs not exposed):
 - a. Minimum 3/4 IN thick particleboard.
 - b. Base unit top:
 - 1) Use either full subtop or web frame.
 - 2) Web frames: Hardwood.
 - c. Provide drawer lock rails at all drawers.
 - d. Provide backs on all cabinets.
- 4. Unexposed case back:
 - a. Tempered hardboard.
 - b. Minimum 1/4 IN thick.
 - c. Full bound: Capture and glue back panel in dado at top, sides and bottom of case.
- 5. Shelves:
 - a. Meet the requirements of the AWS for a 50 pound per square foot load.
- 6. Doors:
 - a. Particleboard:
 - 1) Up to 26 IN wide or 48 IN high: 3/4 IN thick.
 - 2) Up to 36 IN wide or 66 IN high: 1-1/4 IN thick.
- 7. Drawers:
 - a. Fronts: 3/4 IN thick particleboard.
 - b. Subfront, sides and back: 1/2 IN thick hardwood plywood.
 - c. Bottom:
 - 1) Minimum 1/4 IN thick hardboard, captured four (4) sides with 3/8 IN standing shoulder.
 - 2) Over 18 IN wide provide intermediate reinforcing rails.
- 8. Case base:
 - a. Separate ladder style base.
 - b. Preservative treated lumber.
 - c. Provide concealed fastening of cabinet body to base.
 - 1) Fasteners through bottom of casework will not be accepted.
- 9. Small compartment dividers and dust panels: 1/4 IN thick hardboard.
- 10. Filler panels and scribe pieces: Particleboard; provide as required to fit standard size units to space.

- D. Case Configuration:
 - 1. Similar reveal, approximately 1/4 IN at all sides, top and bottom of doors and drawer fronts, and between doors and drawer fronts in same unit except 1/8 IN gaps at the meeting of the edges of door pairs.
 - 2. Double door units: No vertical rail or divider between doors unless called for.
 - 3. Toe space:
 - a. 4 IN high by approximately 3 IN deep.
 - b. Provide on front of each base unit unless otherwise noted.
 - 4. Pairs of sliding doors: Equal width; overlap 1 IN.
 - 5. Countertop: Overhang front and exposed ends 1 IN.
 - 6. Hardware mounting:
 - a. Drawers: Center pull in front, horizontally.
 - b. Drawers with two pulls: Set pulls at 1/4 points.
 - c. Swinging doors:
 - 1) Set pull in swing side corner:
 - a) Base units: Horizontally at top of door.
 - b) Wall units: Vertically at bottom of door.
 - c) Tall units: Vertically, centered at 40 IN above finished floor.
 - 7. Adjustable shelves:
 - a. Use drilled hole supports.
 - b. Depth: 1/2 IN less than inside cabinet depth.
 - c. Width: 1/8 IN, maximum, less than inside cabinet width.

PART 3 – EXECUTION

3.01 PREPARATION

- A. Field verify dimensions prior to fabrication and installation.
- B. Verify locations of items furnished in other sections.
- C. Coordinate installation and locations of all necessary blocking and backing in adjacent walls.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install products in accordance with the ADAAG.
 - 1. Provide sizes, heights and clearances required for accessibility compliance.
- C. Provide balanced construction on each plastic laminated item.

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- D. Use manufacturer's printed instructions or drawings in all cases where items or details are not indicated.
- E. Provide all trim, fillers, closures, stands, supports, sleeves, collars, escutcheons, brackets, braces or other miscellaneous items required for complete installation.
- F. Install extra locks where directed; deliver unused locks and keys to Project Representative
- G. Test and adjust for satisfactory operation.
- H. Seal components with silicone sealants in accordance with AWI Standards and as recommended by Solid Surface Materials manufacturer.
 - 1. Seal joints in plastic laminate countertops before assembly.
 - 2. Seal joints between backsplashes and endsplashes and countertops.
 - 3. Seal joints where backsplashes and endsplashes meet adjoining surfaces.
- I. Adjust hinges so doors hang straight.
- J. Provide protection of installed products during construction activities. Protection is to include dust and liquid-proof drop cloths and rigid products to protect against mechanical damage. Prior to substantial completion, clean casework.
- K. Install Solid Surface Material in accordance with manufacturer's recommendations.

3.03 FIELD QUALITY CONTROL

A. Protect countertop material during construction with minimum 1/8 IN hardboard.

END OF SECTION

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SECTION 07 13 26 SELF-ADHERING SHEET WATERPROOFING

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Installation of sheet membrane waterproofing on surfaces indicated on drawings, consisting of preparation of existing and repaired concrete surfaces, sealing of cracks and joints, and application of Sheet Membrane Waterproofing.

1.02 RELATED SECTIONS

- A. Division 03 Concrete.
- B. Section 07 92 00 Joint Sealants.
- C. Division 20 Mechanical/Floor Drains and Standpipes.
- D. Division 26 Electrical/Conduit and other Electrical.

1.03 REFERENCES

- A. ASTM International (ASTM):
 - 1. D412, Tests for Rubber Properties in Tension.
 - 2. D882, Test Method for Tensile Properties.
 - 3. D751, Test Method for Coated Fabrics.
 - 4. D570, Test Method for Water Absorption of Plastics.
 - 5. D1970, Self-Adhering Polymer Modified Bituminous Sheet Materials.
 - 6. D3767, Practice for Rubber Measurement of Dimensions.
 - 7. E96, (B) Water Vapor Transmission of Materials.
 - 8. E154, Puncture Resistance.
- B. Underwriters Laboratories, Inc. (UL).
 - 1. UL 790 Tests for Fire Resistance of Roof Covering Materials.

1.04 SYSTEM DESCRIPTION

A. Product provided by this Section is a self-adhesive membrane of not less than 60 mils thickness, consisting of a rubberized asphalt membrane laminated to a 4 mil cross-laminated polyethylene film.

1.05 SUBMITTALS

- A. Submittal Procedures: See Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
- B. Approval Submittals:
 - 1. Product Data: Submit manufacturer's product literature and installation instructions.

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- 2. Subcontractors approval by Manufacturer: Submit document stating manufacturer's acceptance of subcontractor as an Approved Applicator for the specified materials.
- C. Closeout Submittals:
 - 1. Extended Warranty: Provide two executed copies of the Extended Warranty required by this Section in accordance with the provisions of Section 01 78 00 Closeout Procedures.

1.06 QUALITY ASSURANCE

- A. Applicator Qualifications: Applicator shall be experienced in applying the same or similar materials and shall be specifically approved in writing by the membrane manufacturer.
- B. Regulatory Requirements: Comply with applicable codes, regulations, ordinances, and laws regarding use and application of products that contain volatile organic compounds (VOC).
- C. Pre-Application Conference: Prior to beginning work, convene a conference to review conditions, installation procedures, schedules and coordination with other work.

1.07 EXTENDED WARRANTY

- A. In accordance with the provisions of Section 01 78 00 Closeout Procedures, provide an Extended Warranty for the Work of this Section:
 - 1. Warranty period for Work of this Section is five (5) years commencing on the date of Substantial Completion.
 - a. The formation or presence of mold or fungi in a building is dependent upon a broad range of factors including, but not limited to, the presence of spores and nutrient sources, moisture, temperatures, climatic conditions, relative humidity, and heating/ventilating systems and their maintenance and operating capabilities. These factors are beyond the control of Carlisle and Carlisle shall not be responsible for any claims, repairs, restoration, or damages relating to the presence of any irritants, contaminants, vapors, fumes, molds, fungi, bacteria, spores, mycotoxins, or the like in any building or in the air, land, or water serving the building.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to project site in original, factory-sealed, unopened containers bearing manufacturer's name and label intact and legible with following information:
 - 1. Name of material.
 - 2. Manufacturer's stock number and date of manufacture.
 - 3. Material safety data sheet.
- B. Store materials in protected and well ventilated area.

1.09 PROJECT CONDITIONS

- A. Do not apply membrane when surface temperature is below or inclement weather conditions conflict with manufacturer's published requirements.
- B. Coordinate waterproofing work with other trades. The applicator shall have sole right of access to the specified areas for the time needed to complete the installation.
- C. Warn personnel against breathing of vapors and contact of material with skin or eyes. Wear applicable protective clothing and respiratory protection gear.
- D. Keep flammable products away from spark or flame. Do not allow the use of spark producing equipment during application and until all vapors have dissipated. Post "NO SMOKING" signs.
- E. Maintain work area in a neat and orderly condition, removing empty containers, rags, and rubbish daily from the site.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the contract documents, the following manufacturers are acceptable:
 - 1. Carlisle Coatings CCW Mira DRI 860/861(<u>www.carlisle.com</u>).
 - 2. WR Grace (<u>www.wrgrace.com</u>).
 - 3. CETCO Corflex 60 (cetco.com).
 - 4. Or approved equal.

2.02 PRODUCTS

- A. Self-Adhesive Sheet Membrane Waterproofing:
 - 1. Tensile Strength: 325 psi minimum, ASTM D 412.
 - 2. Ultimate Elongation: 350 percent minimum, ASTM D 412.
 - 3. Puncture Resistance: 60 LBS minimum, ASTM E 154.
 - 4. Permeance: 0.05 Perm maximum, ASTM E 96 (B).
 - 5. Low Temperature Flexibility: Unaffected at -45 DegF, ASTM D 1970, 1 IN mandrel.
 - 6. Tensile to Film: 5000 psi, ASTM D 882.
 - 7. Thickness: 60 mils, ASTM D 3767.
 - 8. Hydrostatic Head: 230 FT, ASTM D 751.
 - 9. Water Absorption: 0.1 percent by weight, ASTM D 570.

2.03 ACCESSORY PRODUCTS

- A. Surface Primer.
- B. Mastic.

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- C. Sealants.
- D. Backing Rod: Shall be closed-cell polyethylene foam rod.
- E. Protection Course: Shall be for vertical surfaces.
- F. Drainage Composite: As recommended by the manufacturer for each condition.
- G. Perimeter Drainage System: Per Civil Plan.

PART 3 – EXECUTION

3.01 INSPECTION

- A. Before any waterproofing work is started the waterproofing applicator shall thoroughly examine all surfaces for any deficiencies. Should any deficiencies exist, the Project Representative or General Contractor shall be notified in writing and corrections made.
- B. Condition of Concrete Surfaces:
 - 1. The concrete surfaces shall be of sound structural grade and shall have a smooth finish, free of fins, ridges, protrusions, rough spalled areas, loose aggregate, exposed course aggregate, voids or entrained air holes. Rough surfaces shall receive a well-adhered parget coat.
 - 2. Concrete shall be cured by water curing method. Any curing compounds must be of the pure sodium silicate type.
 - 3. Concrete shall be cured at least 7 days and shall be sloped for proper drainage.
 - 4. Voids, rock pockets and excessively rough surfaces shall be repaired with approved non-shrink grout or ground to match the unrepaired areas.
 - 5. Two-stage drains shall have a minimum 3 IN flange and be installed with the flange flush and level with the concrete surface.
 - 6. Surfaces at cold joints shall be on the same plane.

3.02 SURFACE PREPARATION

- A. Protect adjacent surfaces not designated to receive waterproofing.
- B. Prepare surfaces and install according to manufacturer's written instructions and recommendations.
- C. The concrete surface must be thoroughly clean, dry and free from any surface contaminates or cleaning residue that may harmfully affect the adhesion of the membrane.
- D. Install a 3/4 IN face, 45 degree cant of Polyurethane Sealant at all angle changes and inside corners including penetrations through the deck, walls, curbs, etc.
- E. All cracks over 1/16 IN in width and all moving cracks under 1/16 IN in width shall be routed out to 1/4 IN minimum in width and depth and filled flush with an approved polyurethane sealant.
- F. All expansion joints less than 1 IN wide shall be cleaned, primed, fitted with a backing rod and caulked with Polyurethane Sealant approved by manufacturer.

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- G. Allow all sealant to cure at least overnight.
- H. Stir Primer. Apply a thin film of primer 10 IN wide, centered over sealed cracks and joints, hairline cracks, and cold joints. Apply primer 8 IN on each side of all corners. Prime concrete around drain flanges. Allow primer to dry per manufacturer=s recommendations.
- I. Install an 8 IN self-adhering waterproofing membrane centered over joints and cracks. Install a 12 IN wide strip of self-adhering waterproofing membrane centered over the axis of all corners.
- J. Terminate membrane around drains. Terminate the membrane under the clamping ring. Seal all edges with Mastic. Do not interfere with weep holes.

3.03 APPLICATION

- A. Prepare surfaces and install according to manufacturer's written instructions and recommendations.
- B. Ensure accessory materials are compatible with membrane and approved by membrane manufacturer.
- C. Priming: Clean surfaces to remove residual dust before priming. Stir primer. Apply by spray or roller at a rate recommended by manufacturer. Allow to dry per manufacturer=s recommendation.
- D. Horizontal surfaces: Install sheet membrane from low to high point, so that laps will shed water. Overlap edge seams 2-1/2 IN end laps 5 IN. Stagger end seams. Roll in place with an 18 to 24 IN wide, 100 LB (minimum) resilient roller. Ensure that all laps are firmly adhered and that there are no gaps or fishmouths.
- E. Vertical Surfaces: Apply in lengths of 8 FT or less. Overlap edge seams 2-1/2 IN. On walls over 8 FT high, apply in 8 FT sections, starting at the lowest point with the higher section overlapping the lower section 5 IN. Roll in place using firm pressure with a hand roller.
- F. Terminations: Roll terminating edges firmly. Apply mastic to all terminations and joints. Apply mastic to laps at angle changes, extending 9 IN in each direction.

3.04 INTEGRITY TESTING

- A. Test is required for all expanded warranties beyond the standard material warranty of horizontal applications.
- B. The test can be done with Electronic Vector Mapping or flood testing. Flood testing requires 2 IN minimum head of water for a period of 24 HRS.

3.05 PROTECTION COURSE

- A. Vertical Application:
 - 1. Install Perimeter Drainage System as the first course of drainage composite immediately after membrane has been installed on vertical surfaces. Install Drainage Composite on remainder. Stop drainage composite 6 IN below final grade level.

- B. Horizontal Application:
 - 1. Install Drainage Composite immediately after flood testing on horizontal surfaces. If flood testing is delayed, install a temporary covering to protect the membrane from damage by other trades.

END OF SECTION

SECTION 07 21 00 BUILDING INSULATION

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Building insulation.
 - 2. Vapor Retarder.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Division 00 Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 01 General Requirements.
 - 3. Section 09 29 00 Gypsum Board.

1.02 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. ASTM International (ASTM):
 - a. C578, Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.
 - b. C665, Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
 - c. C1289, Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.
 - d. E96, Standard Test Methods for Water Vapor Transmission of Materials.
 - 2. Underwriters Laboratories, Inc. (UL):
 - a. Building Materials Directory.

1.03 SUBMITTALS

- A. Submittal Procedures: See Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
- B. Approval Submittals:
 - 1. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 - c. Manufacturer's recommendations on sealants, tapes and mastics.

2. Certification from insulation manufacturer stating that insulation proposed is acceptable for intended use per the Drawings.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contact Documents, the following manufacturers are acceptable:
 - 1. Rigid extruded polystyrene board insulation:
 - a. Dow. (www.dow.com).
 - b. Dyplast Products. (www.dyplastproducts.com).
 - c. Owens Corning.(<u>www.owenscorning.com</u>).
 - d. Or approved equal.
 - 2. Blanket or batt thermal insulation:
 - a. Owens-Corning Fiberglass Corp. (www.owenscorning.com).
 - b. United States Gypsum Company (USG). (www.usg.com).
 - c. CertainTeed. (www.certainteed.com).
 - d. Or approved equal.
 - 3. Sound control insulation:
 - a. Owen Corning- QuietZone Acoustic Batts. (www.owenscorning.com).
 - b. Thermafiber. (<u>www.thermafiber.com</u>).
 - c. Johns Manfield (www.jm.com).
 - d. Or approved equal.
 - 4. Vapor retarder:
 - a. Raven Industries.(www.ravenind.com).
 - b. Reef Industries.(www.reefindustries.com).
 - c. Stego Industries, LLC (www.stegoindustries.com).
 - d. Or approved equal.
- B. Submit request for substitution in accordance with Specification Section 01 60 00.

2.02 MATERIALS

- A. Rigid Polystyrene Board Insulation:
 - 1. Extruded: ASTM C578, Type IV.
 - 2. Compressive strength: 25 psi minimum.
 - 3. Density: 1.6 pcf minimum.
 - 4. Water vapor transmission: ASTM E96, 1.1 perm-IN maximum.

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- 5. Water absorption: 0.3 percent maximum.
- 6. Thermal resistance (R value at 75 DegF): 3.8/IN.
- 7. Minimum thickness as noted on Drawings.
- 8. Provide insulation designed for intended use.
- B. Sealant and Mastic (for setting polystyrene and/or polyisocyanurate insulation board): Manufacturer's recommended standard.
- C. Blanket or batt thermal insulation, glass or other inorganic fibers and resinous binders formed into flexible blankets or semi-rigid sheets.
 - 1. ASTM C665, Type I.
 - 2. Thermal conductivity (k-value at 75 DegF): 0.27.
 - 3. Kraft-faced.
 - 4. Minimum thickness as noted on Drawings.
- D. Vapor Retarder(if separate from blanket or batt thermal insulation):
 - 1. Fire rated, reinforced, 3 ply, Class 1 material.
 - 2. Perm rating: Not exceeding 0.035 grains/HR-FT²-IN-Hg when determined in accordance with ASTM E96.
- E. Vapor Retarder Tape: As recommended by vapor retarder manufacturer.
- F. Sound Control Insulation:
 - 1. Glass or other inorganic fiber and resinous binders formed into flexible blankets or semi-rigid sheets.
 - a. ASTM C665, Type I.
 - b. UL listed when used in fire rated construction.
 - 2. Minimum K-value: 0.32 Btu-IN/HR FT²F.
 - 3. Thickness: As noted on Drawings.
 - 4. Unfaced, friction fit.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. General:
 - 1. Insulate full thickness over surfaces to be insulated.
 - 2. Fit tightly around obstructions, fill voids.
 - 3. Cover all penetrations (electrical junction boxes, switch boxes, piping, conduits, etc.) with insulation, taking care not to compromise the workings of the device.
 - 4. Seal all joints with sealant or tape as applicable.

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- 5. Seal or tape to abutting materials to maintain vapor retarder integrity.
- 6. Fit butted joints of batt or blanket insulations tightly together.
- 7. Apply single or double layer to achieve total thickness.
 - a. If double layer is provided stagger all joints minimum 12 IN.
- 8. Do not use broken or torn pieces of insulation.
- 9. Install so that completed installation is vapor tight.
- 10. If vapor retarder tape fails to adhere to any surface, apply sprayed-on adhesive as recommended by tape manufacturer to promote adhesion.
- C. Blanket or Batt Insulation with Vapor Retarder:
 - 1. Set with vapor retarder to warm side of wall in all spaces with conditioned or heated air.
 - a. Install with vapor retarder flanges over the edge of the framing member.
 - b. Do not obstruct ventilation spaces.
 - 2. Fill all miscellaneous voids and where indicated on Drawings.
 - 3. Tape joints and ruptures in vapor retarder.
 - 4. Use vapor retarder tape and seal each area of insulation to surrounding construction to assure continuous vapor-tight installation.
 - 5. At Contractor's option, provide blanket or batt insulation without vapor retarder and provide separate vapor retarder as specified.
- D. Rigid Board Polystyrene Insulation in Cavity Walls:
 - 1. Provide insulation manufactured specifically for use in cavity wall construction.
 - 2. Do not proceed with installation until subsequent work which conceals insulation is ready to be performed.
 - 3. Extend insulation full thickness over entire area to be insulated.
 - a. Cut and tightly fit around all penetrations.
 - 4. Set each piece of insulation flush with the abutting piece to eliminate ledges in the face of the insulation.
 - 5. Install mastic on face of concrete or masonry back-up in accordance with mastic and insulation manufacturer's recommendation.
 - 6. Press courses of insulation between wall ties (horizontal reinforcing) with edges butted tightly both ways.
 - 7. Set units firmly into mastic.
 - 8. Seal all horizontal and vertical joints with sealant recommended by insulation manufacturer.
 - 9. Do not use damaged insulation.

10. Ensure that thermal protection requirements for fire stopping of the Building Code are complied with in the installation of combustible rigid insulation.

3.02 FIELD QUALITY CONTROL

A. Repair or replace damaged insulation as directed by Project Representative.

END OF SECTION

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SECTION 07 22 70 ROOF ANCHOR POSTS

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes: Roof anchor post system of fall restraint and fall arrest for worker safety.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Division 00 Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 01 General Requirements.
 - 3. Section 07 61 13 Metal Roofing.

1.02 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. ASTM International (ASTM):
 - a. A240, Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
 - b. A494, Standard Specification for Stainless Steel Rope Wire.
 - c. B221, Standard Specifications for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
- B. Manufacturer Qualifications: Firm having at least 10 years continuous experience in manufacturing fall safety equipment similar to systems specified and exhibiting records of successful in-service acceptability and performance.
- C. OSHA Standards: Comply with Occupational Safety and Health Administration Standards for the Construction Industry 29 CFR § 1926.500 Subpart M (Fall Protection), and with applicable State Administrative Code safety standards for Fall Restraint and Fall Arrest.
- D. Testing: Perform quality control tests for each system per manufacturer's requirements.

1.03 SUBMITTALS

- A. Submittal Procedures: See Section 01 33 00 Submittal Procedures for requirements for the mechanics and administration of the submittal process.
- B. Approval Submittals:
 - 1. Shop Drawings:
 - a. Show layout, profiles, and anchorage details. Include structural analysis data.

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- b. Shop Drawings and calculations to be stamped by a Professional Engineer.
- 2. Product Data: For each appliance type required indicating compliance with requirements. Include complete operating and maintenance instructions for each appliance.
- 3. Submit request for substitution in accordance with Specification Section 01 60 00 Product Requirements.
- C. Quality Assurance Submittals:
 - 1. Test Reports: Indicate compliance with required performance requirements.
- D. Closeout Submittals:
 - Operation & Maintenance (O&M) Manual Content: Provide O&M manual documentation as required by Section 01 73 00 – Operation and Maintenance Manuals.
 - Extended Warranty: Provide two executed copies of the Extended Warranty required by this Section in accordance with the provisions of Section 01 78 00 – Closeout Procedures.

1.04 EXTENDED WARRANTY

- A. In accordance with the provisions of Section 01 78 00 Closeout Procedures, provide an Extended Warranty for the Work of this Section:
 - 1. Warranty period for Work of this Section is five (5) years commencing on the date of Substantial Completion.
 - a. Warranty to include:
 - 1) Removal and replacement of defective roof anchor post(s).

1.05 SYSTEM DESCRIPTION

- A. General:
 - 1. Provide structural fall restraint and fall arrest system capable of withstanding loads and stresses within limits and under conditions specified in OSHA and other applicable safety codes.
 - 2. Provide fall protection anchors permanently attached to roof structure.
- B. Design Requirements:
 - 1. Anchors and accessories comprising system of following type:
 - a. Roof anchors, spaced as indicated, for safety snap connection by individual workers capable of withstanding a 5,000 LB load or safety factor of 2 meeting the requirements of OSHA 1926.502(d)(8).

- C. Performance Requirements:
 - 1. System and components tested for resistance of following loads:
 - a. Design fall protection anchors to resist at least 5,000 LB applied in any direction at a height of approximately 8 IN above top of roof deck or provide engineered system designed meeting the requirements of OSHA 1926.502(d)(8).

1.06 COORDINATION

- A. Coordinate installation of structural deck to meet requirements of roof anchor manufacturer:
 - 1. Metal Deck:
 - a. Minimum 20 gage thickness.
 - b. Use of all anchor screws outlined in roof anchor installation instructions.
 - 2. Other structural decks not listed above for use with roof anchors shall be approved by a Project Representative.
- B. Coordinate installation of structural deck reinforcements and anchorages to receive fall protection anchors.
- C. Coordinate placement of roofing system insulation and flashings to ensure water-tight integrity to roof.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. Miller Fusion Roof Anchor Post fall protection system manufactured by Miller(<u>www.millerfallprotection.com</u>).
 - 2. Fall Protection System by Guardian Fall Protection, Inc. (www.guardianfall.com).
 - 3. Or Approved Equal.
- B. Submit requests for "or equal" substitutions in accordance with Section 01 60 00 – Product Requirements.

2.02 MANUFACTURED ASSEMBLIES

A. Roof Anchors.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Examine framing and substrate and verify conditions comply with structural requirements for proper system performance.

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3.02 INSTALLATION

- A. General:
 - 1. Installation of Anchor Posts performed to be performed by contractor according to manufacturer's instructions and recommendations.
 - 2. System to be installed by a factory trained certified installer.
- B. Provide on-site inspection and supervision of installation by factory-trained representative.

3.03 DEMONSTRATION

- A. Instruct Owner's designated Safety Engineer in proper use of fall protection safety devices.
- B. Test and adjust system devices.
 - 1. Replace damaged or malfunctioning items.

END OF SECTION

SECTION 07 25 00 WEATHER BARRIERS

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Weather Barrier membrane.
 - 2. Seam tape.
 - 3. Fasteners
 - 4. Flexible flashing.
- B. Related Sections include but are not necessarily limited to:
 - 1. Division 00 Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 01 General Requirements.

1.02 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. ASTM International (ASTM):
 - a. C920; Standard Specification for Elastomeric Joint Sealants.
 - b. C1193; Standard Guide for Joint Sealants
 - c. D882; Test Method for Tensile Properties of Thin Plastic Sheathing.
 - d. D1117; Standard Guide for Evaluating Non-woven Fabrics.
 - e. E84, Standard Test Method for Surface Burning Characteristics of Building Materials.
 - f. E96, Standard Test Methods for Water Vapor Transmission of Materials.
 - g. E1677, Standard Specification for Air Barrier (AB) Material or System for Low-Rise Framed Building Walls.
 - h. E2178; Test Method for Air Permeance of Building Materials.
 - i. E2357; Standard Test Method for Determining Air Leakage of Air Barrier Assemblies.

1.03 SUBMITTALS

A. Submittal Procedures: See Section 01 33 00 for requirements for the mechanics and administration of the submittal process.

- B. Approval Submittals:
 - 1. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 - c. Manufacturer's recommendations on sealants, tapes and mastics.
 - d. Manufacturer's Field Service Reports: Provide site reports from authorized field service representative, indicating observation of weather barrier assembly installation.
- C. Closeout Submittals:
 - Extended Warranty: Provide two executed copies of the Extended Warranty required by this Section in accordance with the provisions of Section 01 78 00 – Closeout Procedures.

1.04 EXTENDED WARRANTY

- A. In accordance with the provisions of Section 01 78 00 Closeout Procedures, provide an Extended Warranty for the Work of this Section:
 - 1. Warranty period for Work of this Section is ten (10) years commencing on the date of Substantial Completion.

PART 2 – PRODUCTS

2.01 WEATHER BARRIER

- A. Performance Characteristics:
 - 1. Air Penetration: 0.001 cfm/ft² at 75 Pa, when tested in accordance with ASTM E2178. Type I per ASTM E1677. ≤0.04 cfm/ft² at 75 Pa, when tested in accordance with ASTM E2357.
 - 2. Water Vapor Transmission: 28 perms, when tested in accordance with ASTM E96, Method B.
 - 3. Tensile Strength: Minimum 38/35 LBS/IN, when tested in accordance with ASTM D882, Method A.
 - 4. Tear Resistance: 12/10 LBS, when tested in accordance with ASTM D1117.
 - 5. Surface Burning Characteristics: Class A, when tested in accordance with ASTM E84. Flame Spread: 10, Smoke Developed: 10.
- B. Products:
 - 1. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - a. Dow Chemical Company (The); Styrofoam Weathermate Plus Brand Housewrap (www.dow.com).
 - b. DuPont (E. I. du Pont de Nemours and Company); Tyvek Commercial Wrap (www2.dupont.com).

- c. Pactiv, Inc.; GreenGuard Classic Wrap (http://greenguard.pactiv.com).
- d. Raven Industries Inc.; Fortress Pro Weather Protective Barrier(<u>http://old.ravenefd.com/CF/HW/</u>).
- e. Reemay, Inc.; Typar HouseWrap (<u>www.typar.com</u>).
- f. Or approved equal.
- 2. Submit request for substitution in accordance with Specification Section 01 60 00.
- C. Tape: Pressure-sensitive plastic tape recommended by weather barrier manufacturer for sealing joints and penetrations in weather barrier.
- D. Fasteners: 1-5/8 IN rust resistant screw with 2 IN DIA plastic cap or manufacturer approved 1-1/4 IN or 2 IN metal gasketed washer.

2.02 MISCELLANEOUS MATERIALS

- A. Flexible Flashing: Self-adhesive butyl rubber compound, bonded to a highdensity polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.025 IN.
 - 1. Products:
 - a. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1) Dow Chemical Company (The); Weathermate Flashing (www.dow.com).
 - DuPont (E. I. du Pont de Nemours and Company); DuPont Flashing Tape; StraightFlash[™]; FlexWrap[™] (www2.dupont.com).
 - Grace Construction Products, a unit of W. R. Grace & Co. Conn.; Vycor Butyl Self Adhered Flashing.
 - 4) Protecto Wrap Company; BT-25 XL (www.protectowrap.com).
 - 5) Pactiv, Inc.; GreenGuard Flashing (http://greenguard.pactiv.com).
 - Raven Industries Inc.; Fortress Flashshield (<u>http://old.ravenefd.com/CF/HW/</u>).
 - 7) Or approved equal.
 - b. Submit request for substitution in accordance with Specification Section 01 60 00.

PART 3 – EXECUTION

3.01 WEATHER BARRIER INSTALLATION

- A. General:
 - 1. Install per manufacturer's written instructions.
 - a. Seal seams, edges, fasteners, and penetrations with tape.
 - b. Extend into jambs of openings and seal corners with tape.

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King County Factoria Recycling and Transfer Station Replacement Project WEATHER BARRIERS 07 25 00

Issued for RFP June 2013

3.02 FLEXIBLE FLASHING INSTALLATION

- A. Apply flexible flashing to comply with manufacturer's written instructions.
 - 1. Lap seams and junctures with other materials at least 6 IN except that at flashing flanges of other construction, laps need not exceed flange width.
 - 2. Lap flashing over water-resistive barrier at bottom and sides of openings.
 - 3. Lap water-resistive barrier over flashing at heads of openings.

END OF SECTION

SECTION 07 26 00 UNDER SLAB VAPOR RETARDER

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes: Under slab vapor retarder.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Division 00 Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 01 General Requirements.
 - 3. Division 3 Concrete.

1.02 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. ASTM International (ASTM):
 - a. D882, Standard Test Method for Tensile Properties of Thin Plastic Sheeting.
 - b. D1709, Standard Test Methods for Impact Resistance of Plastic Film by the Free-Falling Dart Method.
 - c. E96, Standard Test Methods for Water Vapor Transmission of Materials.
 - d. E1643, Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.
 - e. E1745, Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs.

1.03 SUBMITTALS

- A. Submittal Procedures: See Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
- B. Approval Submittals:
 - 1. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Product data sheet on vapor retarder sheet and vapor retarder tape.
 - c. All accessories proposed for use.
 - d. Manufacturer's installation instructions.
 - 2. Samples:
 - a. Provide 6 IN x 6 IN samples of vapor retarder material taped together using the vapor retarder tape proposed.

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Issued for RFP June 2013 3. Manufacturer's recommendation on vapor retarder tape.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. Vapor retarder:
 - a. Fortifiber Corporation. (www.fortifiber.com).
 - b. Stego Industries, LLC (www.stegoindustries.com).
 - c. WR Meadows, Inc. (www.wrmeadows.com).
 - d. Or approved equal.
- B. Submit request for substitution in accordance with Specification Section 01 60 00.

2.02 MATERIALS

- A. Vapor Retarder: Polyolefin film or reinforced polyethylene or new generation resin.
- B. Vapor Retarder Tape: As recommended by vapor retarder manufacturers.
- C. Sand: As per Section 31 23 00 Earthworks.

2.03 ACCESSORIES

A. Pipe Boots: Manufacturer's standard boot fabricated to maintain the integrity of the vapor retarder system.

2.04 FABRICATION

- A. Vapor Retarder:
 - 1. ASTM E1745, Class A, minimum 15 mil thickness.
 - 2. Water vapor permeance: 0.03 maximum per ASTM E96.
 - 3. Puncture resistance: ASTM D1709, Method B, 2200 grams.
 - 4. Minimum tensile strength: 45 LBS/IN, ASTM D882.
- B. Vapor Retarder Tape: As recommended by vapor retarder manufacturer.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Install products in accordance with manufacturer's instructions and ASTM E1643.
- B. Place continuous vapor retarder above granular fill subgrade material under all slabs.

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- C. Lap vapor retarder 3 IN at ends and edges of sheets and seal with tape.
- D. Extend to extremities of area, turn up at perimeter to form bond breaker between slab and wall.
 - 1. Tape in place.
 - 2. Do not turn up at perimeter if slab is keyed into perimeter wall.
- E. Provide pipe boot for all pipes penetrating the floor slab.
- F. Trim off excess material even with top of slab after slab is placed.

3.02 FIELD QUALITY CONTROL

- A. Ensure proper precautions are implemented to prevent damage to installed vapor retarder membrane prior to and during pouring of concrete floor slab.
- B. Patch all punctures, tears, holes, etc., with additional layer of vapor retarder and seal entire patch with vapor retarder tape.

END OF SECTION

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SECTION 07 42 14 METAL WALL PANELS

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Exposed-fastener, lap-seam metal wall panels.
 - 2. Concealed-fastener, lap-seam metal wall panels.
 - 3. Metal liner panels.
 - 4. Metal soffit panels.
- B. Related Sections include but are not necessarily limited to:
 - 1. Division 00 Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 01 General Requirements.
 - 3. Section 05 12 00 Structural Steel.
 - 4. Section 05 40 00 Cold-Formed Metal Framing.
 - 5. Section 06 16 00 Exterior Sheathing.
 - 6. Section 07 21 00 Building Insulation.
 - 7. Section 07 25 00 Weather Barrier.
 - 8. Section 07 62 00 Flashing and Sheet Metal.

1.02 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. American Society of Civil Engineers (ASCE):
 - a. 7, Minimum Design Loads for Buildings and Other Structures.
 - 2. ASTM International (ASTM):
 - A653, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - b. A924, Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
 - c. E84, Standard Test Method for Surface Burning Characteristics of Building Materials.
 - d. E283, Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.

- e. E331, Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.
- 3. Underwriters Laboratories, Inc. (UL):
 - a. Building Materials Directory.
 - b. Fire Resistance Directory.
- 4. Building Code:
 - a. International Code Council (ICC):
 - International Building Code and associated standards, 2009 Edition including all amendments, referred to herein as Building Code.
- B. Qualifications:
 - 1. Installer shall be licensed or approved in writing by manufacturer.
 - 2. Installer shall have minimum of 10 years experience in the installation of metal wall panel systems similar to system specified.
 - 3. Installer shall have successfully completed two (2) projects of similar size, scope and complexity within past three (3) years.
- C. Mock-ups:
 - 1. Prior to start of permanent wall construction, construct mock-ups of wall system.
 - a. Mock-ups shall be a minimum of 5 FT x 5 FT.
 - 2. Mock-ups to include all types of wall panel profiles, insulation, liner panel, vapor retarder, trim, caulking, closures, angles, brackets, etc., as needed for a complete water and air tight installation.
 - 3. Step-construction to allow observation of all components.
 - 4. Panels shall be same panels as specified or approved for Project.
 - a. Exact color is not necessary; however, Contractor is to label each exposed component to identify final installed color of component.
 - 5. Construct additional mock-ups or rework existing mock-ups until acceptable to Project Representative.
 - 6. Maintain mock-ups at Project Site until Project Representative approves removal of mock-ups.
 - 7. Approved mock-ups to constitute minimum acceptable standard of quality for actual construction.

1.03 DEFINITION

A. Metal Wall Panel Assembly: Metal wall panels, attachment system components, miscellaneous metal framing, thermal insulation, and accessories necessary for a complete weathertight wall system.

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1.04 SUBMITTALS

- A. Submittal Procedures: See Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
- B. Leadership in Energy and Environmental Design (LEED[®]) Documentation: Submit the following in accordance with Section 01 81 30 – Sustainability Requirements.
 - 1. Product Data for MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content; include statement indicating costs for each product having recycled content.
 - 2. LEED Materials Tracking Form: Form to be provided in an electronic format to the Contractor to record LEED materials used on the project.
- C. Approval Submittals:
 - 1. Fabrication and/or layout Drawings: Drawings, prepared by manufacturer, showing anchorage, flashing, jointing and any special detailing different from or not indicated on the Drawings.
 - 2. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's complete installation and erection instructions and details showing all accessories required.
 - c. Provide sample with specified color.
 - 3. Letter of acceptance of Installer from manufacturer.
 - 4. Product data on insulation for field-insulated panels.
 - 5. Samples:
 - a. For color selection, provide 2 x 3 IN panel samples for each color for Project Representative's color approval.
- D. Quality Assurance Submittals:
 - 1. Installer qualifications and listing of projects completed in past three (3) years.
 - 2. Test data:
 - a. Certification that all tests identified under Article 2.4 have been performed on panel being provided and that panel has passed minimum requirements of those tests.
- E. Closeout Submittals:
 - 1. O&M Manual Content: Provide O&M manual documentation as required by Section 01 73 00 Operation and Maintenance Manuals:
 - a. Provide instructions on proper cleaning methods and materials.

 Extended Warranty: Provide two executed copies of the Extended Warranty required by this Section in accordance with the provisions of Section 01 78 00 – Closeout Procedures.

1.05 EXTENDED WARRANTY

- A. In accordance with the provisions of Section 01 78 00 Closeout Procedures, provide an Extended Warranty for the Work of this Section:
 - 1. Warranty period for Work of this Section is two (2) years commencing on the date of Substantial Completion, except:
 - a. Panel finish shall be warranted free from fading, chipping, cracking, and peeling for a period of twenty (20) years commencing on the date of Substantial Completion.
 - b. Metal wall panels shall be warranted free from rust on inside and outside surfaces for a period of twenty (20) years commencing on the date of Substantial Completion.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver components, sheets, metal wall panels, and other manufactured items so as not to be damaged or deformed. Package metal wall panels for protection during transportation and handling.
- B. Unload, store, and erect metal wall panels in a manner to prevent bending, warping, twisting, and surface damage.
- C. Stack metal wall panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal wall panels to ensure dryness, with positive slope for drainage of water. Do not store metal wall panels in contact with other materials that might cause staining, denting, or other surface damage.
- D. Retain strippable protective covering on metal wall panel for period of metal wall panel installation.
- E. Protect foam-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 foam-plastic insulation materials to Project site before installation time.
 - 3. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

1.07 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal wall panels to be performed according to manufacturers' written instructions and warranty requirements.

B. Field Measurements: Verify locations of structural members and wall opening dimensions by field measurements before metal wall panel fabrication, and indicate measurements on Shop Drawings.

1.08 COORDINATION

A. Coordinate metal wall panel assemblies with rain drainage work, flashing, trim, and construction of wall type, soffits, and other adjoining work to provide a leak proof, secure, and noncorrosive installation.

PART 2 – PRODUCTS

2.01 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/A 755M.
 - 1. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653, G90 coating designation; structural quality.
 - 2. Surface: Smooth, flat finish.
 - 3. Exposed Coil-Coated Finish:
 - a. 2-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish 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.
 - 4. Concealed Finish: Apply pretreatment and manufacturer's standard white acrylic backer finish consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil.
- B. Panel Sealants:
 - Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 IN wide and 1/8 IN thick.
 - 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.
 - 4. Recycled content of Steel Products: Post consumer recycled content plus one-half of preconsumer recycled shall not be less than 25 percent.

2.02 MISCELLANEOUS MATERIALS

A. Panel Fasteners: Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads. Provide exposed fasteners with heads matching color of metal wall panels by means of plastic caps or factory-applied coating. Provide EPDM, PVC, or neoprene sealing washers.

2.03 EXPOSED-FASTENER, LAP-SEAM METAL WALL PANELS

- A. General: Provide factory-formed metal wall panels designed to be field assembled by lapping side edges of adjacent panels and mechanically attaching panels to supports using exposed fasteners in side laps. Include accessories required for weathertight installation.
- B. Corrugated-Profile, Exposed-Fastener Metal Wall Panels: Formed with alternating trapezoidal ribs spaced at 8 IN OC across width of panel.
 - 1. Manufacturers: Subject to compliance with requirements:
 - a. Metal Sales Manufacturing Corporation Model #T2832 (www.metalsales.us.com).
 - b. AEP-Span .(www.aepspan.com).
 - c. MBCI; Div. of NCI Building Systems. (www.mbci.com).
 - d. McElroy Metal, Inc. (www.mcelroymetal.com).
 - e. Metecno-Morin. (<u>www.morincorp.com</u>).
 - f. Or approved equal.
 - 2. Material: Zinc-coated (galvanized) steel sheet, 22 GA. nominal thickness.
 - a. Panel Type II: Per plan.
 - b. Color: Metal Sales, Copper Penny or Project Representative approved equal.
 - 3. Panel Coverage: 32 IN.
 - 4. Panel Height: 2 IN.

2.04 CONCEALED-FASTENER, LAP-SEAM METAL WALL PANELS

- A. General: Provide factory-formed metal wall panels designed to be field assembled by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners in side laps. Include accessories required for weathertight installation.
- B. Flush-Profile, Concealed-Fastener Metal Wall Panels: Formed with vertical panel edges between panel edges; with flush joint between panels.
 1. Manufacturers: Subject to compliance with requirements.
 - a. AEP-Span.(www.aepspan.com).
 - b. MBCI; Div. of NCI Building Systems. (www.mbci.com).
 - c. Ultra Seam Incorporated. (www.ultraseam.com).

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- d. Or approved equal.
- 2. Material: Zinc-coated (galvanized) steel sheet, 22 GA. nominal thickness.
 - a. Type I: Metal Sales TLC-1.
 - b. Type III: Metal Sales TLC-2.
 - c. Color:
 - 1) Type I: Dunn Edwards "Black Bean."
 - 2) Type III: Dunn Edwards "Charcoal Smudge."
- 3. Panel Coverage: 12 IN.
- 4. Panel Height: 1.5 IN.

2.05 METAL LINER PANELS

- A. General: Provide factory-formed metal liner panels designed for interior side of metal wall panel assemblies and field assembled by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners and factory-applied sealant in side laps. Include accessories required for a complete installation.
- B. Flush-Profile Metal Liner Panels: Solid panels formed with vertical panel edges and intermediate stiffening ribs symmetrically spaced between panel edges; with flush joint between panels.
 - 1. Manufacturers: Subject to compliance with requirements.
 - a. Metal Sales (www.metalsales.us.com).
 - b. Architectural Metal Systems (www.ametalsystems.com).
 - c. MBCI; Division of NCI Building Systems (www.mbci.com).
 - d. Metecno-Morin (<u>www.morincorp.com</u>).
 - e. Or approved equal.
 - 2. Material: Zinc-coated 24 GA nominal thickness.
 - a. Color: White.
 - 3. Panel Coverage: 36 IN.
 - 4. Panel Height: 1.125 IN.

2.06 METAL SOFFIT PANELS

- A. General: Provide factory-formed metal soffit panels designed to be installed by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners in side laps. Include accessories required for weathertight installation.
- B. Metal Soffit Panels: Match profile and material of metal wall panels.1. Finish: Flat and Smooth.
 - 2. Sealant: Factory applied within interlocking joint.

- C. Flush-Profile Metal Soffit Panels Solid panels formed with vertical panel edges and flat pan between panel edges; with flush joint between panels.
 - 1. Manufacturers: Subject to compliance with requirements.
 - a. Metal Sales Manufacturing Corp (www.metalsales.us.com).
 - b. AEP-Span (www.aepspan.com).
 - c. MBCI; Division of NCI Building Systems (www.mbci.com).
 - d. Ultra Seam Incorporated (www.ultraseam.com).
 - 2. Material: Same material, finish, and color as metal wall panels Type I.
 - 3. Material: Zinc-coated (galvanized) steel sheet22 GA. nominal thickness.
 - 4. Panel Coverage: 12 IN.
 - 5. Panel Height: 1.5 IN.
 - 6. Sealant: Factory applied within interlocking joint.

2.07 ACCESSORIES

- A. Screws holding wall panels to the structure shall be as follows:
 - 1. Into Steel Stainless steel cadmium plated self-tapping sheet metal screws into pre-drilled holes (or plated hardened steel self-drilling screws).
- B. For weather tightness, screws shall have washers with hot bonded neoprene faces and pop-rivets shall be set in wet sealant. Exposed fasteners shall be a minimum of #14 size screw or 3/16 IN DIA pop-rivet. These fasteners shall be color matched to the wall panels. Snap-on color caps shall not be used.
- C. Precut profile closures shall be closed cell rubber RE-42 meeting ASTM D-1056 EPT. Metal profile closures, of the same material and color as the wall panel, shall be placed in front of all rubber closures that have UV exposure.
- D. Sealant used with the wall system shall be applied between surfaces with a minimum amount of UV exposure on the complete installation.
 - Concealed sealant may be a non-curing, non-skinning butyl polyisobutylene or butyl tape of sufficient thickness to make full contact with both surfaces. The calk must meet Federal Specification TT-C-1796A; Type I, Class A and the tape must meet Federal Specification TT-C-1796A, Type II, Class B.
 - 2. Exposed sealant shall be a curing type with excellent resistance to ultra-violet radiation (sunlight), and will not crack, chalk or lose adhesion to the substrate after exposure to 6,000 HRS of weather ability testing and meet ASTM G-53 and ASTM C793. In addition, the sealant must meet Federal Specification TT-S-00230C, Type II, Class A, Type NS, One Component, ASTM C-920 and be USDA acceptable. The sealant must have excellent adhesion to Galvalume and KYNAR 500 substrates. Color shall be as selected by Project Representative. Color shall match the metal wall panels. Apply in accordance with the sealant manufacturer's recommendations.
 - 3. All sealants shall have an indicated service life of 20 years.

- E. 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 IN- thick, flexible closure strips; cut or premolded to match metal wall panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
 - F. Flashing and Trim: Formed from 0.018 IN minimum thickness, zinc-coated (galvanized) steel sheet or aluminum-zinc alloy-coated steel sheet prepainted with coil coating. 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. Finish flashing and trim with same finish system as adjacent metal wall panels.

2.08 FABRICATION

- A. General: Fabricate and finish metal wall panels and accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.
- B. Fabricate metal wall panels in a manner that eliminates condensation on interior side of panel and with joints between panels designed to form weathertight seals.
- C. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.
- D. Fabricate metal wall panel joints with factory-installed captive gaskets or separator strips that provide a tight seal and prevent metal-to-metal contact, and that will minimize noise from movements within panel assembly.
- E. Sheet Metal Accessories: Fabricate flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of item indicated.
 - 1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
 - 2. Seams: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
 - 3. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.

- 4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
- 5. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended by metal wall panel manufacturer.
 - a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal wall panel manufacturer for application but not less than thickness of metal being secured.

2.09 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 – EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal wall panel supports, and other conditions affecting performance of work.
 - 1. Examine wall framing to verify that girts, angles, channels, studs, and other structural panel support members and anchorage have been installed within alignment tolerances required by metal wall panel manufacturer.
 - 2. Examine wall sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal wall panel manufacturer.
 - 3. Verify that weather-resistant sheathing paper has been installed over sheathing or backing substrate to prevent air infiltration or water penetration.
- 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.

3.02 PREPARATION

- A. Miscellaneous Framing: Install metal studs, base angles, sills, furring, and other miscellaneous wall panel support members and anchorages according to ASTM C 754 and metal wall panel manufacturer's written recommendations.
 - 1. Soffit Framing: Clip furring channels to supports, as required to comply with requirements for assemblies indicated.

3.03 THERMAL INSULATION INSTALLATION

- A. Board Insulation: Extend insulation in thickness indicated to cover entire wall. Comply with installation requirements in Division 07 Section "Thermal Insulation."
 - 1. Erect insulation horizontally and hold in place with Z-shaped furring members spaced 24 IN OC. Attach furring members to substrate with screws spaced 24 IN OC.
 - 2. Retain insulation in place by metal clips and straps or integral pockets within panels, spaced at intervals according to insulation manufacturer's instructions. Maintain cavity width between insulation and metal liner panel of dimension indicated.
- B. Blanket Insulation: Install insulation concurrently with metal wall panel installation, in thickness indicated to cover entire wall, according to manufacturer's written instructions and as follows:
 - 1. Set vapor-retarder-faced insulation with vapor-retarder facing as indicated on Drawings. Do not obstruct ventilation spaces, except for firestopping.
 - 2. Tape joints and ruptures in vapor retarder, and seal each continuous area of insulation to surrounding construction to ensure airtight installation.
 - 3. Install insulation straight and true in one-piece lengths. Comply with the following installation method:
 - a. Over-Framing Installation: Extend insulation over and perpendicular to top flange of framing members.
 - 4. Retainer Strips: Install retainer strips at each longitudinal insulation joint, straight and taut, nesting with framing to hold insulation in place.

3.04 METAL WALL PANEL INSTALLATION

- A. General: Install metal wall panels according to manufacturer's written instructions in orientation, sizes, and locations indicated on Drawings. Install panels perpendicular to metal studs unless otherwise indicated. Anchor metal wall panels and other components of the Work securely in place, with provisions for thermal and structural movement.
 - 1. Commence metal wall panel installation and install minimum of 300 SQ FT in presence of factory-authorized representative.
 - 2. Shim or otherwise plumb substrates receiving metal wall panels.

- 3. Flash and seal metal wall panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until weather barrier and flashings that will be concealed by metal wall panels are installed.
- 4. Install screw fasteners in predrilled holes.
- 5. Locate and space fastenings in uniform vertical and horizontal alignment.
- 6. Install flashing and trim as metal wall panel work proceeds.
- 7. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four panel lap splice condition.
- 8. Apply elastomeric sealant continuously between metal base channel (sill angle) and concrete and elsewhere as indicated or, if not indicated, as necessary for waterproofing.
- 9. Align bottom of metal wall panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.
- 10. Provide weathertight escutcheons for pipe and conduit penetrating exterior walls.
- B. Fasteners:
 - 1. Steel Wall Panels: Use stainless-steel fasteners for surfaces exposed to the exterior; use galvanized steel fasteners for surfaces exposed to the interior.
- C. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action as recommended by metal wall panel manufacturer.
- D. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weathertight performance of metal wall panel assemblies. Provide types of gaskets, fillers, and sealants indicated or, if not indicated, types recommended by metal wall panel manufacturer.
 - 1. Seal metal wall panel end laps with double beads of tape or sealant, full width of panel. Seal side joints where recommended by metal wall panel manufacturer.
 - Prepare joints and apply sealants to comply with requirements in Division 07 Section "Joint Sealants."
- E. Lap-Seam Metal Wall Panels: Fasten metal wall panels to supports with fasteners at each lapped joint at location and spacing recommended by manufacturer.
 - 1. Lap ribbed or fluted sheets one full rib corrugation. Apply panels and associated items for neat and weathertight enclosure. Avoid "panel creep" or application not true to line.
 - 2. Provide metal-backed washers under heads of exposed fasteners bearing on weather side of metal wall panels.

- 3. Locate and space exposed fasteners in uniform vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of washer.
- 4. Install screw fasteners with power tools having controlled torque adjusted to compress washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.
- 5. Provide sealant tape at lapped joints of metal wall panels and between panels and protruding equipment, vents, and accessories.
- 6. Apply a continuous ribbon of sealant tape to weather-side surface of fastenings on end laps; on side laps of nesting-type panels; on side laps of corrugated nesting-type, ribbed, or fluted panels; and elsewhere as needed to make panels weathertight.
- 7. At panel splices, nest panels with minimum 6 IN end lap, sealed with butyl-rubber sealant and fastened together by interlocking clamping plates.

3.05 METAL SOFFIT PANEL INSTALLATION

- A. In addition to complying with requirements of "Metal Wall Panel Installation, General" Article, install metal soffit panels to comply with the requirements of this article.
- B. Metal Soffit Panels: Provide metal soffit panels full width of soffits. Install panels perpendicular to support framing.
 - 1. Flash and seal panels with weather closures where metal soffit panels meet walls and at perimeter of all openings.

3.06 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 wall panel assembly including trim, copings, corners, 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." 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.
 - Install exposed flashing and trim 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. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance.

2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 FT with no joints allowed within 24 IN of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 IN deep, filled with mastic sealant (concealed within joints).

3.07 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Water Penetration: Test areas of installed system indicated on Drawings for compliance with system performance requirements according to ASTM E 1105 at minimum differential pressure of 20 percent of inward-acting, windload design pressure as defined by SEI/ASCE 7, but not less than 6.24 OZ/SQ FT.
- C. Water-Spray Test: After completing the installation of 75 FT by-2-story minimum area of metal wall panel assembly, test assembly for water penetration according to AAMA 501.2 in a 2-bay area directed by Architect.
- D. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect and test completed metal wall panel installation, including accessories.
- E. Remove and replace metal wall panels where tests and inspections indicate that they do not comply with specified requirements.
- F. Additional tests and inspections, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.08 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. On completion of metal wall panel installation, clean finished surfaces as recommended by metal wall panel manufacturer. Maintain in a clean condition during construction.
- B. After metal wall panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.

END OF SECTION

SECTION 07 54 25 FULLY ADHERED TPO ROOFING

PART 1 – GENERAL

1.01 SUMMARY

- A. Furnish all labor, materials, tools, equipment, and services for Fully Adhered TPO Roofing, as indicated, in accordance with provisions of Contract Documents.
- B. Completely coordinate with work of other trades.

1.02 QUALITY ASSURANCE

- A. Applicator Qualifications: Manufacturer authorized roofing installer.
- B. References:
 - 1. SPRI: Wind Load Design Guide for Low Sloped Flexible Membrane Roofing Systems.
 - a. FM Global (FM) www.fmglobal.com.
 - 1) Install per FM Global Property Loss Prevention Data Sheet 1-28 Design Wind Loads.
 - 2) Install per FM Global Property Loss Prevention Data Sheet 1-29 -Roof Deck Securement and Above-Deck Roof Components.
 - 3) Install per FM Global Property Loss Prevention Data Sheet 1-49 Perimeter Flashing.
 - 4) Install per FM Global Property Loss Prevention Data Sheet 1-54 Roof Loads for New Construction.
 - 2. National Roofing Contractors Association (NRCA): Roofing and Waterproofing Manual.
 - 3. Underwriters Laboratories (UL): UL 580 Standard for uplift resistance of roof assemblies.

1.03 MATERIAL STANDARDS: ASTM D6878.

1.04 DESIGN CRITERIA

- A. Design roof system, including roof covering and metal edge securement to satisfy requirements of applicable building codes including local amendments:
 - 1. Design Roof System and anchorage to meet Design Loads as indicated on drawings
 - a. Wind Loads: Use the greater of the following:
 - Wind Pressures as required per local building code based on wind speed, exposure factor and importance factor noted in the Structural Drawings.

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- 2) Wind Pressures defined by Building Code as locally adopted and amended.
- 2. Requirements applicable to designated warranty.
- 3. Roof Height and Parapet Height: As indicated.
- 4. Static Pressure of Building Interior: < 0.5 IN water.
- B. Fire resistance rating:
 - 1. UL 790, Class A.
 - 2. Assembly in conformance with fireproofing as specified.
- C. Design the adhered membrane roofing system to comply with: 1. FM 1-90.

1.05 PRE-INSTALLATION MEETING

- A. Pre-installation meeting, directed by Contractor, prior to beginning of roofing work to discuss following:
 - 1. Contract Document requirements.
 - 2. Roof plan.
 - 3. Roofing and flashing details.
 - 4. Drain and scupper elevations.
 - 5. Roofing manufacturer's specifications and details.
 - 6. UL requirements.
 - 7. Insulation manufacturer's recommendations.
 - 8. Available on site storage.
 - 9. Roof protection from damage by other trades.
 - 10. Registered Professional Engineer to stamp layout of fastening. Layout of fastenings required to meet uplift requirements
- B. Attendance is recommended for:
 - 1. Contractor.
 - 2. Roofing installer superintendent.
 - 3. Roofing manufacturer representative.
 - 4. Sheet metal installer performing metal flashing work.
 - 5. Mechanical installer.
 - 6. Plumbing installer.
 - 7. Deck installer.
 - 8. Other trades whose work may effect roofing system.
- C. Minimum two weeks prior to meeting, forward information to attendees.1. Installation Drawings.

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- 2. Manufacturer product data.
- 3. Other information deemed pertinent for sound and secure application.
- D. Objectives of pre-installation meeting to include:
 - 1. Tour representative areas of roofing substrates, inspect and discuss condition of substrate, roof drains, curbs, penetrations and other preparatory work performed by others.
 - 2. Review foreseeable methods and procedures related to roofing work.
 - 3. Review structural loading limitations of deck and inspect deck for loss of flatness and for required attachment.
 - 4. Review required inspection, testing, certifying and material usage accounting procedures.
 - 5. Review of submittals, Specifications, details, application requirements and preliminary work.
 - 6. Review weather and forecasted weather conditions and procedures for coping with unfavorable conditions, including possibility of temporary roofing.
 - a. Review notification procedures for weather or non-working days.
 - 7. Review and finalize construction schedule related to roofing work and verify availability of materials, installer's personnel, equipment and facilities needed to make progress and avoid delays.
 - 8. Record discussion of meeting including decisions and agreements reached.
- E. Furnish copy of record to each party affected by roofing work and Project Representative.

1.06 SUBMITTALS

- A. Submittal Procedures: See Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
- B. Leadership in Energy and Environmental Design (LEED) Documentation: Submit the following in accordance with Section 01 81 30 – Sustainability Requirements.
 - 1. Product Data for MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content; include statement indicating costs for each product having recycled content.
- C. Approval Submittals:
 - 1. Shop Drawings:
 - a. Roof layout showing insulation thicknesses and details.
 - b. Indicate location of expansion joints, crickets, saddles, curbs, safety tiebacks, vents, drains and other penetrations.

- c. Indicate slope direction, slope amount, and key vertical elevation points.
- d. Profiles of flashing assemblies.
- e. Installation Drawings.
- 2. Product Data:
 - a. Manufacturer standard literature for vapor barrier, insulation and roofing system components, including adhesives and accessories indicating compliance with Specification requirements.
 - b. Manufacturer standard literature for roof coping system indicating components and accessories including anchor plate configuration.
 - c. Manufacturer standard literature for Solar Reflectance Index (SRI) that is equal to greater than 78.
- 3. FM Global:
 - a. Approval of the Roof Assembly by the Owner's insurance underwriter, FM Global is required.
 - b. Use FM Global windstorm classification of 1-90.
 - c. Provide additional fastening at the perimeters and corners per FM Data Sheet 1-29 and the roof systems approval listing.
 - d. The Roof Assembly shall meet FM Global requirements pertaining to the roof slope, wind pressures and other conditions particular to the Project.
 - e. Use assemblies listed in the on-line data base RoofNav application at <u>www.roofnav.com</u>.
 - f. Design and installation should comply with applicable FM Global Property Loss Prevention Data Sheets.
 - g. Submit detailed installation plans and material submittals and a Roof Nav Contractor Package to FM Global for review prior to ordering materials.
 - h. The following Assembly numbers represent FM Assembly Roof Assembly numbers listed by Roof Panel Manufacturer:
 - 1) Carlisle: 13269-0-0.
 - 2) VersiWeld: 13269-0-0 or 95398-0-0.
 - 3) Firestone: 136151-0-0.
 - 4) Or approved equal.
- 4. Samples:
 - a. Roofing manufacturer's facsimile of each sheet metal color for preselection.
 - b. 3 IN x 5 IN samples of roofing manufacturer's sheet metal color for final approval.
 - c. Sample of walkway.

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- D. Closeout Submittals:
 - 1. O&M Manual Content: Provide O&M manual documentation as required by Section 01 73 00 Operation and Maintenance Manuals:
 - a. Include cleaning instruction.
 - Extended Warranty: Provide two executed copies of the Extended Warranty required by this Section in accordance with the provisions of Section 01 78 00 – Closeout Procedures.

1.07 EXTENDED WARRANTY

- A. In accordance with the provisions of Section 01 78 00 Closeout Procedures, provide an Extended Warranty for the Work of this Section.
 - 1. Warranty period for Work of this Section is fifteen (15) years commencing on the date of Substantial Completion, except:
 - a. Finish on edge metal and copings, 70 percent PVDF Kynar 500, shall be warranted free from fading, chalking, and corrosion for a period of twenty (20) years commencing on the date of Substantial Completion.
 - 2. Warranty shall include coverage for peak gusts of wind up to 55 MPH at 33 FT above ground.
 - 3. Warranty to include the entire system: membrane, flashings, adhesives, sealants, counterflashings, insulation, fasteners, fastener plates, fastener strips, hard rubber or metal edging, metal termination bars, sheet metal copings and edge metal, and other material authorized by manufacturer.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Approval of the Roof Assembly by the Owner's insurance underwriter, FM Global is required.
- B. Submit detailed installation plans and material submittals and a Roof Nav Contractor Package to FM Global for review prior to ordering materials.
- C. TPO Membrane:
 - 1. Base:
 - a. Carlisle SynTec (www.carlislesyntec.com).
 - b. VersiWeld.
 - c. Firestone Building Products (www.firestonebpco.com).
 - d. Or approved equal.
- D. Vapor Retarder (VR):
 - 1. Base:
 - a. Same as Membrane Manufacturer.
 - 2. Optional:
 - a. Griffolyn (Reef Industries) (www.reefindustries.com).

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- E. Walkways:
 - 1. Base:
 - a. Same as Membrane Manufacturer.
- F. Other Materials: Manufacturers as noted.

2.02 SCHEDULE OF ROOF SYSTEMS

- A. Roof System Fully Adhered TPO over Steel Deck:
 - 1. Vapor Retarder.
 - 2. Insulation.
 - 3. Cover Board.
 - 4. Membrane (fully adhered).
 - 5. Minimum Solar Reflectance Index of 78.

2.03 GENERAL

- A. All component products made by, or accepted as compatible by membrane manufacturer.
- B. Preliminary Insulation fastening per FM Global Assembly requirements.
- C. Unless otherwise approved by the specifier and accepted by the membrane manufacturer, products including insulation, fasteners, fastening plates and edgings, must be manufactured and supplied by roofing system manufacturer and covered by warranty.

2.04 SHEATHING

- A. Gypsum Sheathing:
 - 1. Use where roofing is installed over metal decking or existing roofing materials.
 - 2. Water-resistant gypsum core with fiberglass facings.
 - 3. Minimum Thickness:
 - a. 5/8 IN.
 - 4. Manufacturers: Subject to compliance with the Contract Documents:
 - a. Dens-Deck Roof Board by Georgia-Pacific.
 - b. GLASROC Sheathing by Certainteed.
 - c. Or approved equal.

2.05 VAPOR RETARDER

- A. Vapor Retarder:
 - 1. Two plies of polyethylene, bonded over one layer of scrim reinforcing.
 - 2. Fire retardant type: Class 1 / Class A per ASTM E84.
 - 3. Permeance: Not exceeding 2.06 Metric Perm 0.036 Perm US.

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- 4. Puncture Strength: 191 N 43 LBS.
- 5. Base Product: Recommended by membrane manufacturer.
- 6. Seaming Tape Self-adhering, asphaltic mastic.
- 7. Repair Tape, for punctures and other damaged areas.

2.06 ROOF INSULATION

- A. General:
 - 1. Furnished by roofing manufacturer.
 - 2. UL listed for assembly indicated.
 - 3. Provide crickets and saddles as required.
 - 4. Insulation shall be installed in multiple layers with joints staggered.
 - a. Where no Sheathing is specified over Metal Decking: Minimum thickness of first insulation layer shall be at least 1/2 of the span distance between flutes of decking.
 - 5. Adhere insulation to substrate in accordance with manufacturer's Specifications.
- B. Polyisocyanurate (PISO) roof insulation:
 - 1. Rigid, closed cell foam core bonded to heavy-duty glass fiber mat facers.
 - 2. Material complying with:

Minimum Physical Properties – Polyisocyanurate Insulation					
Property	Test Method	Required Value			
Material Standards	ASTM C1289	Type II, Class 1			
	HH-I-1972	Class 1			
Density (nominal)	ASTM D1622	2 PCF			
Long Term Thermal Resistance (LTTR) per unit thickness	CAN / ULC-S770	6.0 R per IN			
Compressive Strength	ASTM D1622	20 PSI			
Dimensional Stability	ASTM D2126	2% max., 7 days			
Permeance	ASTM E96	<1.0 Perm (US)			
Water Absorption	ASTM C209	< 1.5% volume			
Service Temperature		-100 to +250 DegF			

- 3. Minimum Insulation Thickness:
 - a. Areas where tapered insulation is indicated:
 - 1) Minimum R=25 at roof drains.
 - 2) Taper to provide slope of 1/4 IN per FT.
 - b. Areas with uniform insulation thickness (sloped structures):
 - 1) Minimum R=25 at roof drains.

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- C. Cover Board (Gypsum-based):
 - 1. Water-resistant gypsum core with fiberglass facings.
 - 2. Minimum Thickness:
 - a. 1/4 IN.
 - 3. Pre-primed.

2.07 ROOFING MEMBRANE

- A. TPO Roofing membrane:
 - 1. Material: Thermoplastic Polyolefin (TPO) single-ply roofing membrane.
 - a. Fire Retardant.
 - b. Polyester fabric reinforced.
 - 2. Color: White.
 - 3. Thickness: 60 mil thick.
 - 4. Minimum Physical Properties:

Minimum Physical Properties – 60mil, Reinforced, TPO Membrane					
Property	Test Method	Required Value			
Tolerance on Nominal Thickness (Max)	ASTM D751	+/- 10%			
Thickness over scrim (Min)	ASTM D4637	15 mil			
Breaking Strength (Min)	ASTM D751	225 LBS			
Tear Strength (Min)	ASTM D751	245 N 55 LBS			
Weather Resistance	ASTM G155	10,080 KJ/(m2*nm)			
Puncture Resistance (min)	FTM 101C Method 2031	1.35 kN 300 LBS			
Energy Stor Solar Deflectance		.79 (White Membrane)			
Energystar solar Renectance	ASTIVI E903	.60 (Tan Membrane)			

B. Membrane flashings, fasteners, adhesives, tapes, cements and sealants: Roofing manufacturer's standard.

2.08 EDGE METAL AND COPING

- A. General:
 - 1. Roofing Manufacturer's pre-engineered, prefabricated system for termination of roofing membrane.
 - 2. Field fabricated components approved by roofing manufacturer for warranted system.
 - 3. Fasteners concealed from view.
 - 4. Concealed splice plates, with color matching snap-on covers.
 - 5. Anchor cleats:
 - a. Material: G90 galvanized steel.
 - b. Thickness: 20 GA.

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- 6. Snap-on cover:
 - a. Material: G90 galvanized steel.
 - b. Thickness:
 - 1) For dimensions less than 10 IN: 24 GA.
 - 2) For dimensions 10 to 24 IN22 GA.
 - c. Finish: 70 percent PVDF Kynar 500.
 - d. Color:
 - 1) To be selected from manufacturers standard colors by Project Representative.
- 7. Wind Rating: Design for pressure indicated for balance of roof system.
- 8. Coverage of these items to be included in roof system warranty.
- 9. Comply with applicable standards.
- B. Roof Edge/Fascia:
 - 1. Match profiles indicated.
 - 2. Include accessories such as pre-fabricated inside and outside corners, Overflow and Downspout Scuppers, Edging Extensions, Fascia Sumps, and other items indicated.
- C. Coping:
 - 1. Match profiles indicated.
 - 2. Include accessories such as pre-fabricated inside and outside corners (seamed), End Caps, Saddles, Tee's, Crosses, Transition Pieces and Radiused Copings, and other items indicated.

2.09 WALKWAYS

- A. TPO Walkway Roll:
 - 1. The entire area under the walkway shall be cleaned prior to installation and all edges are to be fully welded(adhered) to prevent moisture from intruding under the walkway.
 - 2. Manufacturer's standard walkway roll stock, designed to protect TPO roof membrane.
 - a. Slip-resistant surface.
 - 3. Nominal Thickness: 160 mil.
 - 4. Size: 34 IN x 50 FT roll.
 - 5. Secure to roof membrane by heat welding.
 - 6. Discontinue walkway at roof membrane seams.
 - 7. Color: Gray.

2.10 MISCELLANEOUS ITEMS

A. Roofing accessories:

- 1. Use manufacturer's standard prefab accessories where available.
- 2. Nailing strips: As detailed and required.
- 3. Pipe flashings: Provide for each pipe penetration; include clamps, adhesive and sealants.
- 4. Expansion joint covers.
- 5. Underlayment for pavers: As recommended by roofing manufacturer.
- B. Adhesives, cleaners, and primers: As recommended by roofing manufacturer.
- C. Fire-resistive Treated (FRT) Wood Blocking: Specified in Section 06 10 00.
- D. Other Materials as required by manufacturer for complete system warranty.

PART 3 – EXECUTION

3.01 INSPECTION

- A. Inspect entire area to be roofed for acceptability.
- B. Surface on which insulation or roofing membrane is applied shall be clean, smooth, dry, and free of projections or contaminants that would prevent proper application of or be incompatible with the new installation, such as fins, sharp edges and foreign materials.
- C. Correct unsatisfactory conditions.
- D. Commencement of roofing activities constitutes acceptance of all conditions affecting installation and roofing system performance.
- E. TPO roofing to be inspected by Project Representative during construction.

3.02 INSTALLATION - SHEATHING (OVER METAL DECK)

- A. Lay sheathing tightly butted and cut to fit around penetrations.
- B. Apply per UL requirements.
- C. Attach sheathing to deck in accordance with roofing manufacturer's recommendations.
- D. Fasteners exposed to view from finished spaces below:
 - 1. Project fastener through roof deck maximum 1 IN and cap.

3.03 INSTALLATION - VAPOR RETARDER

- A. Install in largest practical widths.
- B. Bond vapor retarder to substrate using approved adhesive.

- C. Install continuously at locations indicated.
 - 1. Insure that no discontinuities occur, including at seams, penetrations, and edge terminations.
 - 2. Join sections of vapor retarder and seal penetrations with mastic tape.
 - 3. Lap joints 4 IN and seal with adhesive.
 - 4. Ensure that surfaces to be taped are clean and dry.
- D. Seal around pipes, conduits, curbs, safety tie-backs, and other penetrations with pipe boots in accordance with manufacturer's instructions.
- E. Maintain continuity of vapor retarder over expansion joints.
- F. Repair holes in vapor retarder with self-adhesive tape recommended by manufacturer.
- G. Protect vapor retarder from damage until covered with insulation.

3.04 INSTALLATION - WOOD BLOCKING

- A. Install where indicated or required for proper securement of roofing system.
- B. Securement of wood blocking:
 - 1. Design to resist a minimum of 200 LBS/LF in any direction per SPRI Test Method RE-1.
- C. Install top of blocking flush with top of insulation.

3.05 INSTALLATION - INSULATION

- A. Where required thickness of insulation is greater than 2 IN: Install insulation in at least two layers.
 - 1. Stagger board joints in successive layers laterally, and longitudinally.
 - 2. Butt joints tightly, and dress top surface of joints as required to preclude ponding at seams.
 - a. Joints shall not exceed 1/4 IN.
 - b. Joints and gaps greater than 1/4 IN shall be filled with the same material.
 - 3. Cut insulation neatly to fit around roof penetrations and projections.

3.06 INSTALLATION – MEMBRANE

- A. General:
 - 1. Unroll and position membrane without stretching.
 - 2. Secure the membrane with the required fasteners and plates.
 - a. Spacing as dictated by wind design and project conditions.
 - 3. Install adjoining membrane sheets in the same manner in accordance with the manufacturer's requirements.
- 4. Position sheets to accommodate contours of roof deck.
 - a. Shingle splices to avoid bucking water.
- 5. Perimeter Securement: Secure membrane along the perimeter of each roof level, roof section, curb, skylight, interior wall, penthouse, and other penetrations as recommended by membrane manufacturer.
- 6. Hot or Cold Weather Procedures: Comply with manufacturer's instructions.
- 7. Protect membrane from stains/discoloring caused by adhesives.
- B. Adhering TPO Membrane:
 - 1. Position TPO membrane over substrate.
 - 2. Fold membrane sheet back lengthwise onto itself exposing half underside of membrane.
 - 3. Apply bonding adhesive in accordance with the manufacturer's instructions, to exposed underside of the membrane and the corresponding substrate area.
 - a. Do not apply bonding adhesive along the splice edge of membrane to be hot air welded over the adjoining sheet.
 - b. Allow adhesive to dry until it is tacky.
 - c. Roll the coated membrane into coated substrate while avoiding wrinkles.
 - d. Brush down bonded section of the membrane sheet immediately after rolling membrane into the adhesive with a soft bristle push broom to achieve maximum contact.
 - e. Fold back unbonded half of sheet lengthwise and repeat the bonding procedures.
- C. Membrane Splicing/Hot Air Welding Procedures:
 - 1. Position adjoining sheets to allow a minimum overlap of 2 IN.
 - 2. Hot air weld TPO membrane sheets using Automatic Hot Air Welding Machine or Hot Air Hand Welder in accordance with the manufacturer's hot air welding procedures.
 - a. At splice intersections, roll seam with a roller prior to membrane seam cooling.
 - b. Where 60 mil membrane is specified: Splice intersections shall be overlaid with non-reinforced TPO flashing material of type recommended by membrane manufacturer.
 - 3. Probe seams once the hot air welds have thoroughly cooled.
 - 4. Repair seam deficiencies same day they are discovered.
 - 5. Apply sealant of type recommended by membrane manufacturer on cut edges of reinforced membrane where scrim reinforcement is exposed after seam probing is complete.

- 6. Pull membrane back along the welded splice so entire underside of membrane is exposed once Hot Air Weld has been completed.
 - a. Apply bonding adhesive to exposed underside of membrane sheet and substrate.
 - b. Allow adhesive to dry until tacky and roll membrane into substrate and brush down bonded section with a bristle broom following procedure noted above.
 - c. Continue to install adjoining membrane sheets in same manner, overlapping edges a minimum of 2 IN and complete bonding procedures.
- D. Flashing:
 - 1. Follow manufacturer's typical flashing procedures for wall, curb, and penetration flashing including metal edging/coping and roof drain applications.
 - 2. Flashing of parapets, curbs, expansion joints and other parts of roof must be performed using reinforced TPO membrane.
 - 3. Manufacturer's standard, non-reinforced TPO membrane can be used for flashing pipe penetrations, sealant pockets, scuppers, as well as inside and outside corners when use of pre-fabricated accessories is not feasible.
 - 4. Terminate base-of-wall flashings in accordance with manufacturer's approved details.
 - 5. Pre-flashing at sheet metal parapet copings:
 - a. Extend TPO membrane, flashing or both over top of parapet prior to capping with sheet metal.
 - 6. Expansion Joints:
 - a. Extend TPO membrane across roofing expansion joints.
 - b. Include adequate slack in membrane to accommodate anticipated movement.

3.07 INSTALLATION - EDGE METAL AND COPING

- A. Verify blocking has been installed and adequately secured.
- B. Sub-flash details with a layer of TPO membrane prior to installation of edge metal or coping system.
- C. Secure anchor cleat to blocking as recommended, using corrosion-resistant fasteners.
- D. Install splice plates and snap-on covers.

3.08 INSTALLATION – WALKWAYS

A. Install walkways at traffic concentration points, such as roof hatches, access doors, rooftop ladders, or locations as indicated.

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- B. Do not locate within 10 FT of roof edge.
- C. Clean surfaces to be bonded.
- D. Secure by heat welding as recommended by membrane manufacturer.
- E. The entire area under the walkway shall be cleaned prior to installation and all edges are to be fully welded(adhered) to prevent moisture from intruding under the walkway.

3.09 DAILY SEAL

- A. On phased roofing, when the completion of flashings and terminations is not achieved by end of work day, a daily seal must be performed to temporarily close the membrane to prevent water infiltration.
- B. Make water cutoffs by extending membrane beyond insulation and setting end of membrane in 4 IN wide strip of water cutoff mastic.
- C. Remove temporary water cutoffs prior to proceeding with next work period.
- D. Remove and replace wet insulation.

3.10 CLEAN UP

A. Remove all construction debris and legally dispose off site.

END OF SECTION

SECTION 07 61 13 METAL ROOFING

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Standing seam metal roofing.
 - 2. Prefinished gutters and downspouts.
 - 3. Roof insulation, vapor retarder.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Division 00 Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 01 General Requirements.
 - 3. Section 06 10 00 Rough Carpentry.

1.02 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. American Architectural Manufacturers Association (AAMA):
 - a. 621, Voluntary Specifications for High Performance Organic Coatings on Coil Coated Architectural Hot Dipped Galvanized (HDG) and Zinc-Aluminum Coated Steel Substrates.
 - 2. ASTM International (ASTM):
 - a. A653, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - b. A792, Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
 - c. C209, Standard Test Methods for Cellulosic Fiber Insulating Board.
 - d. C1289, Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.
 - e. E96, Standard Test Methods for Water Vapor Transmission of Materials.
 - f. E1592. Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference.
 - g. E1646, Standard Test Method for Water Penetration of Exterior Metal Roof Panel Systems by Uniform Static Air Pressure Difference.
 - h. E1680, Standard Test Method for Rate of Air Leakage Through Exterior Metal Roof Panel Systems.

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- i. F593, Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
- 3. FM Global (FM) www.fmglobal.com:
 - a. FM-4471 Approval Standard for Class I Panel Roofs
 - b. Install per FM Global Property Loss Prevention Data Sheet 1-28 Design Wind Loads.
 - c. Install per FM Global Property Loss Prevention Data Sheet 1-29 -Roof Deck Securement and Above-Deck Roof Components.
 - d. Install per FM Global Property Loss Prevention Data Sheet 1-31 Metal Roof Systems.
 - e. Install per FM Global Property Loss Prevention Data Sheet 1-49 Perimeter Flashing.
 - f. Install per FM Global Property Loss Prevention Data Sheet 1-54 Roof Loads for New Construction.
- 4. Sheet Metal and Air Conditioning Contractors' National Association (SMACNA):
 - a. Architectural Sheet Metal Manual, Sixth Edition, 2003.
- 5. Underwriters Laboratories, Inc. (UL):
 - a. Building Materials Directory.
 - b. Fire Resistance Directory.
 - c. 580, Standard for Tests for Uplift Resistance of Roof Assemblies.
- 6. Building Code:
 - a. International Code Council (ICC):
 - International Building Code and associated standards, 2009 Edition as amended by the State of Washington, and the City of Bellevue Amendments, referred to herein as Building Code.
- B. Qualifications:
 - 1. Manufacturer shall have minimum of 10 years experience in the production of structural standing seam metal roofing.
 - a. All structural components of the roof system shall be designed and sealed by registered Professional Structural Engineer licensed in the State of Washington.
 - 2. Installer shall be licensed by or approved in writing by manufacturer.
 - 3. Installer shall have minimum of seven (7) years experience in the installation of structural standing seam metal roof systems similar to system specified.
 - 4. Installer shall have successfully completed two (2) projects of similar size, scope and complexity within past two (2) years.

- 5. All roll forming performed on-site shall be supervised by personnel trained and employed by the roofing manufacturer.
 - a. Roofing manufacturer shall have been engaged in field roll forming for a minimum of 15 years with experience in roll forming long panels similar to panels being used.
- C. Mock-Ups:
 - 1. Prior to start of permanent roof construction construct mock-ups of roofing.
 - a. Mock-ups shall be of sufficient size to properly display all components required by the roofing; fascia and soffit system.
 - b. Mock-ups shall be a minimum 5 FT x 5 FT in size.
 - c. Provide multiple mock-ups as required.
 - 2. Mock-ups shall incorporate all components, specified and/or required but not specified, needed for a complete water and airtight roofing fascia, and soffit system.
 - a. Components include, but are not limited to:
 - 1) Roofing panels, seaming, all eave, rake and top of roof flashing and counterflashing as well as roof/vertical wall intersection flashing and counterflashing conditions, all reglet conditions, gutter, and downspout and soffit conditions.
 - 2) All vapor retarders, insulation, roof underlayment, miscellaneous clips, angles, plates, brackets, closures, calking, roof penetration flashing, counterflashing.
 - 3. Panels shall be same panels as specified or approved for Project.
 - a. Exact color is necessary; Contractor is to label each exposed component to identify final installed color of component.
 - 4. Step construction to allow observation of all components.
 - 5. Construct additional mock-ups or rework existing mock-ups until acceptable to Project Representative.
 - 6. Maintain mock-ups at project site until Project Representative approves removal of mock-ups.
 - 7. Approved mock-ups to constitute minimum acceptable standard of quality for actual construction.

1.03 DEFINITIONS

- A. Installer or Applicator:
 - 1. Installer or applicator is the person actually installing or applying the product in the field at the Project site.
 - 2. Installer and applicator are synonymous.
- B. Steep Slope: Having a pitch of 3:12 or greater.

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- C. Low Slope: Having a pitch less than 3:12 but greater than 1/4:12.
- D. PVDF: Polyvinylidene fluoride.

1.04 SYSTEM DESCRIPTION

- A. Prefinished steel gutters and downspouts, and field-insulated standing seam roof system consisting of exterior panel, roofing underlayment, field installed insulation, and vapor retarder over metal roof deck.
 - 1. Roof panel support and attachment system to be determined by standing seam roof manufacturer.
- B. System also includes all metal flashing, counterflashing, and miscellaneous trim required for a complete water and airtight system.

1.05 SUBMITTALS

- A. Submittal Procedures: See Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
- B. Leadership in Energy and Environmental Design (LEED[®]) Documentation: Submit the following in accordance with Section 01 81 30 – Sustainability Requirements:
 - 1. Product Data for MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content; include statement indicating costs for each product having recycled content.
 - 2. Product Data for MR 5: For products and materials required to comply with requirements for regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.
 - 3. Product Data for IEQ 4.1: For adhesives and sealants used inside the weatherproofing system, documentation including printed statement of VOC content.
 - 4. LEED Materials Tracking Form: Form to be provided in an electronic format to the Contractor to record LEED materials used on the project.
- C. Approval Submittals:
 - 1. Shop Drawings:
 - a. Fabrication and/or layout Drawings:
 - 1) Manufacturer prepared computer generated Drawings showing anchorage, flashing, jointing and all other accessories required and all special detailing required by the system.
 - a) Minimum plan scale: 1 IN = 8 FT.
 - b) Minimum detail scale: 1-1/2 IN = 1 FT.

- 2) Provide complete erection plan for each building structure with all details and sections referenced, all penetrations shown, expansion joints shown, detailed and referenced, and all special conditions identified, referenced and detailed.
- 3) Erection plan to identify limits of each different substrate material (decking).
- 4) Provide distinction between factory and field assembled work.
- 2. Product technical data including:
 - a. Manufacturer data sheets on each component, including reglets used in the roof system.
 - b. Acknowledgement that products submitted meet requirements of standards referenced.
 - 1) Certification by manufacturer that roofing assembly being supplied has been successfully tested under UL 580 procedures and has achieved a Class 90 rating.
 - c. Certification of FM approval.
 - 1) Provide FM test results.
- 3. Test results:
 - a. UL 580, Class 90 test data.
 - b. FM 1-90 classification reports.
 - c. ASTM E1592 test results.
 - Provide results of tests conducted in accordance with ASTM E1592 for panel size and gage and clip type and spacing similar to panels and clips being used.
 - d. ASTM E1646 and ASTM E1680 test results.
 - e. Concentrated load test data.
 - 1) Load test to be conducted on panel size, gage and with clip spacing as required.
- 4. Structural Engineer's sealed and signed calculations certifying that system structural components meet the requirements for lateral, upward and downward loads specified.
- 5. FM Global:
 - a. Approval of the Roof Assembly by the Owner's insurance underwriter, FM Global is required.
 - 1) The Roof Assembly shall have an FM Global Assembly Number.
 - a) Proposed Roof Assemblies based on the Contractor's or Manufacturer's statement of equivalency will not be accepted.

- Products and Components of the Roof Assembly shall be FM Global approved components and shall be listed under the same FM Global Assembly Number.
 - a) Substitutions of products from one approved FM Global Roof Assembly to another are not allowed.
- b. Provide additional fastening at the perimeters and corners per FM Data Sheet 1-29 and the roof systems approval listing.
- c. The Roof Assembly shall meet FM Global requirements pertaining to the roof slope, wind pressures and other conditions particular to the Project.
- d. Use assemblies listed in the on-line data base RoofNav application at <u>www.roofnav.com</u>.
- e. Submit detailed installation plans and material submittals and a Roof Nav Contractor Package to FM Global for review prior to ordering materials.
- f. The following Assembly numbers represent FM Assembly Roof Assembly numbers listed by Roof Panel Manufacturer:
 - 1) Metal Sales: 213688-0-0.
 - 2) MBCI: 16869-0-0.
 - 3) Or approved equal.
- 6. Samples:
 - a. General: Tag, identify and provide statement regarding use for all fasteners, anchor clips, closures and sealants.
 - b. Roof panel:
 - 1) Full width, 24 IN long samples.
 - 2) Provide color selected or specified when possible.
 - c. Fasteners.
 - d. Anchor clips.
 - e. Closures, (both metal and non-metallic).
 - f. Factory and field applied sealants.
 - g. Color samples:
 - 1) For initial preliminary color selection, provide manufacturer's color chart showing all colors available.
 - 2) For final color selection, provide 2 IN x 3 IN colored metal samples, for each color selected during the initial color selection.
- D. Quality Assurance Submittals:
 - 1. Qualifications:
 - a. Manufacturer: Provide Structural Engineer qualifications.

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- b. Installer:
 - 1) Certification of approval or license to install product from manufacturer.
 - 2) Certification of experience.
 - 3) Listing of projects completed in the past two (2) years.
 - Completed projects information to include, square footage of roofing installed, dollar value of roofing installed, manufacturer and type of roofing installed and contact name and telephone number of building Owner.
- c. Installer: Provide qualifications of all personnel expected to be working on the Project.
- 2. Roofing manufacturer's letter of approval for insulation proposed for use.
- E. Closeout Submittals:
 - Extended Warranty: Provide two executed copies of the Extended Warranty required by this Section in accordance with the provisions of Section 01 78 00 – Closeout Procedures.
 - Operation and Maintenance Manuals: Provide O&M manual documentation in accordance with Section 01 73 00 – Operation and Maintenance Manuals.

1.06 EXTENDED WARRANTY

- A. In accordance with the provisions of Section 01 78 00 Closeout Procedures, provide an extended Warranty for the Work of this Section:
 - 1. Warranty period for Work of this Section is two (2) years commencing on the date of Substantial Completion, except:
 - a. The complete metal roof system, including panel side joint and trim conditions, shall be warranted weather-tight and secure against water penetration for a period of twenty (20) years commencing on the date of Substantial Completion.
 - b. The metal panel finish shall be warranted free from fading, chipping, cracking and peeling of the panel exterior finish, and/or erosion of substrate metal for a period of twenty (20) years commencing on the date of Substantial Completion.
 - 1) Repair of panel finish shall match surrounding panel finish in material, color, and application method.

PART 2 – PRODUCTS

2.01 ACCEPTABLE PRODUCTS

- A. Metal roofing and fascia products specified acceptable manufacturer:
 - 1. Metal Sales (www.metalsales.us.com).
 - 2. MBCI (www.mbci.com).

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- 3. Firestone.
- 4. Or approved equal.
- B. Vapor retarder:
 - 1. As approved by Roofing Manufacturer.
- C. Insulation: Any manufacturer meeting these specifications and approved by metal roofing manufacturer.
- D. PVDF resin:
 - 1. PPG DURANAR.
 - 2. Valspar Fluropon.
 - 3. Arkema Inc. KYNAR 500.
 - 4. Solvay Solexis HYLAR 5000.
 - 5. Or approved equal.
- E. Energy Performance: Provide roof panels that are listed on the EPA or Department of Ecology ENERGY STAR "Roof Product List" for low-slope roof products.
- F. Submit request for substitution in accordance with Specification Section 01 60 00.

2.02 MATERIALS

- A. Roof and Fascia Panels:
 - 1. General:
 - a. Steel, ASTM A653, SQ, Grade 37.
 - 1) Galvanized G90 coating.
- B. Insulation:
 - 1. Rigid polyisocyanurate.
 - a. Approved by roofing manufacturer.
- C. Vapor retarder as approved by Roofing Manufacturer.
- D. Perimeter Trim, Panel Closures, Flashing and Counterflashing: Material and factory applied finish to match column.
- E. Fasteners: 300 series stainless steel, ASTM F593.
- F. Intermediate Support System:1. Galvanized steel: ASTM A653, SQ, Grade 50, G90 coating.
- G. Sealant: Manufacturer's standard.
- H. Sheathing: See Specification Section 06 10 00.
- I. Roof Color: Minimum SRI of 78.

2.03 ACCESSORIES

- A. Gutters and Downspouts:
 - 1. Steel, ASTM A653, SQ, Grade 37.
 - a. Minimum thickness: 22 GA.
 - b. Galvanized G90 coating.
 - 1) Meet requirements of AAMA 621.
 - 2. Gutters:
 - a. "Style D" gutter per SMACNA Figure 1-2.
 - 1) Seamless except for expansion joints.
 - b. Stainless steel: ASTM-A484 and ASTM-A276.
 - 1) Exposed: Type 304.
 - a) Finish: ASTM-A480 AISI finish #4, unless otherwise indicated.
 - c. Gutter straps and eave closure flashing: Minimum 22 GA to match gutter material, finish and color.
 - 3. Downspouts:
 - a. Round.
 - 1) Seam on concealed side of downspout.
 - Provide gutter to downspout connection per SMACNA Figure 1-33B, Detail 1.
 - b. Downspout straps: Minimum 22 GA with finish and material to match downspout.
 - c. Finish: To match roof panels.
 - d. Color: To be selected by Project Representative.
- B. Vapor Retarder (Non-Fire Rated):
 - 1. Class A rated.
 - 2. Water vapor permeance: 0.03 maximum.
 - 3. Tensile strength: 45.0 LBF/IN.
 - 4. Puncture resistance: Minimum 2200 grams.
- C. Roof Insulation:
 - 1. Rigid polyisocyanurate foam board.
 - a. ASTM C1289, Class I, Type II.
 - b. Compressive strength: 20 psi minimum.
 - c. Density: 2 pcf minimum.
 - d. Thermal resistance (R-Value): 7.2/IN.
 - e. Water vapor transmission: ASTM E96, less than 1.0 perms.

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- f. Water absorption: ASTM C209, less than 1.0 percent.
- g. Thickness noted on Drawings.
- h. Acceptable to roof manufacturer.
- D. Roof Penetration Flashing:
 - 1. Round penetrations:
 - a. Premolded EPDM boot with metal collar.
 - b. Buildex "DEK-TITE."
 - c. ThyBar Corporation.
 - d. Or approved equal.
- E. Flashing Curb:
 - 1. Provided by metal roofing manufacturer.
 - 2. One-piece completely seal welded prefabricated roof curb, including vertical flashing, and counter flashing, cricket on high side of penetration and flat pan fabricated to replace standing seam metal roof panel.
 - 3. Size as required for penetration.
 - 4. Bottom sloped to match roof.
 - a. Level on top.
 - 5. Minimum 16 GA galvanized metal finished to match roof panel.
- F. Foam and metal closures, calking, gaskets, fasteners, washers, clips, angles, and all miscellaneous trims shall be provided by roofing manufacturer, fabricated for the specific condition as required.

2.04 FABRICATION

- A. General:
 - 1. Fabricate with square, true corners, mitered and welded.
 - 2. Fabricate trim, flashings and closure pieces to match panel profile and finish.
 - 3. Hem all edges.
 - 4. Fabricate panels in full length with no end laps.
 - a. Any roll-forming of panels at the jobsite must be performed with industrial type rolling mill having at least 10 stands to gradually shape the sheet metal, maintaining flatness and strict tolerances.
- B. Standing Seam Metal Roof Panels:
 - 1. Profile: Metal Sales "Seam-Loc 24."
 - 2. Height of standing seam: 2 11/16 IN.
 - 3. Gage: Minimum 24.

- 4. Width: 24 IN.
 - a. Longitudinal stiffening elements to minimize oil canning.
- 5. System shall be designed as a true structural standing seam shape.
- 6. Finish:
 - a. PVDF based with minimum 70 percent resin.
 - b. Three-coat system having minimum 0.8 mil epoxy primer coat on both sides of panel with a 0.8 mil PVDF resin color coat and a 0.8 mil PVDF resin clear top coat on the exterior side of the panel.
 - c. Meet or exceed requirements of AAMA 621.
 - d. Smooth finish.
 - e. Color: White (Roof Panels only).
- 7. Concealed fasteners:
 - a. Provide concealed fasteners in all locations.
 - b. If exposed fasteners are required by the roof panel manufacturer, because of location, constructability issues or other critical design requirement, finish of fastener shall match roof panel finish.
 - 1) Exposed fasteners are to be approved by Project Representative.
 - c. The use of deflection limiter devices is not allowed.
- C. Intermediate Support System:
 - 1. Roof panel anchor clips:
 - a. Manufacturer's standard one-piece clip suitable for condition.
 - 1) Two-piece clips are acceptable if required by roofing manufacturer.
 - b. Minimum 16 GA.
 - c. ASTM A653, hot-dipped galvanized, with minimum 2.0 OZ zinc/SF coating.
 - 2. Roof panel manufacturer shall be responsible for designing and providing all necessary intermediate "Z" or "hat-shaped" or other miscellaneous support members as required to transfer roof panel loads into building roof framing members.
 - a. Design in accordance with Building Code and loads specified.
 - 3. Bearing plates:
 - a. Galvanized steel sized by roofing manufacturer for roof loading indicated.
 - b. Minimum 16 GA.
 - c. ASTM A653, hot-dipped galvanized, with minimum 2.0 OZ zinc/SF coating.

2.05 SOURCE QUALITY CONTROL

- A. Structural Testing:
 - 1. The system shall be designed to safely resist the positive and negative loads as specified below:

	POSITIVE	
AREA	(DOWNWARD)	
Overhangs	10 psf	
All other areas	10 psf	
ROOF LOCATION	NEGATIVE	
	(UPWARD)	
	10 (ft ²)	
Eave	37 psf	
Corner (including	56 psf	
Corner @ Overhang)		
Overhang	37 psf	
All other areas	22 psf	

- 2. Structural-uniform uplift load capacity of the panel system shall be determined in accordance with ASTM E1592.
 - a. The factor of safety on the test results shall be 1.65 for the panel, batten or clip ultimate loads with no increase for wind.
 - b. The factor of safety for fasteners shall be 3.0 for one (1) single fastener per clip, 2.25 for two (2) fasteners per clip and 4.0 in masonry.
 - c. Design uplift capacity for conditions of gage, span or loading other than those tested may be determined by interpolation of test results.
 - 1) Extrapolation of conditions outside the range of the tests is not acceptable.
 - d. Deflection shall be L/180 for positive loading.
- B. Water Penetration: No uncontrollable leakage at minimum 6.4 psf when tested in accordance with ASTM E1646.
- C. Air Infiltration: Maximum 0.036 scfm/SF when tested at 4.0 psf differential pressure when tested in accordance with ASTM E1680.
- D. The panel system shall have a FM 1-90 rating.
- E. The panels shall withstand a 250 LB concentrated load applied to a 4 SQ IN area at the center of the panel at mid span between supports with no panel deformation, rib buckling, or panel sidelap separation which will adversely affect the weather tightness of the system.

- F. Support roofing panels on top of roof insulation using bearing plates attached to the structural frame or connect to manufacturer-provided intermediate support system.
 - 1. Bearing plate and standing seam roof panel anchor clip attachment is to be determined by the roofing manufacturer and shall take precedent over this Specification.
 - a. Provide attachment to roof structural frame or deck as required for loading criteria specified.
 - 2. Roof panel anchor clips shall be designed to allow thermal movement of the panels except where specific fixed points are indicated.
 - a. Roof panel manufacturer shall be responsible for determining fixed point locations unless otherwise indicated.
 - b. Wood blocking shown at roof edge is strictly for attachment of miscellaneous flashings and shall not be used for any structural value.
 - 3. Maximum spacing of roof clips shall be determined by manufacturer.
- G. Roof panel manufacturer shall be responsible for designing and installing all necessary expansion joints in the roof system.

2.06 MAINTENANCE MATERIALS

A. Provide Project Representative with 4 OZ of touch-up paint to match each different color used in the system.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Provide all closures, trim, angles, plates, calking, gaskets, fasteners, washers, etc., as required for a complete water and air tight installation.
- B. Install all soffit panels in accordance with manufacturer's recommendations using concealed fasteners when possible.
 - 1. Exposed fasteners to be painted to match soffit finish.
- C. Install products in accordance with manufacturer's instructions, SMACNA (where referenced) and details shown on Drawings.
- D. Attachments shall allow for thermal expansion and contraction.
- E. Seal all joints as required for watertight installation.
- F. Install panels in one (1) continuous length from ridge to eave.
- G. Touch-up paint all damaged surfaces.
- H. Install vapor retarder in accordance with manufacturer's recommendations.
 - 1. Repair all tears and tape all joints with tape recommended by vapor retarder manufacturer.
 - 2. Lap joints minimum 4 IN.

- I. Gutters:
 - 1. Install gutters using gutter straps in accordance with SMACNA Table 1-8 and Figure 1-12 and per roofing manufacturer's recommendations.
 - a. Provide gutter brackets or hangers at 24 IN OC maximum.
 - b. Provide expansion joints in gutters per SMACNA and at expansion joint locations shown on Drawings.
 - c. Install gutters to provide positive drainage to downspout locations.
 - d. Seal all joints in gutters to provide completely water tight system.
 - e. Provide 1/4 x 1/4 IN stainless steel mesh debris screen continuous on top of gutter.
 - 1) Screen shall be mounted in stainless steel frame which will allow replacement of screen without damage to gutter, screen or screen frame.
- J. Downspouts:
 - 1. Install downspouts in locations shown on the Drawings.
 - 2. Provide downspout anchor straps per SMACNA Figure 1-35 as appropriate for downspout style.
 - 3. Provide gutter to downspout connection per SMACNA Figure 1-33B, Detail 1.
 - 4. Seal all joints in downspout for a complete watertight system.
 - 5. Angle bottom of downspout out away from building unless indicated on Drawings to be inserted into piped storm water drainage system.
 - 6. Anchor hanger straps to building wall with stainless steel screws and anchor sleeves appropriate for wall construction.
 - a. Provide minimum of two (2) anchors per strap.
 - Maximum spacing of hanger straps shall be 10 FT with minimum of two (2) hanger straps per vertical piece of downspout.
 - 8. Spacing and location of hanger straps shall be consistent from downspout to downspout.

END OF SECTION

SECTION 07 62 00 FLASHING AND SHEET METAL

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes: Architectural flashing and sheet metal work.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Division 00 Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 01 General Requirements.
 - 3. Section 07 92 00 Joint Sealants.
 - 4. Section 09 91 00 Painting and Protective Coatings.

1.02 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. American Architectural Manufacturers Association (AAMA):
 - a. 2605, Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels.
 - 2. ASTM International (ASTM):
 - a. A167, Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
 - b. A176, Standard Specification for Stainless and Heat-Resisting Chromium Steel Plate, Sheet, and Strip.
 - c. A653, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.
 - d. B32, Standard Specification for Solder Metal.
 - 3. FM Global (FM).
 - 4. Sheet Metal and Air Conditioning Contractors' National Association (SMACNA):
 - a. Architectural Sheet Metal Manual, Sixth Edition, 2003.
- B. Qualifications:
 - 1. Sheet metal fabricator shall have minimum 10 years experience in fabrication of sheet metal items similar to items specified.
 - 2. Sheet metal installer shall have minimum five (5) years experience installing sheet metal items specified.

1.03 DEFINITIONS

- A. Installer or Applicator:
 - 1. Installer or applicator is the person actually installing or applying the product in the field at the Project site.
 - 2. Installer and applicator are synonymous.

1.04 SUBMITTALS

- A. Submittal Procedures: See Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
- B. Approval Submittals:
 - 1. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 - 2. Fabrication and/or layout Drawings.
 - a. Scaled drawing showing expansion joint locations, special conditions, profile, fastening and jointing details.
 - 1) Minimum plan scale: 1/8 IN = 1 FT.
 - 2) Minimum detail scale: 1-1/2 IN = 1 FT.
 - 3. Samples:
 - a. Finish and color samples for each product specified for Project Representative preliminary color selection.
 - b. For final color selection, provide 2IN x 3 IN colored metal samples for each color selected during the preliminary color selection.
- C. Quality Assurance Submittals:
 - 1. Fabricator qualifications.
 - 2. Installer qualifications.
- D. Closeout Submittals:
 - Extended Warranty: Provide two executed copies of the Extended Warranty required by this Section in accordance with the provisions of Section 01 78 00 – Closeout Procedures.

1.05 EXTENDED WARRANTY

- A. In accordance with the provisions of Section 01 78 00 Closeout Procedures, provide an Extended Warranty for the Work of this Section:
 - 1. Warranty period for Work of this Section is five (5) years commencing on the date of Substantial Completion.
 - a. Agree to repair or replace work which leaks water or, where applicable, air or deteriorates excessively, including color failure, or otherwise fails to perform as watertight and, where appropriate, airtight flashing.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following Reglet manufacturers are acceptable:
 - 1. Fry Reglet (<u>www.fryreglet.com</u>).
 - 2. WP Hickman (www. wphickman.com).
 - 3. CJ Metals (<u>www.cjmetals.com</u>).
 - 4. Or approved equal.
- B. Submit request for substitution in accordance with Specification Section 01 60 00.

2.02 MATERIALS

- A. Factory Formed Galvanized Steel Coping:
 - 1. Coping piece: Aluminum, ASTM B209.
 - 2. Coping chair and anchor plate: Steel, galvanized per ASTM A653 or stainless steel per ASTM A167.
- B. Sheet Metal: Steel, galvanized per ASTM A653.
 - 1. Finish PVDF resin:
 - a. PPG DURANAR.
 - b. Valspar Fluropon.
 - c. Arkema Inc. KYNAR 500.
 - d. Solvay Solexis HYLAR 5000.
 - e. Or approved equal.
- C. Fasteners: Non-ferrous compatible with sheet metal.
- D. Retainer Clips and Continuous Cleats: Galvanized steel or stainless steel.
- E. Solder: ASTM B32.
- F. Finish:
 - 1. Coil Coat.

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- 2. Kynar Factory finish.
- G. Dissimilar Metal Protection: Comply with Specification Section 09 91 00.

2.03 ACCESSORIES

A. Accessories as required to form a complete water and airtight system.

2.04 FABRICATION

- A. Sheet Metal (Steel):
 - 1. Minimum 24 GA galvanized steel.
 - 2. Factory applied Kynar Coating.
 - a. Finish: Meet requirements of AAMA 2605.
- B. Retainer Clips and Continuous Cleats:
 - 1. Use 16 GA galvanized steel, G60 coating minimum with ferrous steel flashing, coping and counterflashing and standing seam metal roofing wall trim.
 - 2. Use 0.050 IN stainless steel with aluminum or stainless steel.
- C. Shop fabricate items to maximum extent possible.
 - 1. Fabricate true and sharp to profiles and sizes indicated on Drawings.
 - a. Shop fabricate and weld or solder all corners.

PART 3 – EXECUTION

3.01 PREPARATION

A. Provide items to be built into other construction to Contractor in time to allow their installation.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions, SMACNA, and as indicated on Drawings.
- B. Set top edges of membrane flashing and sheet metal flashing into reglets.
- C. Fasten materials at intervals recommended by SMACNA.
- D. Install slip joints to allow for thermal movement as recommended by SMACNA and manufacturer.
 - 1. Maximum spacing: 10 FT OC.
 - 2. Provide slip joint 24 IN from corners.
 - 3. Provide slip joint at each vertical expansion joint location in wall.
 - a. Provide break in continuous cleat at each vertical expansion joint.
 - b. The above expansion joints do not include brick veneer expansion joints.

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- E. Caulk slip joints with two (2) beads of sealant on each side of slip joint overlap.
 - 1. Refer to Specification Section 07 92 00 for sealant.
- F. Caulk all exposed joints of coping with sealant to match color of metal being sealed.
- G. Form flashings to provide spring action with exposed edges hemmed or folded to create tight junctures.
- H. Provide dissimilar metals and materials protection where dissimilar metals come in contact or where sheet metal contacts mortar, concrete masonry or concrete.
 - 1. Refer to Specification Section 09 91 00 for dissimilar metals protection.
- I. Provide all components necessary to create watertight junctures between roofing and sheet metal work.
- J. Provide all miscellaneous sheet metal items not specifically covered elsewhere, as indicated or required to provide a weathertight installation.

END OF SECTION

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SECTION 07 72 33 ROOF HATCHES

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes: Roof hatches.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Division 00 Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 01 General Requirements.
 - 3. Section 07 62 00 Flashing and Sheet Metal.
 - 4. Section 09 91 00 Painting and Protective Coatings.

1.02 SUBMITTALS

- A. Submittal Procedures: See Section 01 33 00 Submittal Procedures for requirements for the mechanics and administration of the submittal process.
- B. Leadership in Energy and Environmental Design (LEED[®]) Documentation: Submit the following in accordance with Section 01 81 30 – Sustainability Requirements:
 - Product Data for MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content; include statement indicating costs for each product having recycled content.
 - 2. Product Data for MR 5: For products and materials required to comply with requirements for regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.
 - 3. Product Data for IEQ 4.1: For adhesives and sealants used inside the weatherproofing system, documentation including printed statement of VOC content.
 - 4. Product Data for IEQ 4.2: For paints and coatings used inside the weatherproofing system, documentation including printed statement of VOC content.
 - 5. LEED Materials Tracking Form: Form to be provided in an electronic format to the Contractor to record LEED materials used on the project.
- C. Approval Submittals:
 - 1. Shop Drawings:
 - a. Scaled plan of roof showing location of all units and anchoring details.
 - 1) Minimum plan scale: 1/8 IN = 1 FT.

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- 2) Minimum detail scale: 1-1/2 IN = 1 FT.
- 2. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
- D. Closeout Submittals:
 - Operation & Manufacturer (O&M) Manual Content: Provide O&M manual documentation as required by Section 01 73 00 – Operation and Maintenance Manuals.
 - Extended Warranty: Provide two executed copies of the Extended Warranty required by this Section in accordance with the provisions of Section 01 78 00 – Closeout Procedures.

1.03 EXTENDED WARRANTY

- A. In accordance with the provisions of Section 01 78 00 Closeout Procedures, provide an Extended Warranty for the Work of this Section:
 - 1. Warranty period for Work of this Section is five (5) years commencing on the date of Substantial Completion.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. Roof hatch(es) (scuttle):
 - a. Bilco. (www.bilco.com).
 - b. Dur-Red Products. (www.dur-red.com).
 - c. Milcor Inc.(www.commercialproductsgroup.com/products/milcor.aspx).
 - d. Babcock-Davis Associates Inc. (www.babcockdavis.com).
 - e. Or approved equal.
- B. Submit request for substitution in accordance with Specification Section 01 60 00.

2.02 MANUFACTURED UNITS

- A. Roof Hatches:
 - 1. 12 IN high aluminum units:
 - a. 11 GA curb.
 - b. Insulate curb with minimum 1 IN rigid fiberboard insulation.
 - c. Integral cap flashing.
 - d. Mill finish.

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- 2. Metal cover:
 - a. Insulated with minimum 1 IN fiberglass.
 - b. 11 GA aluminum exterior.
 - c. 18 GA aluminum interior liner.
 - d. Completely weather sealed and gasketed.
 - e. Mill finish.
 - f. Padlock hasp.
- B. Gaskets: Mechanically retained thermoplastic.
- C. Hardware:
 - 1. Standard vinyl-covered grip lifting mechanism, automatic hold-open device, hinges, latch, and padlock hasp.
 - a. Operating handles for inside and outside operation.
 - 2. All hardware to be Type 316 stainless steel.
- D. Construct for minimum 40 psf live loading.
- E. Ladder Safety Post:
 - 1. Furnish and install ladder safety post at all roof hatch locations Model LU-1. The ladder safety post shall be pre-assembled from the manufacturer.
 - 2. Performance characteristics:
 - a. Tubular post shall lock automatically when fully extended.
 - b. Safety post shall have controlled upward and downward movement.
 - c. Release lever shall disengage the post to allow it to be returned to its lowered position.
 - d. Post shall have adjustable mounting brackets to fit ladder rung spacing up to 14 IN OC and clamp brackets to accommodate ladder rungs up to 1-3/4 IN DIA.
 - 3. Post: Shall be manufactured of high strength square tubing. A pull up loop shall be provided at the upper end of the post to facilitate raising the post.
 - 4. Material of construction: Steel.
 - 5. Balancing spring: A stainless steel spring balancing mechanism shall be provided to provide smooth, easy, controlled operation when raising and lowering the safety post.
 - 6. Hardware: All mounting hardware shall be Type 316 stainless steel.
 - 7. Finishes: Factory finish shall be: yellow powder coat.
- F. Unit similar to Bilco Type "S" 2 FT-6 IN x 3 FT.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Install units in accordance with manufacturer's installation instructions.
- B. Securely anchor units as appropriate.
 - 1. Anchor to steel with 1/2 IN stainless steel bolts, nuts and washers at a maximum spacing of 12 IN OC.
 - 2. Manufacturer's predrilled fastener locations take precedent over this Specification.
 - 3. Provide attachment at each corner as a minimum.
- C. Flash and counterflash to provide weathertight installation.
- D. For units mounted directly to concrete curbs (such as on site vault structures), flash down the sides of the units with 60 mil single ply roofing membrane flashing material.
 - 1. Extend flashing material horizontally over the unit base mounting flange and out onto the concrete surface a minimum of 3 IN beyond the unit mounting flange.
 - 2. Adhere the membrane to the concrete using recommended adhesive and seal all membrane edges with sealant recommended by membrane manufacturer.
 - a. See Specification Section 07 54 25 Fully Adhered TPO Roofing for membrane flashing.
- E. Provide aluminum sheet metal liner at opening through roof deck as shown on the Drawings.
 - 1. 0.40 IN aluminum.
 - 2. See Specification Section 07 62 00 Flashing and Sheet Metal.
- F. Adjust to provide smooth easy operation.
- G. Provide dissimilar metals protection as required.
 - 1. Refer to Specification Section 09 91 00 Painting and Protective Coatings.

END OF SECTION

SECTION 07 72 36 SMOKE, HEAT AND EXPLOSION RELIEF VENTS

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes: Smoke, heat and explosion relief vents.
- B. Related Sections include but are not necessarily limited to:
 - 1. Division 00 Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 01 General Requirements.
 - 3. Section 09 91 00 Painting and Protective Coatings.

1.02 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. ASTM International (ASTM):
 - A653, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.
 - b. B209, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
 - c. B221, Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
 - 2. FM Global (FM).
 - 3. Underwriters Laboratories, Inc. (UL):
 - a. Building Materials Directory.

1.03 DEFINITIONS

- A. Installer or Applicator:
 - 1. Installer or applicator is the person actually installing or applying the product in the field at the Project site.
 - 2. Installer and applicator are synonymous.

1.04 SUBMITTALS

A. Submittal Procedures: See Section 01 33 00 – Submittal Procedures for requirements for the mechanics and administration of the submittal process.

- B. Leadership in Energy and Environmental Design (LEED[®]) Documentation: Submit the following in accordance with Section 01 81 30 – Sustainability Requirements:
 - 1. Product Data for MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content; include statement indicating costs for each product having recycled content.
 - 2. Product Data for IEQ 4.1: For adhesives and sealants used inside the weatherproofing system, documentation including printed statement of VOC content.
- C. Approval Submittals:
 - 1. Shop Drawings:
 - a. Scaled Drawings show location of units size and installation details.
 - 1) Minimum plan scale: 1 = 96.
 - 2) Minimum detail scale: 1 = 8.
 - 2. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
- D. Quality Assurance Submittals: Fused link test results.
- E. Closeout Submittals:
 - Operation & Maintenance (O&M) Manual Content: Provide O&M manual documentation as required by Section 01 73 00 – Operation and Maintenance Manuals.
 - Extended Warranty: Provide two executed copies of the Extended Warranty required by this Section in accordance with the provisions of Section 01 78 00 – Closeout Procedures.

1.05 EXTENDED WARRANTY

- A. In accordance with the provisions of Section 01 78 00 Closeout Procedures, provide an Extended Warranty for the Work of this Section:
 - 1. Warranty period for Work of this Section is five (5) years commencing on the date of Substantial Completion.
 - a. Warranty to cover repair or replacement in event of leakage, defective design, materials, and construction.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. Smoke and heat vents (UL listed):
 - a. APC. (www.apcdayliter.com).
 - b. Babcock-Davis Hatchways, Inc. (www.babcockdavis.com).
 - c. Bilco Company. (www.bilco.com).
 - d. Dur-Red Products. (www.dur-red.com).
 - e. Naturalite, Inc. (<u>www.naturalite.com</u>).
 - f. Or approved equal.
- B. Submit request for substitution in accordance with Specification Section 01 60 00 – Product Requirements.

2.02 MATERIALS

- A. Smoke and Heat Vents:
 - 1. Cover: Steel.
 - 2. Curb: Aluminum.
 - 3. Liner: Steel.
 - 4. Hardware: Cadium-plated steel.
 - 5. Insulation: Glass fiber.
- B. Dome-Type Smoke and Heat Vent:
 - 1. Dome: Acrylic.
 - 2. Curb: Aluminum.
 - 3. Frame: Aluminum.
 - 4. Hardware: Stainless steel.
 - 5. Insulation: Rigid fiber.
- C. Fasteners: Stainless steel.
- D. Dissimilar Metal Protection: Refer to Section 09 91 00 Painting and Protective Coatings.

2.03 FABRICATION

- A. Smoke and Heat Vents:
 - 1. Factory built.
 - 2. UL listed.
 - 3. Operation:

a. 165 DegF fusible link for automatic operation.

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- b. Inside and outside pull rings for manual operation without destroying fusible link.
- 4. Curb:
 - a. 14 GA galvanized steel per ASTM A653.
 - b. Insulated with 1 IN thick material.
 - c. 12 IN high with flanges.
 - d. Integral cap flashing.
- 5. Cover:
 - a. Same material as curb.
 - b. Insulated with 1 IN thick material.
- 6. Liner:
 - a. 22 GA galvanized per ASTM A653.
- 7. Steel Security Bars:
 - a. 1/2 IN steel bars at 8 IN OC each direction welded and assembled into a 1 1/2 IN x 1 1/2 IN x 1/8 IN steel angle frame.
 - b. Approved by OSHA as a fall protection device.
- 8. Furnish units completely assembled with positive hold-release mechanism, heavy-duty hinges, compression spring operator, neoprene draft seal, heavy-duty shock absorbers, flashing and all accessories required for operation.
- 9. Sizes indicated on the Drawings.
- B. Dome-Type Smoke and Heat Vent:
 - 1. Factory built and glazed.
 - 2. UL listed and/or FM approved.
 - 3. Operation:
 - a. 165 DegF fusible link for automatic operation.
 - b. Manual release to permit opening from inside or outside without destroying the fusible link.
 - 4. Curb:
 - a. 0.064 IN thick, ASTM B221, 6063 T5 extruded aluminum.
 - b. Corners mitered and welded.
 - c. 12 IN high.
 - d. Insulated with minimum 3/4 IN thick material.
 - 5. Frame:
 - a. ASTM B221, 6063 T5 extruded aluminum.
 - b. Corners mitered and welded.

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- 6. Dome:
 - a. Double glazed.
 - b. Acrylic primary and secondary dome.
 - c. Primary dome designed for 200 psf live load.
- 7. Furnish units completely assembled with positive hold-release mechanism, heavy-duty hinges, compression spring operator, neoprene draft seal, heavy-duty shock absorbers, flashing and all accessories required for operation.
- 8. Sizes indicated on the Drawings.

2.04 MAINTENANCE MATERIALS

- A. Extra Material:
 - 1. Furnish three (3) extra fusible links with each unit requiring fusible links.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Provide all periphery items as required to provide complete weathertight installation.
- C. Paint all galvanized and primed surfaces in accordance with Section 09 91 00 Painting and Protective Coatings.

3.02 FIELD QUALITY CONTROL

- A. After installing fusible link, test operation by fusing the link.
- B. After test is acceptable, replace fusible link.

END OF SECTION

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SECTION 07 84 00 FIRESTOPPING

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes: Firestopping.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Division 00 Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 01 General Requirements.
 - 3. Firestopping of mechanical and electrical penetrations: Refer to Division 23 - Heating, Ventilating, and Air-Conditioning (HVAC) and Division 26 -**Electrical Specification Sections.**

1.02 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. ASTM International (ASTM):
 - a. A653, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - b. C665, Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
 - c. E84, Standard Test Method for Surface Burning Characteristics of **Building Materials.**
 - d. E119, Standard Test Methods for Fire Tests of Building Construction and Materials.
 - 2. National Fire Protection Association (NFPA).
 - a. 220, Standard on Types of Building Construction.
 - 3. Underwriters Laboratories, Inc. (UL):
 - a. Building Materials Directory.

1.03 SUBMITTALS

- A. Submittal Procedures: See Section 01 33 00 Submittal Procedures for requirements for the mechanics and administration of the submittal process.
- B. Leadership in Energy and Environmental Design (LEED[®]) Documentation: Submit the following in accordance with Section 01 81 30 - Sustainability Requirements:
 - 1. Product Data for IEQ 4.1: For sealants and sealant primers used inside the weatherproofing system, documentation including printed statement of VOC content.

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- 2. LEED Materials Tracking Form: Form to be provided in an electronic format to the Contractor to record LEED materials used on the project.
- C. Approval Submittals:
 - 1. Product technical data, including:
 - a. Acknowledgement that products meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 - c. Manufacturer's recommendations for joint cleaner, primer, backer rod, tooling and bond breaker.
 - d. Detailed drawings of special conditions.
 - e. Data sheet on each type of firestopping assembly being used:
 - 1) Provide certification that assembly is UL listed.
 - 2. Samples:
 - a. Cured samples of available colors for Project Representative's color selection.
 - b. Color chart not acceptable.
 - 3. Certification from sealant manufacturer stating product being used is recommended for and is best suited for joint in which it is being applied.
 - 4. UL certification.
 - 5. Prior to acceptance by the Project Representative, provide written statement that all fire-rated penetrations have been sealed using products specified in accordance with UL requirements for required rating.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Deliver material in manufacturer's original, unopened containers with labels intact:
 - 1. Labels shall indicate contents and expiration date on material.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. Safing insulation:
 - a. Thermafiber LLC.(www.thermafiber.com).
 - b. Owens-Corning.(<u>www.owenscorning.com</u>).
 - c. Roxul (www.roxul.com).
 - d. Or approved equal.

- 2. Expanding silicone elastomer:
 - a. Any manufacturer UL listed for system used.
- 3. Firestop sealant:
 - a. Dow Corning.(www.dowcorning.com).
 - b. 3M Company.(www.3m.com).
 - c. U.S. Gypsum Co.(<u>www.usg.com</u>).
 - d. Or approved equal.
- 4. Moldable putty:
 - a. 3M Company.(www.3m.com).
 - b. Hilti CP617 (www.hilti.com).
 - c. Or approved equal.
- B. Submit request for substitution in accordance with Specification Section 01 60 00 – Product Requirements.

2.02 MATERIALS

- A. Safing Insulation:
 - 1. Inorganic mineral fibers and binders formed into semi-rigid blankets.
 - a. Density: 4.0 LB/CF.
 - b. ASTM C665, Type 1.
 - c. Rated noncombustible as defined by NFPA 220.
 - 2. ASTM E84 flame spread: 15 maximum, smoke developed 0.
 - 3. ASTM E119 tested for assembly and rating indicated.
 - 4. Thickness as required to maintain fire rating of assembly.
 - 5. Retainer: Minimum 20 GA, galvanized steel closure, ASTM A653, G60.
- B. Expanding Silicone Elastomer:
 - 1. Two part, liquid silicone elastomer.
 - 2. UL listed as "Fill, Void or Cavity Material (ZCPY)" for use in "Wall or Floor Opening Protective, Multiple Cable Systems (ZCOR)."
 - 3. Forming materials as described in applicable UL system.
- C. Firestop Sealant:
 - 1. One-part silicone.
 - 2. Capable of providing up to a 4 HR fire rating.
 - 3. Provide self-leveling grade for all horizontal slab conditions.
 - 4. UL listed.
- D. Moldable Putty:
 - 1. 100 percent solids material, single component.

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- 2. Intumescent and endothermic.
- 3. UL listed.
- E. Plastic Pipe Fire Barrier:
 - 1. UL listed for floor or wall penetrations.
 - 2. Capable of providing up to 2 HR fire rating on a 4 IN pipe (outside diameter).
 - 3. Factory made, single component, ready to use device.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Firestop all openings and penetrations through fire-rated floors, walls, ceilings, etc., in accordance with UL "Wall or Floor Opening Protective, Multiple Cable Systems (ZCOR)" latest edition, or as indicated on the Drawings.
 - 1. Install products in accordance with manufacturer's instructions.
- B. Refer to Specification Section 01 73 20 Openings and Penetrations in Construction for openings and penetrations requiring fire stopping.
- C. Expanding Silicone Elastomer:
 - 1. Remove all combustible form materials after installation.
 - 2. Thickness required to maintain fire rating indicated or required.
- D. Firestop Sealant: Completely seal opening to obtain required rating.
- E. Moldable Putty:
 - 1. Install in accordance with manufacturer's recommendations.
 - 2. Trowel to smooth finish, remove excess putty from surrounding surfaces.

END OF SECTION

SECTION 07 92 00 JOINT SEALANTS

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes: Sealant work.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Division 00 Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 01 General Requirements.
 - 3. Section 07 84 00 Firestopping.
 - 4. Section 09 91 00 Painting and Protective Coatings.
- C. Work included consists of but is not necessarily limited to:
 - Sealing all joints which will permit penetration of dust, air or moisture, unless sealing work is specifically required under other Specification Sections.
 - a. Work may include the following:
 - 1) Flashing reglets and retainers.
 - 2) Exterior wall joints.
 - 3) Masonry control joints, exterior and interior and between masonry and other materials.
 - 4) Flooring joints.
 - 5) Isolation joints.
 - 6) Joints between paving or sidewalks and building.
 - 7) Concrete construction, control and expansion joints, exterior and interior.
 - 8) Sawed joints in interior concrete slabs.
 - Joints between precast roof units, between precast roof units and walls, and all exterior and interior joints between precast wall panels.
 - 10) Joints at penetrations of walls, floors and decks by piping and other services and equipment.
 - 11) Exterior and interior perimeters of exterior and interior door and window frames, louvers, grilles, etc.
 - 12) Thresholds at exterior doors.
 - 13) Sealing of plumbing fixtures to floor or wall.

- 14) Sealing around piping, duct or conduit penetrations through roof, floors, interior and exterior walls.
 - a) See Specification Section 07 84 00 for firestopping these penetrations.
- 15) Sealing perimeter and penetrations of sound insulated walls.
- 16) Other joints where calking, sealant, expanding foam sealant or compressible sealant is indicated.

1.02 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. American Concrete Institute (ACI):
 - a. 302.1R, Guide for Concrete Floor and Slab Construction.
 - 2. ASTM International (ASTM):
 - a. C834, Standard Specification for Latex Sealants.
 - b. C920, Standard Specification for Elastomeric Joint Sealants.
 - c. C1521, Standard Practice for Evaluating Adhesion of Installed Weatherproofing Sealant Joints.
 - 3. NSF International (NSF).
 - 4. Underwriters Laboratories, Inc. (UL).
- B. Qualifications: Sealant applicator shall have minimum five (5) years experience using products specified on projects with similar scope.
- C. Mock-Ups:
 - 1. Before calking work is started, a mock-up of each type of joint shall be calked where directed by the Project Representative.
 - a. The approved mock-ups shall show the workmanship, bond, and color of calking materials as specified or selected for the work and shall be the minimum standard of quality on the entire project.
 - b. Each sample shall cure for a minimum of seven (7) days at which time the sealant manufacturer's authorized factory representative shall perform adhesion tests on each sample joint.
 - 1) Perform adhesion tests per ASTM C1521.
 - If mock-up is not acceptable or if adhesion test fails, provide additional mock-up and adhesion testing as required until acceptable to Project Representative.

1.03 DEFINITIONS

- A. "Caulk(ing)," "calk(ing)," and "sealant": Joint sealant work.
- B. "Interior wet areas": Toilets, showers and similar areas.

- C. Installer or Applicator:
 - 1. Installer or applicator is the person actually installing or applying the product in the field at the Project site.
 - 2. Installer and applicator are synonymous.
- D. Finish sealant: Sealant material per this specification applied over face of compressible sealant or expanding foam sealant specified, to provide a finished, colored sealant joint.
- E. Defect(ive): Failure of watertightness or airtightness.

1.04 SUBMITTALS

- A. Submittal Procedures: See Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
- B. Leadership in Energy and Environmental Design (LEED[®]) Documentation: Submit the following in accordance with Section 01 81 30 – Sustainability Requirements:
 - 1. Product Data for IEQ 4.1: For sealants and sealant primers used inside the weatherproofing system, documentation including printed statement of VOC content.
- C. Approval Submittals:
 - 1. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 - c. Manufacturer's recommendations for joint cleaner, primer, backer rod, tooling and bond breaker.
 - 2. Samples:
 - a. Cured sample of each color for Project Representative's color selection.
 - b. Color chart not acceptable.
- D. Quality Assurance Submittals:
 - 1. Certification of applicator qualification.
 - 2. Certification from sealant manufacturer stating product being used is recommended for and is best suited for joint in which it is being applied.
 - 3. Test Results:
 - a. Provide adhesion test results for each sealant sample including adhesion results compared to adhesion requirements.
 - b. Manufacturer's authorized factory representative recommended remedial measures for all failing tests.

- E. Closeout Submittals:
 - Extended Warranty: Provide two executed copies of the Extended Warranty required by this Section in accordance with the provisions of Section 01 78 00 – Closeout Procedures.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver material in manufacturer's original unopened containers with labels intact: Labels shall indicate contents and expiration date on material.

1.06 EXTENDED WARRANTY

- A. In accordance with the provisions of Section 01 78 00 Closeout Procedures, provide an Extended Warranty for the Work of this Section:
 - 1. Warranty period for Work of this Section is two (2) years from the date of Substantial Completion.
 - 2. Sealant work free of defects for a period of two (2) years from date of final acceptance.
 - a. Remove any defective work or materials and replace with new work and materials.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. Polyurethane sealants:
 - a. Pecora.(www.pecora.com).
 - b. Sika Chemical Corp.(http://usa.sika.com/).
 - c. Sonneborn (www.buildingsystems.basf.com).
 - d. Tremco.(<u>www.tremcosealants.com</u>).
 - e. Or approved equal.
 - 2. Silicone sealants:
 - a. General Electric (www.siliconeforbuilding.com).
 - b. Dow Corning Corp (www.dowcorning.com).
 - c. Tremco.(www.tremcosealants.com).
 - d. Or approved equal.
 - 3. Compressible sealant:
 - a. Polytite Manufacturing Corporation(polytite.com).
 - b. Emseal (www.emseal.com).
 - c. Norton(.www.foams.saint-gobain.com).
 - d. Sandell(www.sandellmfg.com).

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- e. Or approved equal.
- 4. Fire-resistant sealant: See Specification Section 07 84 00.
- 5. Acoustical sealant:
 - a. Pecora (www.pecora.com).
 - b. Sonneborn.(www.buildingsystems.basf.com).
 - c. Tremco.(www.tremcosealants.com).
 - d. Or approved equal.
- 6. Polysulfide rubber sealant:
 - a. Pecora (*www.pecora.com*).
 - b. Sonneborn.(www.buildingsystems.basf.com).
 - c. TIOKEL (http://www.polyspec.com/products/THIOKOL_2235M.htm).
 - d. Or approved equal.
- 7. Expanding foam sealant:
 - a. Convenience Products (www.touch-n-foam.com).
 - b. Polytech Foam Products (www.polytechfoam.com).
 - c. Fomo Products, Inc (www.fomo.com).
 - d. Or approved equal.
- 8. Polyurea joint filler:
 - a. Dayton Superior Specialty Chemical Corporation (www.daytonsuperior.com).
 - b. Euclid Chemical Co(www.euclidchemical.com).
 - c. Sonneborn.(www.buildingsystems.basf.com).
 - d. Or approved equal.
- 9. Backer rod, compressible filler, primer, joint cleaners, bond breaker: As recommended by sealant manufacturer.
- B. Submit request for substitution in accordance with Specification Section 01 60 00.

2.02 MATERIALS

- A. Sealants General:
 - 1. Provide colors matching materials being sealed.
 - 2. Where compound is not exposed to view in finished work, provide manufacturer's color which has best performance.
 - 3. Nonsagging sealant for vertical and overhead horizontal joints.
 - 4. Sealants for horizontal joints: Self-leveling pedestrian/traffic grade.

- B. Polyurethane Sealant:
 - 1. One (1) or two (2) components.
 - 2. Paintable.
 - 3. Meet ASTM C920 Type S or Type M, Grade NS or P, Class 25, Use NT, T, M, A and O.
 - a. Pecora Dynatrol-IXL, Dynatrol II, Urexpan NR-200, NR-201.
 - b. Sika Chemical Corporation Sikaflex-1a, Sikaflex-2C NS/SL.
 - c. Sonneborn Sonolastic NP-1, NP-II, SL-1 SL-2.
 - d. Tremco Dymonic or Dymeric, Vulkem 116,227,45,245.
 - e. Or approved equal.
- C. Silicone Sealant:
 - 1. One (1) component.
 - 2. Meet ASTM C920, Type S, Grade NS, Class 25, Use NT, G, A, O.
 - a. General Electric: Silpruf, Silglaze II.
 - b. General Electric: Sanitary 1700 sealant for sealing around plumbing fixtures.
 - c. Dow Corning: 786 for sealing around plumbing fixtures.
 - d. Dow Corning: 790, 795.
 - e. Tremco: Spectrem 1, Spectrem 3, Tremsil 600.
 - f. Or approved equal.
 - 3. Mildew resistant for sealing around plumbing fixtures.
- D. Compressible Sealant:
 - 1. Size so that width of material is twice joint width.
 - 2. Foamed polyurethane strip saturated with polymerized polybutylene waterproofing coated on front face with nonreactive release agent that will act as bond breaker for applied sealant.
 - 3. Fire rated where required.
- E. Joint Cleaner, Primer, Bond Breaker: As recommended by sealant manufacturer.
- F. Sealant Backer Rod and/or Compressible Filler:
 - 1. Closed cell polyethylene, polyethylene jacketed polyurethane foam, or other flexible, nonabsorbent, nonbituminous material recommended by sealant manufacturer to:
 - a. Control joint depth.
 - b. Break bond of sealant at bottom of joint.
 - c. Provide proper shape of sealant bead.
 - d. Serve as expansion joint filler.

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- G. Adhesive, Compressible Sealant: As recommended by sealant manufacturer.
- H. Fire-Resistant Sealant: See Specification Section 07 84 00.
- I. Expanding Foam Sealant:
 - 1. One (1) or two (2) component fire rated moisture cured expanding urethane.
 - 2. Shall not contain formaldehyde.
 - 3. Density: Minimum 1.5 pcf.
 - 4. Minimum 70 percent closed cell content.
 - 5. R-value minimum 5.0/IN.
 - 6. Flame spread: Less than 25.
 - 7. Smoke developed: Less than 25.
- J. Acoustical Sealant:
 - 1. One (1) component siliconized acrylic latex sealant.
 - 2. Non-Sag, Non-staining, non-bleeding.
 - 3. Compatible with paints specified for adjoining materials.
 - a. See Specification Section 09 91 00.
 - 4. Meet ASTM C834.
 - a. Pecora AC20+.
 - b. Sonneborn Sonolac.
 - c. Tremco Tremflex 834.
 - d. Or approved equal.
- K. Polysulfide Rubber Sealant:
 - 1. One (1) or two (2) component.
 - 2. Meet ASTM C920.
 - a. Pecora Synthacalk GC2+.
 - b. Sonneborn Sonolastic two-part polysulfide sealant.
 - c. Morton Polymer Systems Thiokol Sealants.
 - d. Or approved equal.
- L. Polyurea Joint Filler:
 - 1. Two (2) component, semi-rigid material for filling control, sawcut and construction joints in interior concrete floors and exterior walls.
 - a. Dayton Superior Specialty Chemical Corp. "Joint Fill, Joint Seal, Joint Saver II" as required for condition and recommended by manufacturer.
 - b. Euclid Chemical Co. "EUCO QWIK" joint.

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- c. L&M Construction Chemicals, Inc. "Joint Tite 750".
- d. Sonneborn "TF-100" control joint filler.
- e. Or approved equal.
- 2. Comply with ACI 302.1R performance recommendations regarding control and construction joints.
- 3. Color: Gray on concrete walls and Black on interior concrete floors.

PART 3 – EXECUTION

3.01 PREPARATION

- A. Before use of any sealant, investigate its compatibility with joint surfaces, fillers and other materials in joint system.
- B. Use only compatible materials.
- C. Where required by manufacturer, prime joint surfaces.1. Limit application to surfaces to receive calking.
 - 2. Mask off adjacent surfaces.
- D. Provide joint depth for joints receiving polyurea joint filler in accordance with manufacturer's recommendations.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions and UL requirements.
- B. Clean all joints.
- C. Make all joints water and airtight.
- D. Make depth of sealing compounds, except expanding foam and polyurea sealant, not more than one-half width of joint, but in no case less than 1/4 IN nor more than 1/2 IN unless recommended otherwise by the manufacturer.
- E. Provide correctly sized backer rod, compressible filler or compressible sealant in all joints to depth recommended by manufacturer:
 - 1. Take care to not puncture backer rod and compressible filler.
 - 2. Provide joint backer rod as recommended by the manufacturer for polyurea joint filler.
- F. Apply bond breaker where required.
- G. Tool sealants using sufficient pressure to fill all voids.
- H. Upon completion, leave calking with smooth, even, neat finish.
- I. Where piping, conduit, ductwork, etc., penetrate wall, seal each side of wall opening.
- J. Install compressible sealant to position at indicated depth.
 - 1. Take care to avoid contamination of sides of joint.

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- 2. Protect side walls of joint (to depth of finish sealant).
- 3. Install with adhesive faces in contact with joint sides.
- 4. Install finish sealant where indicated.
- K. Install expanding foam sealant to minimum 4 IN depth or thickness of wall being penetrated if less than 4 IN or as indicated on Drawings.
 - 1. Provide adequate fire rated backing material as required.
 - 2. Hold material back from exposed face of wall as required to provide backer rod and finish sealant.
 - a. Allow expanding foam sealant to completely cure prior to installing backer rod and finish sealant.
 - 3. Material shall be a minimum of 70 DegF prior to and during installation.
 - 4. Trim off excess material flush with surface of the wall if not providing finished sealant.

3.03 FIELD QUALITY CONTROL

- A. Adhesion Testing:
 - 1. Perform adhesion tests in accordance with ASTM C1521 per the following criteria:
 - a. Water bearing structures: One (1) test per every 1000 LF of joint sealed.
 - b. Exterior precast concrete wall panels: One (1) test per every 2000 LF of joint sealed.
 - c. Chemical containment areas: One (1) test per every 1000 LF of joint sealed.
 - d. Building expansion joints: One (1) test per every 500 LF of joint sealed.
 - e. All other type of joints except butt glazing joints: One (1) test per every 3000 LF of joint sealed.
 - f. Manufacturer's authorized factory representative shall recommend, in writing, remedial measures for all failing tests.

3.04 SCHEDULE

- A. Furnish sealant as indicated for the following areas:
 - 1. Exterior areas: Silicone.
 - 2. Interior wet areas: Silicone.
 - 3. Interior wet, corrosive areas: Polyurethane.
 - 4. Interior nonwet, corrosive areas: Silicone.
 - 5. Interior nonwet, noncorrosive areas: Silicone.
 - 6. Fire-rated construction: See Specification Section 07 84 00.

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- 7. Compressible sealant: Where indicated.
- 8. Sealant which will be subject to prolonged contact with or submersion in water (except wastewater and sewage):
 - a. Polysulfide or polyurethane: NSF approved for use in potable water tanks.
- 9. Penetrations exterior wall above grade:
 - a. For non-corrosive areas, provide expanding urethane foam, with polyurethane finish sealant.
 - b. For corrosive areas, provide expanding urethane foam, bond breaker and polysulfide finish sealant on corrosive side with polyurethane finish sealant on non-corrosive side.
- 10. Sealant exposed to or having the potential of being exposed to concentrated chlorine gas or chlorine liquid: Polysulfide.
- 11. Sealant which will be immersed in wastewater or sewage: Polysulfide.
- 12. Interior concrete floor control joints or sawed joints: Polyurea joint filler.
- 13. Sealing around plumbing fixtures: Silicone.
- 14. Plastic laminate casework, plastic laminate countertops and solid surface materials: Silicone.

END OF SECTION

SECTION 07 95 13 EXPANSION JOINT COVERS

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes: Expansion joint cover assemblies.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Division 00 Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 01 General Requirements.
 - 3. Section 05 50 00 Metal Fabrications.
 - 4. Section 07 62 00 Flashing and Sheet Metal.
 - 5. Section 07 92 00 Sealants.
 - 6. Section 09 91 00 Painting and High Performance Industrial Coatings.

1.02 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. The Aluminum Association (AA):
 - a. DAF 45, Designation System for Aluminum Finishes.
 - 2. ASTM International (ASTM):
 - a. B209, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
 - b. B221, Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
 - c. E1399, Standard Test Method for Cyclic Movement and Measuring the Minimum and Maximum Joint Widths of Architectural Joint Systems.

1.03 DEFINITIONS

- A. Installer or Applicator:
 - 1. Installer or applicator is the person actually installing or applying the product in the field at the Project site.
 - 2. Installer and applicator are synonymous.
- B. Heavy Duty: Capable of withstanding a point load of 2000 LB without damage or permanent deformation.
- C. Standard Duty: Capable of withstanding a point load of 500 LB without damage or permanent deformation.

1.04 SUBMITTALS

- A. Submittal Procedures: See Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
- B. Leadership in Energy and Environmental Design (LEED[®]) Documentation: Submit the following in accordance with Section 01 81 30 – Sustainability Requirements:
 - 1. Product Data for MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content; include statement indicating costs for each product having recycled content.
 - 2. Product Data for MR 5: For products and materials required to comply with requirements for regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.
 - Product Data for IEQ 4.1: For adhesives and sealants used inside the weatherproofing system, documentation including printed statement of VOC content
 - 4. Product Data for IEQ 4.2: For paints and coatings used inside the weatherproofing system, documentation including printed statement of VOC content.
- C. Approval Submittals:
 - 1. Shop Drawings:
 - a. Scaled plan of roof showing location of all units and anchoring details.
 - 1) Minimum plan scale: 1/8 IN = 1 FT.
 - 2) Minimum detail scale: 1-1/2 IN = 1 FT.
 - b. Color selections from manufacturer's standard colors for Project Representative to select from.
 - 2. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 - c. Provide sample in selected color.
- D. Closeout Submittals:
 - 1. O&M Manual Content: Provide O&M manual documentation as required by Section 01 73 00 Operation and Maintenance Manuals.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. Expansion joint covers:
 - a. C/S Group. (www.c-sgroup.com).
 - b. MM Systems. (www.mmsystemscorp.com).
 - c. Johns Manville(<u>www.jm.com</u>).
 - d. Or approved equal.
- B. Submit request for substitution in accordance with Specification Section 01 30 00.

2.02 MATERIALS

- A. Aluminum:
 - 1. Sheet and plate: ASTM B209, alloy 6061-T6.
 - 2. Extrusions, bars, rods, wire, and tubes: ASTM B221, alloy 6063-T5.
- B. Thermoplastic Elastomer:
 - 1. Extrusions and sheet goods: ASTM D2000.

2.03 MANUFACTURED UNITS

- A. General:
 - 1. Provide expansion joint cover assemblies of design, profile, materials and operation indicated.
 - a. Factory fabricated joints, transitions, connections and intersections.
 - 2. Provide manufacturer's standard anchors, fasteners, spacers, vapor seals, filler materials, adhesive and other accessories as required for complete installation.
 - 3. Where expansion joint covers are located in fire-rated assemblies, include fire-barrier system to provide a UL listed joint assembly.
 - 4. Provide units in longest practicable lengths to minimize number of end joints.
 - a. Locate end joints in non-conspicuous areas; avoid locating in traffic areas.
 - 5. Finishes:
 - a. Aluminum: Black.
 - b. Elastomeric inserts: To be selected by Project Representative.

- B. Seismic Expansion Joint Covers:
 - 1. Provide roof aluminum expansion joint cover:
 - a. Model SRJW-1200 by Construction Specialties.
 - b. Type: Vertical cover-plate.
 - 1) Exposed Metal: Aluminum- Mill Finish.
 - 2) Secondary Seal: 7-ply laminate reinforced Polyehylene.
 - c. Cover plate thickness shall be determined by the performance requirements of the roof, but shall be no less than 0.090 IN thick.
 - d. Factory Fabricated Transitions: All end caps, transitions and miters to be factory fabricated to ensure weather integrity. Field fabrication is not acceptable.

2.04 ACCESSORIES

- A. Sealant: See Specification Section 07 92 00.
- B. Fasteners:
 - 1. Stainless steel.
 - 2. See Specification Section 05 50 00.

PART 3 – EXECUTION

3.01 PREPARATION

- A. Provide items to be built into other construction to Contractor in time to allow their installation.
 - 1. If such items are not provided in time for installation, coordinate block-out requirements for later installation.
 - 2. Where block-outs are subject to traffic or potential for damage, provide temporary fillers to protect joint until specified items can be installed.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
 - 1. Locate end joints in non-conspicuous areas; avoid locating in traffic areas.
 - 2. Seal joints in accordance with manufacturer's written installation instructions.
 - 3. Ensure bolting joints are fastened such that the two (2) components create a smooth flat surface with hairline jointery unless a wider joint is required by the joint cover manufacturer.
- B. Set work level, true and plumb.
- C. Provide dissimilar materials protection in accordance with Specification Section 09 91 00.

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- D. After installation, clean all aluminum surfaces to remove excess calking, sealer, adhesives, etc.
 - 1. Repair or replace damaged inserts, patch paint coatings on components having scratched or otherwise damaged finish coatings.
 - 2. Replace all components that cannot be adequately repaired to satisfaction of the Project Representative.

END OF SECTION

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SECTION 08 11 00 METAL DOORS AND FRAMES AND BORROWED LIGHT FRAMES

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Metal doors and frames.
 - 2. Grouting of door frames.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Division 00 Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 01 General Requirements.
 - 3. Section 08 70 00 Finish Hardware.
 - 4. Section 08 81 00 Glass and Glazing.
 - 5. Section 09 91 00 Painting and Protective Coatings.

QUALITY ASSURANCE 1.02

- A. Referenced Standards:
 - 1. ASTM International (ASTM):
 - a. A653, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - 2. National Association of Architectural Metal Manufacturers (NAAMM):
 - a. Hollow Metal Manufacturers Association (HMMA).
 - National Fire Protection Association (NFPA):
 - a. 80, Standard for Fire Doors and Other Opening Protectives.
 - 4. Underwriters Laboratories, Inc. (UL):
 - a. Building Materials Directory.
 - b. Fire Resistance Directory.
 - 5. Steel Door Institute (SDI):
 - a. 117, Manufacturing Tolerances for Standard Steel Doors and Frames.
 - b. All SDI publications.
 - 6. Steel Door Institute/American National Standards Institute (SDI/ANSI):
 - a. A250.6, Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames.
 - b. A250.7, Nomenclature for Standard Steel Doors and Steel Frames.

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- c. A250.8 (formerly SDI 100), Recommended Specifications for Standard Steel Doors and Frames.
- d. A250.10, Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames.
- e. A250.11, Recommended Erection Instructions for Steel Frames.
- 7. Building Code:
 - a. International Code Council (ICC):
 - International Building Code and associated standards, 2009 Edition as amended by the State of Washington, and the City of Bellevue Amendments, referred to herein as Building Code.
- B. Qualifications: Manufacturer must be current member of SDI, and NAAMM (HMMA).
- C. Wipe coat galvanized steel is not acceptable as substitute for galvanizing finish specified.

1.03 DEFINITIONS

A. As identified in SDI/ANSI A250.7.

1.04 SUBMITTALS

- A. Submittal Procedures: See Section 01 33 00 Submittal Procedures for requirements for the mechanics and administration of the submittal process.
- B. Leadership in Energy and Environmental Design (LEED[®]) Documentation: Submit the following in accordance with Section 01 81 30 – Sustainability Requirements:
 - 1. Product Data for MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content; include statement indicating costs for each product having recycled content.
 - 2. Product Data for MR 5: For products and materials required to comply with requirements for regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.
 - 3. Product Data for IEQ 4.1: For adhesives and sealants used inside the weatherproofing system, documentation including printed statement of VOC content.
 - 4. Product Data for IEQ 4.2: For paints and coatings used inside the weatherproofing system, documentation including printed statement of VOC content.
 - 5. LEED Materials Tracking Form: Form to be provided in an electronic format to the Contractor to record LEED materials used on the project.

- C. Approval Submittals:
 - 1. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - Manufacturer's installation instructions.
 - 2. Schedule of doors and frames using same reference numbers as used on Drawings.
 - 3. SDI certification.
 - 4. Color samples on actual product samples.
- D. Closeout Submittals:
 - 1. Extended Warranty: Provide two executed copies of the Extended Warranty required by this Section in accordance with the provisions of Section 01 78 00 – Closeout Procedures.

1.05 EXTENDED WARRANTY

- A. In accordance with the provisions of Section 01 78 00 Closeout Procedures, provide an Extended Warranty for the Work of this Section:
 - 1. Warranty period for Work of this Section is five (5) years commencing on the date of Substantial Completion.

1.06 **DELIVERY, STORAGE, AND HANDLING**

A. Store doors and frames in accordance with SDI/ANSI A250.11.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. Metal doors and frames and metal borrowed light frames:
 - a. CECO Corporation (www.cecodoor.com).
 - b. Steelcraft Manufacturing Co (www.steelcraft.com).
 - c. Curries Company(www.curries.com).
 - d. Or approved equal.
- B. Submit request for substitution in accordance with Specification Section 01 60 00 – Product Requirements.

MATERIALS 2.02

- A. Steel Sheet: Hot-dipped galvannealed steel, ASTM A653, A60 coating.
- B. Frames: Hot-dipped galvannealed steel, ASTM A653, A60 coating.

- C. Supports and Reinforcing: Hot-dipped galvannealed steel, ASTM A653, A60 coating.
- D. Inserts, Bolts and Fasteners: Manufacturer's standard.
- E. Primer: Manufacturer's standard coating meeting SDI/ANSI A250.10.
- F. Galvannealed Coating Repair: See Specification Section 09 91 00 Painting and Protective Coatings.
- G. Thermal Insulation: Polyurethane, CFC free.
- H. Sound Insulation: Fiberglass batt insulation or impregnated Kraft honeycomb.

2.03 ACCESSORIES

- A. Frame Anchors:
 - 1. Jamb anchors:
 - a. Masonry wire anchors: Minimum 0.1875 IN wire, galvanized.
 - b. Existing wall anchor: Minimum 18 GA, galvanized.
 - c. Stud partition and base anchors: Minimum 18 GA, galvanized.

2.04 FABRICATION

- A. General:
 - 1. SDI/ANSI A250.8.
 - 2. Fabricate rigid, neat in appearance and free from defects.
 - 3. Form to sizes and profiles indicated on Drawings.
 - a. Beveled edge.
 - 4. Fit and assemble in shop wherever practical.
 - 5. Mark work that cannot be fully assembled in shop to assure proper assembly at site.
 - 6. Continuously wire weld all joints, dress exposed joints smooth and flush.
 - 7. Fabricate doors and frames to tolerance requirements of SDI 117.
 - 8. Fit doors to SDI and NFPA 80 clearances.
 - 9. All doors shall be handed.
 - 10. Hinge cut-out depth and size on doors and frames shall match hinge specified in Specification Section 08 70 00 Finish Hardware.
 - 11. Design and fabricate doors to requirements of the Building Code.
- B. Fire Rated Doors and Frames: Ratings as indicated on Door Schedule, when tested in accordance with NFPA 252, UL 10B or UL 10C.
 - 1. Labeled by UL, WH, or other agency acceptable to the authorities having jurisdiction.

- C. Hollow Metal Doors:
 - 1. General:
 - a. 1-3/4 IN thick.
 - b. Fabricate with flush top caps.
 - 1) Thickness and material to match door face.
 - 2) On exterior doors, seal weld top cap to door face and grind smooth and flush.
 - 3) On interior doors, attach top cap to door with concealed fasteners or by welding.
 - a) Factory seal if attached with fasteners.
 - b) No exposed fasteners will be accepted.
 - c. Continuously wire weld all joints and dress, smooth and flush.
 - d. Galvannealed per ASTM A653, A60 coating.
 - e. Provide steel astragals where indicated on the Drawings or where required by the manufacturer or NFPA 80.
 - 2. Exterior:
 - a. SDI/ANSI A250.8, Level 3, and physical performance level A, Model 2.
 - 1) Face sheet minimum thickness: 16 GA.
 - 2) Insulated: Minimum R10.
 - 3. Interior:
 - a. SDI/ANSI A250.8, Level 3, and physical performance level "A", Model 2.
 - 1) Face sheet minimum thickness: 18 GA.
 - b. Sound insulated, minimum STC-35.
- D. Hollow Metal Frames:
 - 1. Door frames:
 - a. Provide 2 IN face at all heads, jambs and mullions for frames in stud walls.
 - b. Provide 4 IN face at head where noted on Drawings or required by wall construction.
 - c. 26 GA galvannealed steel boxes welded to frame at back of all hardware cutouts.
 - d. Steel plate reinforcement welded to frame for hinge, strikes, closers and surface-mounted hardware reinforcing.
 - 1) All plate reinforcement shall meet size and thickness requirements of SDI/ANSI A250.8.
 - 2) Galvannealed per ASTM A653, minimum A60.

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- e. Split type frames not acceptable.
 - 1) All horizontal and vertical mullions and transom bars shall be welded to adjacent members.
- f. Conceal all fasteners.
- g. Frames shall be set up, all face joints continuously wire welded and dressed smooth.
- h. Exterior: 14 GA steel galvannealed per ASTM A653, A60.
- i. Interior: 16 GA steel galvannealed per ASTM A653, A60.
- j. Provide removable spreaders at bottom of frame.
- E. Prepare for finish hardware in accordance with hardware schedule, templates provided by hardware supplier, and SDI/ANSI A250.6.
 - 1. Locate finish hardware in accordance with SDI/ANSI A250.8.
 - 2. See Specification Section 08 70 00 Finish Hardware for hardware.
 - 3. Prepare doors for swing direction indicated.
 - a. Preparing doors for non-handed hinges is not acceptable.
- F. After fabrication, clean off mill scale and foreign materials, repair damaged galvannealed surfaces, and treat and prime with rust inhibiting primer.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Install doors and frames in accordance with SDI/ANSI A250.11, the Building Code and manufacturer's instructions.
- B. Where applicable, place frames prior to construction of enclosing walls and ceilings.
- C. Plumb, align, and brace securely until permanently anchored.
- D. After completion of walls, remove temporary braces and spreaders.
- E. Use plastic plugs to keep silencer holes clear during construction.
- F. Immediately after erection, sand smooth rusted or damaged areas of prime and galvannealed coating.
- G. Touch-up prime and galvannealed coating in accordance with Specification Section 09 91 00 Painting and Protective Coatings.
- H. Where indicated to be painted leave finish smooth for finish painting.
- I. Install three (3) silencers on strike jamb of single door frame and two (2) on head of double door frame.

- J. Number and location of anchors shall be in accordance with frame manufacturer's recommendation with minimum of three (3) anchors per jamb.
- K. Protect doors and frames during construction.

END OF SECTION

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SECTION 08 14 16 FLUSH WOOD DOORS

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes: Factory finished flush wood doors.
- B. Related Sections include but are not necessarily limited to:
 - 1. Division 00 Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 01 General Requirements.
 - 3. Section 08 11 00 Metal Doors and Frames And Borrowed Light Frames.
 - 4. Section 08 70 00 Finish Hardware.

1.02 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. American National Standards Institute (ANSI):
 - a. A208.1, Particleboard.
 - 2. Architectural Woodwork Institute (AWI):
 - a. Quality Standards:
 - 1) Section 1500, Factory Finishing.
 - 3. National Fire Protection Association (NFPA):
 - a. 80, Standard for Fire Doors and Other Opening Protectives.
 - b. 252, Standard Methods of Fire Tests of Door Assemblies.
 - 4. Underwriters Laboratories, Inc. (UL):
 - a. 10C, Standard for Positive Pressure Fire Tests of Door Assemblies.
 - 5. Window and Door Manufacturers Association (WDMA):
 - a. I.S. 1A, Industry Standard for Architectural Wood Flush Doors.
 - 6. Warnock Hersey (WH):
 - a. Certification Listings for Fire Doors.
 - 7. Building Code:
 - a. International Code Council (ICC):
 - International Building Code and associated standards, 2009 Edition as amended by the State of Washington, and the City of Bellevue Amendments, referred to herein as Building Code.

- B. Qualifications:
 - 1. Door manufacturer must have minimum 10 years experience in manufacturing of wood veneer doors.
 - 2. Manufacturer shall be current member of Architectural Woodwork Institute
- C. All doors to be provided by same manufacturer.
- D. All doors to be fabricated using Hot Press 5 Ply construction.

1.03 SUBMITTALS

- A. Submittal Procedures: See Section 01 33 00 Submittal Procedures for requirements for the mechanics and administration of the submittal process.
- B. Leadership in Energy and Environmental Design (LEED[®]) Documentation: Submit the following in accordance with Section 01 81 30 – Sustainability Requirements:
 - Certificates for MR 7: Chain-of-custody certificates certifying that flush wood doors comply with forest certification requirements. Include documentation that manufacturer is certified for chain of custody by an Forest Stewardship Council (FSC)-accredited certification body. Include statement indicating cost for each certified wood product.
 - 2. Product Data for IEQ 4.1: For adhesives and sealants used inside the weatherproofing system, documentation including printed statement of VOC content.
 - 3. Product Data for IEQ 4.4: For adhesives and composite wood products, documentation indicating cost for each certified wood product and documentation indicating urea formaldehyde content of each material.
 - 4. LEED Materials Tracking Form: Form to be provided in an electronic format to the Contractor to record LEED materials used on the project.
- C. Approval Submittals:
 - 1. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 - c. For fire-rated doors provide all associated fire test information.
 - d. Schedule of doors using same reference numbers as indicated on Drawings.
 - 1) Schedule shall include size, type, swing, rating, frame type and size, and hardware set required.
 - e. Available wood species.
 - 2. Samples:
 - a. Provide actual samples of plastic-laminate door faces and factory finished doors.

- b. After initial finish selection, provide 12 IN x 12 IN samples showing door construction in veneer and finish selected.
 - 1) Provide 12 IN by 12 IN samples of fire-rated door construction in any veneer type.
 - a) Samples are to show interior door construction including core, blocking and edge treatment.
- D. Quality Assurance Submittals: Certification of AWI membership.
- E. Closeout Submittals:
 - Extended Warranty: Provide two executed copies of the Extended Warranty required by this Section in accordance with the provisions of Section 01 78 00 – Closeout Procedures.

1.04 EXTENDED WARRANTY

- A. In accordance with the provisions of Section 01 78 00 Closeout Procedures, provide an Extended Warranty for the Work of this Section:
 - 1. Warranty period for Work of this Section is five (5) years commencing on the date of Substantial Completion.
 - a. Veneer delamination.
 - b. Bow or twist of 1/4 IN or more.
 - c. Telegraphing of any part of core through face veneer.
 - d. Surface variation exceeding 1/100 IN in 3 IN span.
 - e. Any other defect which may impair or affect performance of door for purpose for which it is intended.
- B. Warranty to include:
 - 1. Removal and replacement of defective door(s).
 - 2. Removal of existing hardware and refitting to new door.

1.05 DELIVERY STORAGE AND HANDLING

A. Store and protect doors in accordance with manufacturer's recommendations and WDMA.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Doors specified are based on products manufactured by Algoma Hardwoods, Inc.
- B. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. Flush wood door:
 - a. Algoma Hardwoods, Inc (www.algomahardwoods.com).

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- b. Eggers Industries (www.eggersindustries.com).
- c. Marshfield Door Systems (www.marshfielddoors.com).
- d. Vancouver Door Company (www.vancouverdoorco.com)VT Industries (www.vtindustries.com).
- e. Or approved equal.
- C. Submit request for substitution in accordance with Specification Section 01 60 00 Product Requirements.

2.02 MATERIALS

- A. Plastic Laminate Faces: High-pressure decorative laminates complying with NEMA LD 3, Grade HGS.
 - 1. Color: Wilson Art Asian Night.
- B. Core:
 - 1. Non-fire-rated doors:
 - a. Solid particle core PC-5, ANSI A208.1.
 - b. Grade: LD-2. Made with binder containing no urea-formaldehyde resin.
 - c. Density: 30-35 LBS/CF.
 - d. Provide solid wood reinforcing at all hardware locations and around all cut-outs.
 - 2. Fire-rated doors:
 - a. 20-minute rated:
 - 1) Solid particle core.
 - 2) Density: 30-32 LBS/CF.
 - b. Other fire ratings: Non-combustible mineral core UL listed.
 - c. Provide fire treated solid wood blocking at all hardware locations and around all cut-outs.
 - 1) Minimum 5 IN top rail and bottom rail.
 - d. Maximum transmitted temperature:
 - 1) 3 HR rated: 450 DegF at 30 minutes.
 - 2) 1-1/2 HR rated: 250 DegF at 30 minutes.
 - 3) 1 HR rated: 250 DegF at 30 minutes.
- C. Exposed Vertical Edges:
 - 1. Plastic laminate that matches faces, applied before faces.
- D. Adhesives: Type 1 water resistant glue.

- E. Accessories:
 - 1. Glass Vision Panels:
 - a. Size as indicated on Drawings.
 - b. Frame shall be factory cut and shipped with door.
 - c. See Section 08 81 00 for glass.
 - d. Comply with NFPA 80 requirements for fire-rated doors.

2.03 FABRICATION

- A. General:
 - 1. All doors shall be fabricated in accordance with and shall meet requirements of WDMA I.S. 1A Custom Grade standards.
 - 2. Hardware preparation:
 - a. Factory machine doors for application of hardware specified.
 - b. Bevel vertical edges 1/8 IN in 2 IN.
 - c. Clearance at bottom of door: 1/2 IN.
 - d. Clearance at top of door: 1/8 IN.
 - e. Tolerances:
 - 1) Width: +1/32 IN.
 - 2) Height: +1/16 IN.
 - 3) Thickness: +1/16 IN.
 - 4) Hardware location: +1/32 IN.
 - 5) Locks and hinges: +1/32 IN.
 - f. Fit fire rated doors to meet requirements of labeling agency.
 - g. Refer to Section 08 70 00 for hardware requirements and template provided by hardware manufacturer.
 - 3. Cut-outs:
 - a. Make all cut-outs in the factory.
 - b. Seal edges of all openings.
 - 4. All doors shall be 1 3/4 IN thick unless indicated otherwise.
- B. Low-Emitting Materials: Fabricate doors with adhesives and composite wood products that do not contain urea formaldehyde.
- C. Fire-Rated Doors:
 - 1. Provide doors with UL labels.
 - a. Doors to meet applicable requirements of UL 10C.
 - 2. Comply with NFPA 80 and NFPA 252.
- D. "Hot Press" bond hardwood veneer cross-banding to core using Type II glue.

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E. Identify doors for proper location.

2.04 SOURCE QUALITY CONTROL

A. Inspect finished door units at factory and repair damage in accordance with AWI.

PART 3 – EXECUTION

3.01 PREPARATION

- A. Correct defects or conditions which may interfere with or prevent a satisfactory installation.
- B. Condition doors to prevailing humidity for minimum 72 HRS prior to handling.

3.02 INSTALLATION

- A. Condition doors to prevailing climactic conditions for 72 HRS prior to installation.
- B. Install doors in hollow metal frames in accordance with manufacturer's instructions and WDMA I.S. 1A.
 - 1. See Section 08 11 00 Metal Doors and Frames and Borrowed Light Frames for door frames.
- C. Fit doors to frames and machine for hardware to whatever extent not previously worked at factory.
- D. Install fire-rated doors in accordance with NFPA 80.

3.03 FIELD QUALITY CONTROL

- A. Remove and replace defective units.
- B. Repair damage to finish in accordance with AWI recommendations.
- C. Remove and replace damaged doors that are not capable of being satisfactorily repaired.
 - 1. Project Representative to make final decision on acceptance of finish repair.

3.04 ADJUSTMENT

A. Prior to Project startup, make final adjustments to doors.

END OF SECTION

SECTION 08 31 16 ACCESS PANELS AND DOORS

PART 1 – GENERAL

1.01 SUMMARY

- A. Furnish all labor, materials, tools, equipment, and services for all Access Panels and Doors, as indicated, in accordance with provisions of Contract Documents.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Division 00 Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 01 General Requirements.
- C. Completely coordinate with work of other trades.
- D. Provide where indicated:
 - 1. Architectural: See Architectural Drawings.
 - 2. Mechanical: See Mechanical Drawings.

1.02 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. ASTM International (ASTM):
 - A653, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - b. A666, Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
- B. Fire Rated Construction:
 - 1. Provide in fire rated walls, floors and ceilings.
 - 2. UL listed.

1.03 DEFINITIONS

- A. Standard Duty: Will support live load of 150 psf.
- B. Heavy Duty: Will support live load of 300 psf.

1.04 SUBMITTALS

A. Submittal Procedures: See Section 01 33 00 – Submittal Procedures for requirements for the mechanics and administration of the submittal process.

- B. Leadership in Energy and Environmental Design (LEED[®]) Documentation: Submit the following in accordance with Section 01 81 30 – Sustainability Requirements:
 - 1. Product Data for MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content; include statement indicating costs for each product having recycled content.
 - 2. Product Data for MR 5: For products and materials required to comply with requirements for regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.
 - 3. Product Data for IEQ 4.1: For adhesives and sealants used inside the weatherproofing system, documentation including printed statement of VOC content.
 - 4. Product Data for IEQ 4.2: For paints and coatings used inside the weatherproofing system, documentation including printed statement of VOC content.
 - 5. LEED Materials Tracking Form: Form to be provided in an electronic format to the Contractor to record LEED materials used on the project.
- C. Approval Submittals:
 - 1. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
- D. Closeout Submittals:
 - 1. O&M Manual Content: Provide O&M manual documentation as required by Section 01 73 00 Operation and Maintenance Manuals.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. Milcor. (www.milcorinc.com).
 - 2. JL Industries. (www.activarcpg.com/jl-industries).
 - 3. Larsens Manufacturing Co. (www.larsensmfg.com).
 - 4. Or approved equal.
- B. All access doors shall be provided by the same manufacturer when possible.
- C. Submit request for substitution in accordance with Specification Section 01 60 00 Product Requirements.

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2.02 ACCESS DOORS PANELS AND FRAMES – GENERAL

- A. General:
 - 1. Size:
 - a. As required to allow access, inspection, service, and removal of items served.
 - b. Minimum 18 x 18 IN.
 - 2. Non-fire rated:
 - a. Door panels: Minimum 14 GA steel.
 - b. Frame: Minimum 16 GA steel.
 - 3. Fire rated construction:
 - a. Provide in fire rated walls, floors and ceilings.
 - b. UL listed.
 - c. Minimum 20 GA steel door, factory primed.
 - d. Sandwich type door filled with insulation.
 - e. 1-1/2 HR (B) fire rating.
 - f. Automatic door closing system.
 - 4. Latching Mechanism:
 - a. Cylinder-operated steel cam lock with 2 keys; all units keyed alike.
 - 1) Exception: Standard screwdriver slotted cam locks may be used at units that are installed 90 IN or higher above floor or walking surface when measured to the centerline of latching mechanism.
 - 5. Finish:
 - a. Factory-primed.
 - b. Paint in field: See Section 09 91 00.
 - 6. Hinges: Stainless steel, concealed; opens to 175 degrees.
 - 7. Anchors: Manufacturer's standard stainless steel or zinc plated.
 - 8. Provide flush, screwdriver-operated locks with metal cam.
 - 9. Access doors, panels, and frames in ductwork: See additional requirements in Section 23 31 00.
 - 10. Use of lighting fixtures for access in lieu of access panels is not acceptable.

2.03 ACCESS DOOR TYPES

A. Style and type as required for wall or ceiling materials in which installed.

- B. Flush Access Doors installed in gypsum wallboard walls and ceilings:
 - 1. Provide units with galvanized wallboard taping flange to be embedded in wallboard construction.
 - a. Units to have a trimless final appearance when installation is complete.

2.04 ACCESSORIES

- A. Load Rating Plates:
 - 1. Minimum 18 GA Type 316 stainless steel, ASTM A666.
 - 2. Engraved with maximum design live load allowed for unit on which it will be mounted.
 - 3. Load shall be displayed in English units as well as metric units.
 - 4. Size as required for text as needed.
 - 5. Text:
 - a. Font: Helvetica Narrow, all caps.
 - b. Size: 1/4 IN height.
 - c. Depth of engraving: 3 mils.
 - 6. Finish:
 - a. Text:
 - 1) Black epoxy baked on paint.
 - 2) Plate to have finish conductive to paint application.
 - b. Entire plate shall be coated with baked on clear coat on front and back side.
 - 7. Attach to top of all floor, vault, sidewalk, odor resistant, fire rated, H-20 loading and floodtight access doors using stainless steel screws in location determined by manufacturer.
 - a. Provide a neoprene gasket under the plate to separate the stainless steel from the aluminum cover or frame.

2.05 FABRICATION

- A. General:
 - 1. Provide access door and frame assemblies manufactured as integral units ready for installation.
 - 2. Sizes: Minimum 18 IN by 18 IN at ceilings, and 12 IN x 12 IN at other locations, unless larger size is required for access to device.
- B. Metal Surfaces:
 - 1. For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes.
 - 2. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.

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- C. Doors and Frames:
 - 1. Grind exposed welds smooth and flush with adjacent surfaces.
 - 2. Furnish attachment devices and fasteners of type required to secure access panels to types of supports indicated.
- D. Latching Mechanisms:
 - 1. Furnish number required to hold doors in flush, smooth plane when closed.
- E. Extruded Aluminum: After fabrication, apply manufacturer's standard protective coating on aluminum that will come in contact with concrete.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Comply with manufacturer's written instructions for installing access doors and frames.
- B. Set frames accurately in position and attach securely to supports with plane of face panels aligned with adjacent finish surfaces.
- C. Install doors flush with adjacent finish surfaces or recessed to receive finish material.

3.02 ADJUSTING AND CLEANING

- A. Adjust doors and hardware after installation for proper operation.
- B. Remove and replace doors and frames that are warped, bowed, or otherwise damaged.

END OF SECTION
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SECTION 08 33 23 STEEL ROLLING OVERHEAD DOORS

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Steel rolling overhead doors.
 - a. Motor operated.
- B. Related Sections include but are not necessarily limited to:
 - 1. Division 00 Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 01 General Requirements.
 - 3. Section 40 05 05 Equipment: Basic Requirements.
 - 4. Division 26 Electrical.

1.02 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. ASTM International (ASTM):
 - a. A123, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - A653, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - c. E283, Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
 - 2. National Electrical Manufacturers Association (NEMA):
 - a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
- B. Qualifications:
 - 1. Installer to be licensed or approved in writing by door manufacturer.

1.03 DEFINITIONS

- A. Installer or Applicator:
 - 1. Installer or applicator is the person actually installing or applying the product in the field at the Project site.
 - 2. Installer and applicator are synonymous.

1.04 SUBMITTALS

- A. Submittal Procedures: See Section 01 33 00 Submittal Procedures for requirements for the mechanics and administration of the submittal process.
- B. Leadership in Energy and Environmental Design (LEED[®]) Documentation: Submit the following in accordance with Section 01 81 30 – Sustainability Requirements:
 - 1. Product Data for MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content; include statement indicating costs for each product having recycled content.
 - 2. Product Data for MR 5: For products and materials required to comply with requirements for regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.
 - 3. Product Data for IEQ 4.1: For adhesives and sealants used inside the weatherproofing system, documentation including printed statement of VOC content.
 - 4. LEED Materials Tracking Form: Form to be provided in an electronic format to the Contractor to record LEED materials used on the project.
- C. Approval Submittals:
 - 1. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 - 2. Schedule of doors using same reference number for openings as indicated on Drawings.
 - 3. Motor operator and accessories technical data including complete wiring and control diagrams.
 - 4. Samples:
 - a. Actual metal color samples painted in color chosen by Project Representative.
- D. Quality Assurance Submittals:
 - 1. Certifications:
 - a. Certification of installer qualifications.
- E. Closeout Submittals:
 - Operation & Maintenance (O&M) Manual Content: Provide O&M manual documentation as required by Section 01 73 00 – Operation and Maintenance Manuals.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. Steel rolling overhead doors:
 - a. The Cookson Company (www.cooksondoor.com).
 - b. Cornell Iron Works (www.cornelliron.com).
 - c. Overhead Door Corp (www.overheaddoor.com).
 - d. Raynor (<u>www.raynor.com</u>).
 - e. Or approved equal.
- B. Submit request for substitution in accordance with Specification Section 01 60 00 – Product Requirements.

2.02 MATERIALS

- A. Door Curtain and Hood: Galvanized steel, ASTM A653, G-60.
- B. Weatherproofing: Neoprene or vinyl.
- C. Guides, Head Plates and Pipe Barrel: Galvanized steel, ASTM A123.
- D. Fasteners: Same material as door construction.

2.03 ACCESSORIES

- A. Motor Operator:
 - 1. Minimum 1/2 HP, 460/3/60.
 - a. Motor shall be sized by door manufacturer for door size indicated on Drawings.
 - b. Provide complete wiring connections to motor operator including all intermediate junction boxes, conduit, disconnects, wiring and low voltage wiring.
 - 2. Opening and closing rate: Between 2/3 FPS and 1 FPS.
 - 3. Standard oil tight three (3) pushbutton control(s).
 - a. NEMA 4X.
 - 4. Electric interlock with locking device.
 - 5. See Section 40 05 05 Equipment: Basic Requirements for additional motor requirements.
 - Provide manufacturer's standard reversing controller with motor thermal protection if motor is not internally protected as specified in Section 40 05 05 – Equipment: Basic Requirements.
 - 7. Provide for safety reversing edges and/or photocell safety reverse system.

2.04 FABRICATION

- A. Door Curtain:
 - 1. Non-insulated flat profile:
 - a. 2-5/8 IN high.
 - b. Minimum 22 GA.
 - c. Galvanized steel endlocks.
 - 2. Weather stripping:
 - a. Guide sealing adjustable weatherstripping at jambs and lintel (exterior doors only).
 - 3. Finish: Factory prime and finish coats.
 - a. Prime coat: Minimum 0.2 mil baked-on prime paint.
 - b. Finish coat: Minimum 0.6 mil baked-on polyester powder coat.
 - c. Color: Dunn Edwards Charcoal Smudge.
- B. Hood:
 - 1. Rated for Exterior Installation.
 - 2. Minimum 24 GA.
 - 3. Provide full length air baffle weatherstripping at all exterior doors.
 - 4. Finish: Match door curtain.
- C. Guides:
 - 1. Mounting:
 - a. Interior face of wall.
 - 2. Manufacturer's standard angle guide system for size of door specified.
 - a. Rolled guides are not acceptable.
 - b. Furnish wind locks.
 - 3. Finish: Galvanized steel.
- D. Head Plates:
 - 1. Galvanized steel plate mounted to guides.
 - 2. Sized to support counter balance assembly, curtain, motor operator and hood.
 - 3. Finish: Galvanized.
- E. Counterbalance Assembly:
 - 1. Pipe barrel:
 - a. Stainless steel pipe shaft.
 - b. Maximum deflection: 0.03 IN/FT.

- 2. Torsion springs:
 - a. Oil-tempered helical torsion springs on cast anchors.
 - b. 100,000 cycle.
- 3. Adjustable tension wheel.
- F. Trim Pieces: Material and finish to match curtain.
- G. Wind Load: 20 psf minimum.
- H. Operation: Motor operated with chain operator backup.
- I. Locking: Slide bolts..

2.05 SOURCE QUALITY CONTROL

A. Air Infiltration: 1.98 CFM/SF of door when tested on a 10 FT x 10 FT door in accordance with ASTM E283 with 25 mph wind load.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Installation shall be done by manufacturer's authorized representative.
- C. Provide all required trim, weatherstripping, closures etc., for complete weather tight installation.
- D. Adjust for proper counter balance.
- E. Seal along bottom of vertical track (guides), seal the vertical joint between the two (2) separate track angles (if not filled by welding) and seal all holes in vertical track (not being used for fasteners) to provide a completely weather tight track and door system.
 - 1. At fastener locations provide steel washers under bolt head to completely cover the slotted holes in the vertical track.
 - a. Finish of steel washer shall match finish of track (guides).
- F. Electrical disconnect and conduit and wiring from standard three (3) pushbutton control to motor operator is to be provided by Division 26.
- G. Provide bracing for motor operator to eliminate vibration.

3.02 ADJUSTMENT

A. Prior to occupancy, adjust door for smooth operation.

END OF SECTION

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SECTION 08 34 20 ROLLING STEEL HANGAR DOORS

PART 1 – GENERAL

1.01 DESCRIPTION

- A. Perform work required to complete the Hangar Doors indicated by the Contract Documents including supplementary items and accessories necessary for complete installation.
- B. All of the Contract Documents, including General and Supplementary Conditions and Division 1, General Requirements, apply to the work of this Section.

1.02 RELATED SECTIONS

- A. Other Specification Sections, which directly relate to the work of this Section include, but are not necessarily limited to, the following:
 - 1. Division 05 Metals.
 - 2. Section 09 91 00 Painting and Protective Coatings.
 - 3. Division 26 Electrical.

1.03 SUBMITTALS

- A. Submittal Procedures: See Section 01 33 00 Submittal Procedures for requirements for the mechanics and administration of the submittal process.
- B. Leadership in Energy and Environmental Design (LEED[®]) Documentation: Submit the following in accordance with Section 01 81 30 – Sustainability Requirements:
 - Product Data for MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content; include statement indicating costs for each product having recycled content.
 - 2. Product Data for IEQ 4.1: For adhesives and sealants used inside the weatherproofing system, documentation including printed statement of VOC content.
 - 3. Product Data for IEQ 4.2: For paintings and coatings used inside the weatherproofing system, documentation including printed statement of VOC content.
 - 4. LEED Materials Tracking Form: Form to be provided in an electronic format to the Contractor to record LEED materials used on the project.
- C. Approval Submittals:
 - 1. Product Data: Submit manufacturer's product data and installation instructions. Include both published data and any specific data prepared for this Project.

- 2. Shop Drawings: Submit Shop Drawings for approval prior to fabrication. Include detailed plans, elevations, details of framing members, required clearances, anchors and accessories. Include relationship with adjacent materials. Include Wind Load calculations. The make and type of door, operators and controls shall be clearly shown. Door weight, method of suspension, operation and all fastenings shall be indicated. Doors shall be marked on Shop Drawings to agree with numbering on Architectural Drawings.
- 3. Provide setting Drawings, templates and directions for installation of anchorage devices.
- D. Closeout Submittals:
 - Operation & Maintenance (O&M) Manual Content: Provide O&M manual documentation as required by Section 01 73 00 – Operation and Maintenance Manuals.
 - a. Operating Instructions: Submit a copy (for each door) of manufacturer's operating instructions and maintenance data/manual.
 - 2. Warning Labels: Furnish warning labels for any potentially hazardous locations related to the operation of the door.

1.04 QUALITY ASSURANCE

- A. Manufacturer: Bottom Rolling Steel Hangar Doors shall be manufactured by a firm with a minimum of ten years documented experience in the fabrication and installation of the types of doors specified herein.
- B. Installer: An experienced or authorized representative of the manufacturer shall perform installation of bottom rolling steel hangar doors.
- C. Single-Source Responsibility: Provide each hangar door as a complete unit designed and produced by a single manufacturer, including frames, sections bracket guides, tracks and all parts required to complete assembly.
- D. Design Criteria:
 - 1. Shall withstand dead load, seismic forces and design loads due to pressure and suction of wind calculated in accordance with applicable sections of the Building Code.
 - 2. Wind Loading: Design and reinforce to withstand wind loading pressure as required by codes and as indicated on Structural Drawings, plus the dead load of the door.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials and products in manufacturer's labeled protective packages. Store and handle in strict compliance with manufacturer's instructions and recommendations. Protect from damage from weather, excessive temperatures and construction operations.
- B. Furnish inserts and anchoring devices that must be set in concrete or built into the building structure for unit installation. Coordinate delivery of these devices with other work to avoid delay.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURER

- A. Products of the following manufacturer are acceptable, provided they comply with the Contract Documents.
 - 1. Wilson Doors, Inc.
 - 2. Or approved equal.

2.02 MATERIALS

- A. General:
 - 1. Door where shown on Drawings shall be automatic power drive bottom rolling slide door.
- B. Construction:
 - Door outer frame shall be constructed of structural steel channel no substitution with cold-formed steel members. Structural steel members shall conform to ASTM A36. Steel tubing members shall conform to ASTM A500 and ASTM A513.
 - 2. Door frame shall bolt together with GR-5 fasteners (zinc coated).
 - 3. Bottom rollers shall be solid steel (12 IN minimum diameter) with tapered roller bearings and a greasable axle assembly. Bottom rollers will be removable for purposes of repair, without disturbing any other door components except the drive rollers.
 - Doors equipped with fixed position top roller brackets, these roller brackets will have approximately 8 IN of vertical travel: 4-1/2 IN up and 3-1/2 IN down.
 - 5. Fixed top roller bracket will keep the door panels attached to upper guide beams in the event of derailment from bottom tracks.
 - 6. Weather-stripping: Brush seals and two ply fiber reinforced neoprene rubber shall be provided to seal the bottom; two ply fiber reinforced neoprene rubber at the top of the slide door panels. Foam seal to be provided for side seals.
- C. Dimensions: Dimensions shall be as shown on the Drawings.
- D. Operation (for an electrically operated slide door system):
 - 1. Electrically power slide door systems shall be opened and closed by means of power driven bottom roller or rollers with manual release clutches for manual operation in the event of power failure.
 - The Standard slide door shall have a control box with a minimum of three (3) buttons marked as followed:
 - a. OPEN "open button."
 - b. STOP "stop button."
 - c. CLOSE "close button."
 - 3. Door opening and closing rate shall be approximately 40 FT per minute.

- 4. Electrically operated slide door system shall permit the door to be stopped and positively locked in position at any degree of door opening.
- 5. Slide Door shall be equipped with limit switches that automatically stop door operation at the full-opened and full-closed positions.
- 6. Door shall be fully automatic and fully controlled through the control box that is standard mounted to the lead edge of the drive panel.
- 7. Motors are controlled by an AC drive system only; no substitutions.
- E. Design:
 - 1. Door shall be designed for wind load in accordance with the controlling local building code.
 - 2. Door shall be designed so horizontal and vertical deflections of the door structural members shall not exceed L/180 under full design wind load when the door is in the closed position.
 - 3. Door shall be designed so deflection of any horizontal or vertical door member shall not exceed 2.5 IN under full design wind load.
- F. Cleaning and Painting:
 - 1. Steel door frame and miscellaneous steel parts are factory cleaned to remove all loose dirt, grease, and mill scale, then spray painted with one coat of primer paint.
- G. Color:
 - Dunn Edwards Charcoal Smudge or as selected by Project Representative. Refer to Section 09 91 00 – Painting and Protective Coatings, system #7 for more finish coat information.
- H. Electrical:
 - 1. Motor controller enclosure, motor push button control station and all electrical components shall be installed in accordance with the National Electrical Code 513.
- I. Installation:
 - 1. Door shall be installed in strict accordance with the manufacturer's installation Drawings and instructions.
 - 2. Door covering and insulation provided by others shall conform to the following restrictions:
 - a. Exterior cover panels shall not be heavier than 26 GA galvanized steel or 0.032 IN thick aluminum.
 - b. Interior door cover panels (when required) shall be 29 GA galvanized steel ribbed panels.
 - c. Door shall be designed for panels to run vertically.
 - d. Door frame shall be field drilled for tapping screws or self-drilling screws may be used.
 - e. Panel corrugations at the top and bottom of door shall be sealed with corrugation closures.
 - f. Insulation shall be fiberglass blanket type.

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- 3. Door Opening Framing:
 - a. Door opening framing structures shall be supplied by the contractor and shall be designed to properly support and withstand loads imposed by the door and wind loads.
 - b. See Paragraph 2.2 D.5. above.

PART 3 – EXECUTION

3.01 PREPARATION

- A. Coordinate requirements of insert and anchorage device installation with concrete Contractor and building structural frame Contractor.
- B. Take field dimensions and examine conditions of substrates, supports and other conditions under which this work is to be performed. Do not proceed with work until unsatisfactory conditions are corrected.

3.02 INSTALLATION

- A. Strictly comply with the manufacturer's installation instructions and recommendations. Coordinate installation with adjacent work to ensure proper clearances and allow for maintenance.
- B. Instruct Project Representative's personnel in the proper operating procedures and maintenance schedule.

3.03 ADJUSTING AND CLEARING

- A. Test doors for proper operation and adjust as necessary to provide proper operation without binding or distortion.
- B. Touch-up damaged coatings and finishes and repair minor damage. Clean the exposed surface using non-abrasive materials and methods recommended by manufacturer of material or product being cleaned.

END OF SECTION

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SECTION 08 41 10 STOREFRONT

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Thermally broken storefront.
 - 2. Exterior manual-swing entrance doors and door frame units.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Division 00 Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 01 General Requirements.
 - 3. Section 07 92 00 Joint Sealants.
 - 4. Section 08 81 00 Glass and Glazing.
 - 5. Section 09 91 00 Painting and Protective Coatings.

1.02 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. Aluminum Association (AA):
 - a. DAF 45, Designation System for Aluminum Finishes.
 - 2. American Architectural Manufacturers Association (AAMA):
 - a. 1503, Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections.
 - 3. American Society of Civil Engineers (ASCE):
 - a. 7, Minimum Design Loads for Buildings and Other Structures.
 - 4. ASTM International (ASTM):
 - a. A36, Standard Specification for Carbon Structural Steel.
 - A653, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - c. B221, Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
 - d. C1363, Standard Test Method for the Thermal Performance of Building Assemblies by Means of a Hot Box Apparatus.
 - e. E283, Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.

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- f. E330, Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights, and Curtain Walls by Uniform Static Air Pressure Difference.
- g. E331, Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.
- 5. American Welding Society (AWS):
 - a. D1.2, Structural Welding Code Aluminum.
- B. Qualifications:
 - 1. Qualify welders and welding process in accordance with AWS D1.2.

1.03 DEFINITIONS

- A. Installer or Applicator:
 - 1. Installer or applicator is the person actually installing or applying the product in the field at the Project site.
 - 2. Installer and applicator are synonymous.
- B. All Weather: Capable of operation from -50 to +120 DegF.

1.04 SUBMITTALS

- A. Submittal Procedures: See Section 01 33 00 Submittal Procedures for requirements for the mechanics and administration of the submittal process.
- B. Leadership in Energy and Environmental Design (LEED[®]) Documentation: Submit the following in accordance with Section 01 81 30 – Sustainability Requirements:
 - Product Data for MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content; include statement indicating costs for each product having recycled content.
 - 2. Product Data for MR 5: For products and materials required to comply with requirements for regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.
 - 3. Product Data for IEQ 4.1: For adhesives and sealants used inside the weatherproofing system, documentation including printed statement of VOC content.
 - 4. LEED Materials Tracking Form: Form to be provided in an electronic format to the Contractor to record LEED materials used on the project.

- C. Approval Submittals:
 - 1. Product technical data for framing system and major accessories specific to this Project:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 - 2. Shop Drawings:
 - a. Computer generated elevation Drawings indicating all frame and door dimensions and details specific to this Project.
 - 3. Test reports.
 - 4. Samples:
 - a. Metal samples showing range of anodizing finish specified for Project Representative's approval.
 - b. After approval of color samples, provide 2 IN x 3 IN samples of color and finish approved.
- D. Closeout Submittals:
 - Extended Warranty: Provide two executed copies of the Extended Warranty required by this Section in accordance with the provisions of Section 01 78 00 – Closeout Procedures.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Store units in vertical position off ground with wood spacers between each unit.
 - 1. Store in accordance with manufacturer's instructions.

1.06 EXTENDED WARRANTY

- A. In accordance with the provisions of Section 01 78 00 Closeout Procedures, provide an Extended Warranty for the Work of this Section:
 - 1. Warranty period for Work of this Section is five (5) years commencing on the date of Substantial Completion.
 - a. Storefront system shall be warranted free from defects in materials, installation, workmanship, water tightness of assembly, calking, glazing, or any other defects which affects its ability to perform as weathertight envelope.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. Storefront system:
 - a. Kawneer Co., Inc (www.kawneer.com).

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- b. United States Aluminum (www.usalum.com).
- c. Oldcastle Building Envelope (www.oldcastle.com).
- d. YKK-AP America (<u>www.ykkap.com</u>).
- e. Arcadia (www.arcadiainc.com).
- f. Or approved equal.
- B. Submit request for substitution in accordance with Specification Section 01 60 00 – Product Requirements.

2.02 MATERIALS

- A. Storefront: Aluminum, ASTM B221, 6063-T5.
- B. Thermal Barrier: Extruded copolymer.
- C. Fasteners: Stainless steel.
- D. Sealants: See Specification Section 07 92 00 Joint Sealants.
- E. Brackets, Anchors, Reinforcements: Aluminum or stainless steel.

2.03 ACCESSORIES

- A. Glass:
 - 1. ASCE 7.
 - 2. See Specification Section 08 81 00 Glass and Glazing.
- B. Flashing:
 - 1. Minimum 0.040 IN aluminum.
 - 2. Finish to match storefront if exposed.
 - 3. Mill finish if concealed.
- C. Sealant: See Specification Section 07 92 00 Joint Sealants and manufacturer's recommendations.
- D. Fasteners:
 - 1. Structural fasteners anchoring framing to building structure: Stainless steel.
 - 2. Exposed fasteners attaching system framing or components to other system framing or components.
 - a. Aluminum: Finish to match finish of system.
 - 3. Provide Phillips head screws where exposed.

2.04 FABRICATION

- A. General:
 - 1. Fully degrease and clean members prior to assembly or application of protective coatings.

- 2. Weld using methods recommended by manufacturer and AWS to avoid discoloration.
- 3. Grind exposed welds smooth and restore finish.
- 4. Ease corners of cut edges to a radius of approximately 1/64 IN.
- 5. Conceal fasteners wherever possible.
- 6. Fit and assemble work at shop to maximum extent possible.
- 7. Maintain true continuity of line and accurate relation of planes and angles.
- 8. Provide secure attachment and support at mechanical joint, with hairline fit of contacting members.
- 9. Reinforce work as necessary to withstand wind loadings and to support system.
- 10. Separate dissimilar metal with bituminous paint or preformed separators to prevent corrosion.
- 11. Separate metal surfaces at moving joints with plastic inserts or other nonabrasive concealed inserts to permanently prevent freeze-up of joint.
- 12. Frames to be structurally reinforced as required by frame manufacturer.
 - a. Reinforcement:
 - 1) Structural steel, ASTM A36, hot-dip galvanized after fabrication, ASTM A653, G90.
 - Provide dissimilar metals protection; see Specification Section 09 91 00 – Paintings and Protective Coatings.
 - 3) All structural reinforcement sizes shall be determined by the frame manufacturer.
- 13. Minimum wall thickness of 0.07 IN for all frame components.
- B. Storefront:
 - 1. Nominal 1-3/4 IN x 4-1/2 IN minimum section with sightline maximum of 2 IN.
 - a. Depth of system as required for loading criteria indicated.
 - b. Depth of system may be different between thermally broken and nonthermally broken frames but is to be consistent on entire Project for each of the individual systems.
 - 2. Complete extruded aluminum framing system:
 - a. Thermally broken system:
 - 1) Kawneer VG451T or approved Manufacturers system as listed in Section 2.01.
 - 2) Provide thermally broken system on all openings in the building exterior wall and where specified on the interior for borrowed light systems.
 - 3. Include all sills, mullions, anchors, division bars, and flashing.

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- 4. Use no through metal connectors in thermally broken systems.
- 5. Fabricate thermally broken system to accept 1 IN insulating glass and non-thermally broken system to accept 1/4 IN glass.
- 6. Provide complete system under single responsibility.
- C. Sealants:
 - 1. Refer to Specification Section 07 92 00 Joint Sealants.
 - 2. Provide sealant color to match finish of system at exposed locations.
 - 3. Provide sealants compatible with aluminum system and recommended for use with this type of installation.
- D. Finishes:
 - 1. Architectural Class 1 coating per AA DAF 45.
 - a. Anodized: Black.

2.05 SOURCE QUALITY CONTROL

- A. General Test Requirements:
 - 1. Utilize independent testing laboratories specifically qualified to conduct all performance tests required.
 - 2. Performance tests may be conducted in manufacturer's laboratories provided they are witnessed and certified by qualified independent testing laboratory personnel.
 - 3. Provide certification that proposed system has been tested in accordance with and meets the requirements of the standards identified in this Specification Section.
 - 4. Test air infiltration first, water resistance second.
 - a. Other tests may be in any order.
- B. Air Infiltration Tests (Storefront Framing):
 - 1. Test in accordance with ASTM E283.
 - 2. Air infiltration: 0.06 cfm/SF of wall area when tested at a static air pressure differential of 6.24 psf.
- C. Water Resistance Test:
 - 1. Test in accordance with ASTM E331.
 - 2. No leakage allowed at a minimum static air pressure differential of 8 psf.
- D. Uniform Load Test:
 - 1. Uniform load:
 - a. A static air design load of 20 psf shall be applied in the positive and negative direction in accordance with ASTM E330.
 - b. There shall be no deflection in excess of L/240 of the span of any framing member.

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- c. At a structural test load equal to 1.5 times the specified design load, no glass breakage shall occur and no permanent set in the framing members in excess of 0.2 percent of their clear spans shall occur.
- E. Thermal Tests:
 - 1. Perform all thermal tests on unit sized as required to produce representative areas of framing, vision glass, and spandrel glass.
 - 2. Provide test unit which reflects most restrictive situation on project (e.g., worst framing, glass, spandrel proportions for producing desired thermal results).
 - 3. Test in accordance with AAMA 1503.
 - 4. Thermal transmittance of insulated glass and framing areas: Average U-value of 0.65 BTUH/SF/DegF, maximum.
 - 5. Condensation resistance test:
 - a. Determine in accordance with ASTM C1363 and AAMA 1503.
 - b. Provide condensation resistance factor (CRF) not less than 50.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Verify suitability of substrate to accept installation.1. Correct defects.
- B. Install products in accordance with manufacturer's instructions.
- C. Set units plumb, level and true to line.
- D. Anchor securely in place.
- E. Separate metal surfaces from sources of corrosion or electrolytic action.
- F. Set sill and base members in a bed of sealant.
- G. Provide joint fillers or gaskets for weathertight construction.
- H. Calk all joints within and at perimeter of system.1. Do not calk joints intended to allow the framing system to drain.
- I. Install flashing where shown on Drawings and/or where required.

3.02 CLEANING

A. Clean all excess sealant, compounds, metal shavings, dirt, fingerprints, and any other foreign material from frame surface promptly after installation.

END OF SECTION

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SECTION 08 44 13 CURTAINWALL SYSTEM (THERMALLY BROKEN)

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Curtainwall system.
 - a. Thermally broken.
 - b. Includes perimeter trims, stools, accessories, shims and anchors and perimeter seating of curtain wall units.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Division 00 Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 01 General Requirements.
 - 3. Section 07 92 00 Joint Sealants.
 - 4. Section 08 81 00 Glass and Glazing.

1.02 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. Aluminum Association (AA):
 - a. DAF 45, Designation System for Aluminum Finishes.
 - 2. American Architectural Manufacturers Association (AAMA):
 - a. 1503, Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors, and Glazed Wall Sections.
 - 3. ASTM International (ASTM):
 - a. B221, Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
 - b. C1363, Standard Test Method for the Thermal Performance of Building Assemblies by Means of a Hot Box Apparatus.
 - c. E283, Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
 - d. E330, Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
 - e. E331, Standard Test Method for Water Penetration of Exterior Windows, Doors, Skylights, and Curtain Walls by Uniform Static Air Pressure Difference.

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- 4. American Welding Society (AWS):
 - a. D1.2, Structural Welding Code Aluminum.
- 5. Building Code:
 - a. International Code Council (ICC):
 - International Building Code and associated standards, 2009 Edition including all amendments, referred to herein as Building Code.
- B. Qualifications:
 - 1. Curtainwall system:
 - a. Curtainwall manufacturer shall have minimum of 10 years experience in the design and production of curtainwall systems similar to system specified.
 - 1) All structural components of the system shall be designed and sealed by a registered professional structural engineer licensed in the State of Washington.
 - b. Installing contractor shall be licensed or approved in writing by the curtainwall manufacturer.
 - c. Installing contractor shall have a minimum of five (5) years experience installing systems similar to system specified.
 - d. Installing contractor and installers shall have successfully completed two (2) projects of similar size, scope and complexity within the past year.
 - 2. Qualify welders and welding process in accordance with AWS D1.2.
 - 3. Independent laboratory shall have minimum 10 years experience in performing tests specified.
 - a. All testing shall be done by personnel having minimum five (5) years experience in performing tests specified.

1.03 SYSTEM DESCRIPTION

A. System shall be designed for 20 psf inward wind pressure and 25 psf outward pressure normal to the plane of the wall.

1.04 DEFINITIONS

- A. Installer or Applicator:
 - 1. Installer or applicator is the person actually installing or applying the product in the field at the Project site.
 - 2. Installer and applicator are synonymous.
- B. All weather: Capable of operation from -50 to +120 DegF.

1.05 **SUBMITTALS**

- A. Submittal Procedures: See Section 01 33 00 Submittal Procedures for requirements for the mechanics and administration of the submittal process.
- B. Approval Submittals:
 - 1. Shop Drawings:
 - a. Manufacturer prepared computer generated drawings showing movement type joints, anchorage, flashing, jointing and all other accessories required, and any special detailing required by the system.
 - b. Provide complete erection plan for each building having curtainwall.
 - 1) Show:
 - a) References to all details and sections.
 - b) All expansion joints.
 - c) Size of all glazing panels and steel reinforcements.
 - d) All glass thicknesses.
 - e) Finish.
 - f) All unusual framing conditions that will require frame sightlines in excess of sightlines specified or detailed.
 - Minimum plan scale: 1/8 IN = 8 FT.
 - 3) Minimum detail scale: 1-1/2 IN = 1 FT.
 - c. Provide distinction, properly identified, between factory fabricated/assembled components and field fabricated/assembled components.
 - 2. Product technical data for framing system and major accessories including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 - c. Technical data sheets on each hardware item and all system components.
 - d. Elevation Drawings indicating all frame and door dimensions and details.
 - 3. Structural Engineer's sealed and signed calculations certifying that the system structural components meet the requirements for lateral, and all other, loads required by the Building Code.
 - 4. Samples:
 - a. General: Tag, identify and provide statement regarding use for all fasteners, anchor clips, closures and sealants.

b. Metal samples showing range of color of anodized finishes.

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- c. After initial color selection, provide 2 IN x 3 IN aluminum samples of each color and finish specified.
- C. Quality Assurance Submittals:
 - 1. Qualifications:
 - a. Manufacturer:
 - 1) Certification of design and production experience.
 - 2) Certification of and experience qualifications of structural engineer.
 - b. Installing Contractor:
 - 1) Certification of approval or license to install product from manufacturer.
 - 2) Certificate of experience.
 - 3) Listing of projects completed in past five (5) years.
 - a) Completed projects information to include square footage of curtainwall installed, cost of curtainwall, manufacturer and system, and contact name and telephone number.
 - 2. Installers:
 - a. Provide qualifications for all personnel expected to be working on this Project.
 - b. Provide qualifications when someone new is brought onto Project after Project start.
 - 3. Test results:
 - a. ASTM E283 test results for air infiltration.
 - b. ASTM E331 test results for water resistance.
 - c. ASTM E330 test results for uniform load structural test.
 - d. AAMA 1503 test results for thermal tests.
 - e. ASTM C1363 and AAMA 1503 test results for condensation resistance factor.
- D. Closeout Submittals:
 - Extended Warranty: Provide two executed copies of the Extended Warranty required by this Section in accordance with the provisions of Section 01 78 00 – Closeout Procedures.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store units in vertical position off ground with wood spacers between each unit.
 - 1. Store in accordance with manufacturer's recommendations.

1.07 EXTENDED WARRANTY

- A. In accordance with the provisions of Section 01 78 00 Closeout Procedures, provide an Extended Warranty for the Work of this Section:
 - 1. Warranty period for Work of this Section is five (5) years commencing on the date of Substantial Completion.
 - a. Repair or replace any items of work under this Section which fail.
 - Failure includes but is not necessarily limited to defects in material or workmanship, watertightness of assembly, calking, glazing, blemishes in finish including cracking, peeling or flaking of finish color integrity or any other defects which affect the systems ability to perform as weathertight envelope.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. Curtainwall system:
 - a. Kawneer Co., Inc (www.kawneer.com).
 - b. United States Aluminum (www.usalum.com).
 - c. Oldcastle Building Envelope (www.oldcastle.com).
 - d. YKK-AP America (www.ykkap.com).
 - e. Wausau Windows and Wall Systems (<u>www.wausauwindow.com</u>).
 - f. Or approved equal.
- B. Submit request for substitution in accordance with Specification Section 01 60 00 Product Requirements.

2.02 MATERIALS

- A. Aluminum: ASTM B221, 6063-T5 alloy.
- B. Fasteners: Stainless steel.
- C. Structural Thermal Barrier: Extruded copolymer.
- D. Sealants: See Specification Section 07 92 00 Joint Sealants.
- E. Brackets, Anchors and Reinforcements: Stainless steel.

2.03 ACCESSORIES

- A. Glass: See Specification Section 08 81 00 Glass and Glazing.
- B. Flashings:
 - 1. Minimum 0.040 IN aluminum.
 - 2. Finish to match aluminum frame color if exposed.

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- 3. Mill finish if concealed.
- C. Fasteners:
 - 1. Finish exposed fasteners to match finish of system.
 - 2. Provide Phillips flat head screws where exposed.
- D. Sealants: See Specification Section 07 92 00 Joint Sealants and manufacturer's recommendations.

2.04 FABRICATION

- A. General:
 - 1. Fully degrease and clean members prior to assembly or application of sealing compound or protective coatings.
 - 2. Weld using methods recommended by manufacturer and AWS to avoid discoloration.
 - 3. Grind exposed welds smooth and restore finish.
 - 4. Ease corners of cut edges to a radius of approximately 1/64 IN.
 - 5. Conceal fasteners wherever possible.
 - 6. Fit and assemble work at shop to maximum extent possible.
 - 7. Maintain true continuity of line and accurate relation of planes and angles.
 - 8. Provide secure attachment and support at mechanical joints, with hairline fit of contacting members.
 - 9. Reinforce work as necessary to withstand wind loadings and to support system.
 - 10. Separate dissimilar metals with bituminous paint or preformed separators to prevent corrosion.
 - 11. Separate metal surfaces at moving joints with plastic inserts or other nonabrasive concealed inserts to permanently prevent freeze-up of joint.
 - 12. Prepare and reinforce frames for hardware.
 - a. Refer to Specification Section 08 70 00 Finish Hardware for hardware not specified in this Specification Section.
- B. Curtainwall System:
 - 1. Sight line: Minimum 2-1/2 IN and maximum of 3-1/2 IN.
 - 2. Depth of framing members to be determined by manufacturer.
 - 3. Complete extruded aluminum framing system and glazing including sills, mullions, division bars, anchors and accessories.
 - a. Provide insulating material to achieve thermal separation of interior and exterior components.
 - b. Use no through metal connectors.
 - 4. System to receive 1 IN insulating glass.

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- 5. Provide complete system under single responsibility.
- 6. Outside glazed pressure plate format aluminum curtain wall systems.
 - a. Frame depth: 7-1/2 IN and 10-1/2 IN with 1 IN Double Glazed Insulating Glass.
 - b. Tested to AAMA 501-05 and TAS 202.
- C. Finishes:
 - 1. Architectural Class 1 coating per AA DAF 45.
 - a. Anodized: AA-M12C22A4, AAMA 611, Architectural Class I Color Anodic Coating, Black.

2.05 SOURCE QUALITY CONTROL

- A. Testing Requirements:
 - 1. Utilize independent testing laboratories specifically qualified to conduct all performance test required.
 - 2. Performance tests may be conducted in manufacturer's laboratories provided they are witnessed and certified by qualified independent testing laboratory personnel.
 - 3. Perform all tests on "Test Unit":
 - a. Full sized unit for Project or a minimum two-story high, 6 FT wide unit mounted in test chamber in exact accordance with Project conditions including anchorage system, calking, sealing, etc.
 - b. Unit for test to be completely assembled glazed unit.
 - c. Thermal tests may be conducted on 4 FT x 6 FT unit.
 - 4. Test air infiltration first, water resistance second.
 - a. Other tests may be in any order.
- B. Energy Performance: Glazed aluminum curtain walls shall be tested in accordance with NFRC and AAMA Standards.
 - 1. Thermal Transmittance (U-factor):
 - a. Glass and framing areas shall have U-factor of no greater than 0.41 with 1 IN High Performance (HP) Glass as determined according to AAMA 507.
- C. Solar Heat Gain Coefficient: Glass and framing areas shall have a solar heat gain coefficient of no greater than 0.33 as determined according to NFRC 200.
- D. Air Infiltration Test (Curtainwall Framing):
 - 1. Test in accordance with ASTM E283.
 - 2. Air infiltration: 0.06 CFM/MIN/SF of wall area when tested at 6.24 psf pressure differential.

- E. Water Resistance Test:
 - 1. Test in accordance with ASTM E331.
 - 2. No uncontrolled leakage allowed at 15 psf pressure differential at a rate of 5 GAL/HR/SF.
- F. Uniform Load Structural Test:
 - 1. Subject unit to load equal to 150 percent of design wind load.
 - 2. Test in accordance with ASTM E330.
 - 3. No failure or permanent deformation of structural members allowed.
- G. Thermal Tests:
 - 1. Perform all thermal tests on unit sized as required to produce representative areas of framing, vision glass.
 - 2. Provide test unit which reflects most restrictive situation on Project (i.e., worst framing, glass, proportions for producing desired thermal results).
 - 3. Submit elevations indicating which areas were selected from Project along with calculations verifying that test areas are in fact proportional to area selected.
 - The glazed wall system shall be capable of withstanding expansion and contraction of components caused by ambient air temperature range from -10 to +120 DegF without buckling, stress on glass, edge seal failure, excess stress on curtainwall structure anchors and fasteners or reduction in performance.
 - a. Test in accordance with AAMA 1503.
 - 5. Thermal transmittance of insulated glass and framing areas: Average U-value of 0.65 BTUH/SF/DegF, maximum.
 - 6. Average calculated thermal transmittance of composite wall: U-value of 0.65 BTUH/SF/DegF, maximum, with substantiating test performed on similar units.
- H. Condensation Resistance Test:
 - 1. Determine in accordance with ASTM C1363 and AAMA 1503.
 - 2. Provide minimum CRF (Condensation Resistance Factor) of 50.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Verify suitability of substrate to accept installation.1. Correct defects.
- B. Install products in accordance with manufacturer's instructions.
- C. Set units plumb, level and true to line.
- D. Anchor securely in place.

- E. Separate metal surfaces from sources of corrosion of electrolitic action.
- F. Set sill and base members in a bed of sealant.
- G. Provide joint fillers or gaskets for weathertight construction.
- H. Calk all joints within and at perimeter of system.
- I. Install flashing where shown on Drawings and/or where required.

3.02 CLEANING

- A. Clean all surfaces promptly after installation.
- B. Exercise care to avoid damage to finish, surrounding structure, fastenings, etc., and to protective coating, if any.
- C. Remove excess glazing and sealant compounds and dirt and leave clean.
- D. Protect work and take other precautions required to ensure that work will be without damage at time of acceptance.

END OF SECTION

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SECTION 08 45 00 TRANSLUCENT PANEL SYSTEMS

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes: Translucent panel system.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Division 0 Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 01 General Requirements.
 - 3. Section 07 62 00 Flashing and Sheet Metal.
 - 4. Section 07 92 00 Joint Sealants.

1.02 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. Aluminum Association (AA):
 - a. 45, Designation System for Aluminum Finishes.
 - 2. ASTM International (ASTM):
 - a. C1363, Standard Test Method for Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus.
 - b. D635, Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position.
 - c. E84, Standard Test Method for Surface Burning Characteristics of Building Materials.
 - 3. Society of the Plastics Industry (SPI):
 - a. Shatter Resistance Test.
 - 4. FM Global (FM):
 - a. Install per FM Global Property Loss Prevention Data Sheet 1-57, Plastics in Construction.
 - 5. Building Code:
 - a. International Code Council (ICC):
 - International Building Code and associated standards, 2009 Edition as amended by the State of Washington, and the City of Bellevue Amendments, referred to herein as Building Code.
- B. Qualifications:
 - 1. Installer factory trained and approved in writing by system manufacturer.

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- 2. Installer shall have a minimum of five (5) years experience installing system similar to system specified.
- 3. Panel system shall be designed by Professional Structural Engineer licensed in the State of Washington.

1.03 DEFINITIONS

- A. Installer or Applicator:
 - 1. Installer or applicator is the person actually installing or applying the product in the field at the Project site.
 - 2. Installer and applicator are synonymous.

1.04 SUBMITTALS

- A. Submittal Procedures: See Section 01 33 00 Submittal Procedures for requirements for the mechanics and administration of the submittal process.
- B. Leadership in Energy and Environmental Design (LEED[®]) Documentation: Submit the following in accordance with Section 01 81 30 – Sustainability Requirements:
 - 1. Product Data for IEQ 4.1: For sealants and sealant primers used inside the weatherproofing system, documentation including printed statement of VOC content.
 - 2. LEED Materials Tracking Form: Form to be provided in an electronic format to the Contractor to record LEED materials used on the project.

C. Approval Submittals:

- 1. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
- 2. Provide computer generated scaled elevation Drawings, Specification Sections and details stamped and signed by a Professional Structural Engineer licensed in the State of Washington incorporating the wall construction used for this Project to demonstrate anchorage, flashing and sealing conditions.
- 3. Provide structural calculations specific to this Project stamped and signed by same Engineer stamping and signing the Shop Drawings.
- 4. Samples:
 - a. Provide 12 IN long pieces of proposed framing material in finish specified for Project Representative's review and approval.
 - b. Provide 12 IN x 24 IN sections of translucent panel system in color specified.
- 5. Mockups: Build mockups to verify selections made under Samples submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

- D. Quality Assurance Submittals:
 - 1. Certifications:
 - a. Certified test reports indicating conformance to material properties and design criteria specified.
 - b. Certification of installer qualifications.
 - c. Certification of Structural Engineer's credentials.
- E. Closeout Submittals:
 - Extended Warranty: Provide two executed copies of the Extended Warranty required by this Section in accordance with the provisions of Section 01 78 00 – Closeout Procedures.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver products in protective cartons and store to protect from damage.

1.06 EXTENDED WARRANTY

- A. In accordance with the provisions of Section 01 78 00 Closeout Procedures, provide an Extended Warranty for the Work of this Section:
 - 1. Warranty period for Work of this Section is five (5) years commencing on the date of Substantial Completion, except:
 - a. Warranty against breakage and yellowing of translucent panel materials is ten (10) years, commencing on the date of Substantial Completion.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. Translucent panel system:
 - a. ExTech (www.extechinc.com).
 - b. CPI, Inc. (<u>www.cpidaylighting.com</u>).
 - c. Or approved equal.
- B. Submit request for substitution in accordance with Specification Section 01 60 00 Product Requirements.

2.02 MATERIALS

- A. Translucent Polycarbonate Honeycomb Panels:
 - 1. Factory fabricated sandwich panels of inner and outer face sheets bonded under heat and pressure to core.
 - a. Light transmission: 37 percent.

- b. Color:
 - 1) Bronze.
 - 2) Resist Yellowing: Maximum of 10 delta for a minimum of 10 years.
- c. Grid design: Vertical.
- d. Panel:
 - 1) Flat.
 - 2) Thickness: 16mm.
 - 3) Length and width as indicated on Drawings.
 - 4) UV Stabilization: Coextruded into panels, not coated.
 - 5) Sheet Appearance: Uniform in color.
- B. Panel Framing System:
 - 1. Extruded aluminum.
 - 2. Manufacturer's standard section capable of performing for intended use on this Project.
 - 3. Sealant tape between frame and panel at inner and outer face.
 - 4. Finish:
 - a. Architectural Class I coating per AA 45.
 - 1) AA-M12C22A41, Bronze anodized.
 - 2) Anchor panel framing to building structure.
 - a) Fasteners: Stainless steel.
 - 3) Factory pre-assemble framing and panels as far as practical..
- C. Flashing: See Specification Section 07 62 00 Flashing and Sheet Metal.
- D. Face Sheets:
 - 1. Polycarbonate structural sheet.
 - a. UV stabilization:
 - 1) Coextruded into panels, not coated.
 - b. Uniform in color.
 - c. Flammability of interior sheet:
 - 1) Flame spread:
 - a) Maximum 25 when tested in accordance with ASTM E84.
 - 2) Smoke developed:
 - a) Maximum 300, when tested in accordance with ASTM E84.
 - 3) Burn extent:
 - a) Maximum 1 IN, when tested in accordance with ASTM D635.

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- d. Weatherability.
- e. Flatness: Free of imperfections which impair bonding.
- f. Thickness:
 - 1) Exterior sheet: 0.07 IN.
 - 2) Interior sheet: 0.045 IN.
 - 3) Thickness tolerance: +/-10 percent, maximum.
- g. Impact strength: Resist 60 FT/LB, when tested in accordance with SPI.
- E. Grid Core:
 - 1. Structural aluminum members, 6063-T6 Alloy.
 - 2. Dimensional tolerances:
 - a. Face to face dimension and difference in plane of faces at intersections restricted to maximum allowable to provide full bonding face surface to contact face sheets.
 - 3. Jointing: Mechanically interlocked.
- F. Adhesive:
 - 1. To bond face sheets to core.
 - 2. Heat and pressure type, formulated for sandwich panel adhesive use.
- G. Insulation:
 - 1. Translucent fiberglass batt insulation.
 - a. Provide required thickness and density to achieve "U" values specified.
 - 2. Manufactured specifically for use in translucent panels.
- H. Sealant Tape: Factory applied; manufacturer's standard.

2.03 DESIGN CRITERIA

- A. Design Loads:
 - 1. Design panels and framing systems to resist loadings, with maximum deflection of L/240:
 - a. Walls:
 - 1) Wind loads: See Drawings.
- B. Testing:
 - 1. General:
 - a. Performed by independent testing agency.
 - 2. "U" value:
 - a. 0.29 maximum.
 - b. Test in accordance with ASTM C1363.

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- c. Provide results for overall thermal value.
- d. Calculated values are not acceptable.

PART 3 – EXECUTION

3.01 PREPARATION

- A. Verify suitability of substrate to accept work.
- B. Installation constitutes acceptance of substrate.

3.02 INSTALLATION

- A. Install units in accordance with manufacturer's written installation instructions.
- B. Anchor units to resist loading indicated.
- C. Seal perimeter of units in accordance with Specification Section 07 92 00 Joint Sealants.

3.03 CLEANING

A. Prior to final acceptance by Project Representative, wash inside and outside face sheets in accordance with manufacturer's instructions and clean frames and patch all scratches.

END OF SECTION

SECTION 08 51 23 STEEL WINDOWS

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes: Steel windows from cold-formed steel members.

1.02 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide steel windows capable of withstanding the effects of the following loads and stresses within limits and under conditions indicated, based on testing windows that are representative of those specified according to ASTM E 330:
 - 1. Design Wind Loads: Determine design wind loads under conditions indicated according to ASCE/SEI 7.
 - a. Basic Wind Speed: 85 mph.
 - b. Importance Factor: 1.5.
 - c. Exposure Category: C.
 - 2. Deflection Limits: Design glass framing system to limit lateral deflections of glass edges to less than 1/175 of glass-edge length or 3/4 IN, whichever is less, at design pressures.
- B. Windborne-Debris Resistance: Provide glazed steel windows capable of resisting impact from windborne debris, based on the pass/fail criteria as determined from testing glazed steel windows identical to those specified, according to ASTM E 1886 and testing information in ASTM E 1996 and requirements of authorities having jurisdiction.
- C. Condensation-Resistance: Provide steel windows with a CR determined according to NFRC 500 of 40 minimum.
- D. Thermal Transmittance: Provide steel windows with the maximum whole-fenestration product U-factor indicated, when determined according to NFRC 100.
 1. U-Factor: 0.49 Btu/SF x H x Deg F.
- E. Solar Heat-Gain Coefficient (SHGC): Provide steel windows with a maximum wholefenestration product SHGC of 0.40, determined according to NFRC 200.
- F. Air Infiltration for Weather-Stripped Ventilators: Not more than 0.37 CFM/FT of ventilator crack length at an inward test pressure of 6.24 LBF/SF when tested according to ASTM E 283.
- G. Air Infiltration for Non-Weather-Stripped Ventilators: Not more than 1.0 CFM/FT of ventilator crack length at an inward test pressure of 1.56 LBF/SF when tested according to ASTM E 283.
- H. Water Penetration: No leakage for 15 minutes when window is subjected to a rate of flow of 5 GAL/HR/SF with a differential pressure across the window of 6.24 LBF/SQFT when tested according to ASTM E 331.

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1.03 SUBMITTALS

- A. Submittal Procedures: See Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
- B. Leadership in Energy and Environmental Design (LEED[®]) Documentation: Submit the following in accordance with Section 01 81 30 Sustainability Requirements:
 - 1. Product Data for MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content; include statement indicating costs for each product having recycled content.
 - 2. Product Data for MR 5: For products and materials required to comply with requirements for regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.
 - 3. Product Data for IEQ 4.1: For adhesives and sealants used inside the weatherproofing system, documentation including printed statement of VOC content.
 - 4. LEED Materials Tracking Form: Form to be provided in an electronic format to the Contractor to record LEED materials used on the project.
- C. Approval Submittals:
 - 1. Product technical data for framing system and major accessories including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Hardware being provided by window manufacturer.
 - c. Glass being provided by window manufacturer in factory glazed units.
 - d. Manufacturer's installation instructions.
 - 2. Shop Drawings:
 - a. Elevation Drawings indicating window dimensions and details.
 - 3. Color charts showing range of colors of anodized units for Project Representative's color selection.
 - 4. Samples:
 - a. After initial color selection, provide 2 x 3 IN minimum sample of each color and finish selected.
- D. Quality Assurance Submittals: Test Results.
- E. Delegated-Design Submittal: For steel windows 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. Closeout Submittals:
 - Extended Warranty: Provide two executed copies of the Extended Warranty required by this Section in accordance with the provisions of Section 01 78 00 – Closeout Procedures.

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1.04 QUALITY ASSURANCE

- A. SWI Publication: Comply with applicable requirements in SWI's "The Architect's Guide to Steel Windows and Doors" except where more stringent requirements are indicated.
- B. Pre-installation Conference: Conduct conference at Project site.

1.05 EXTENDED WARRANTY

- A. In accordance with the provisions of Section 01 78 00 Closeout Procedures, provide an Extended Warranty for the Work of this Section:
 - 1. Warranty period for Work of this Section is two (2) years commencing on the date of Substantial Completion, except:
 - a. Metal Finishes five (5) years from date of Substantial Completion.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Cold Formed Steel Windows:
 - a. <u>D.V</u>., Fyre-Tec, Inc.
 - b. Optimum Window Manufacturering Corp. (www.optimumwindow.com).
 - c. Hope's Windows, Inc. (www.hopeswindows.com).
 - d. Torrance Steel Window Co., Inc. (www.torrancesteelwindow.com).
 - e. Or approved equal.

2.02 MATERIALS

- A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- B. Fasteners: Provide fasteners of bronze, brass, stainless steel, or other metal that are warranted by manufacturer to be noncorrosive and compatible with trim, hardware, anchors, and other components of steel windows.
- C. Anchors, Clips, and Window Accessories: Provide units of stainless steel, hot-dip zinc-coated steel, bronze, brass, or iron complying with ASTM A 123/A 123M. Provide units with sufficient strength to withstand design pressure indicated.
- D. Compression-Type Weather Stripping: Provide compressible weather stripping designed for permanently resilient sealing under bumper or wiper action and for complete concealment when steel window is closed.
- E. Sliding-Type Weather Stripping: Provide manufacturer's standard woven-pile weather stripping of wool, polypropylene, or nylon pile and resin-impregnated backing fabric.
 - 1. Weather Seals: Provide weather stripping with integral barrier fin or fins of semirigid, polypropylene sheet or polypropylene-coated material.

- F. Trim Members, Screen Frames, Retainers for Weather Stripping, Flashing, and Similar Items: Manufacturer's standard.
- G. Glazing Stops: Manufacturer's standard.
- H. Sealant: For sealants required within fabricated windows, provide manufacturer's standard, permanently elastic, nonshrinking, and nonmigrating type recommended by sealant manufacturer for joint size and movement.

2.03 WINDOW

- A. Window Type: Fixed.
- B. Cold-Formed Steel Window Members: Provide frame and ventilator members mechanically formed from metallic-coated, low-carbon, cold-rolled steel sheet complying with ASTM A 653/A 653M.
 - 1. Provide SWI heavy intermediate windows.
 - a. Window Finish: Baked enamel.
 - b. Color: Match Kawneer color "Permadize Black."
- C. Glass and Glazing System: See Section 08 81 00 for glass units and glazing requirements for steel windows.

2.04 FABRICATION

- A. General:
 - 1. Fabricate steel windows of type and in sizes indicated to comply with SWI standards.
 - 2. Include a complete system for assembly of components and anchorage of window units.
- B. Mullions:
 - 1. Formed of cold-formed steel matching window units; with anchors for support to structure and for installation of window units and having sufficient strength to withstand design pressure indicated.
 - 2. Provide mullions of profile indicated and with cover plates.
 - 3. Allow for erection tolerances and provide for movement of window units due to thermal expansion and building deflections.
- C. Subframes and Operable Ventilators:
 - 1. Formed of cold-formed steel of profile indicated.
 - 2. Miter or cope corners, and weld and dress joints smooth.
- D. Provide weep holes and internal water passages to conduct infiltrating water to the exterior.

2.05 METALLIC-COATED STEEL SHEET FINISHES

- A. Surface Preparation:
 - 1. Clean surfaces with nonpetroleum solvent so surfaces are free of oil and other contaminants.

- 2. After cleaning, apply a conversion coating suited to the organic coating to be applied over it.
- 3. Clean welds, mechanical connections, and abraded areas and apply galvanizing repair paint complying with SSPC-Paint 20 and ASTM A 780.
- B. Baked-Enamel:
 - 1. Immediately after cleaning and pretreating, apply manufacturer's standard twocoat, baked-on finish consisting of prime coat and thermosetting topcoat, with a minimum dry film thickness of 1 mil for topcoat.
 - 2. Comply with coating manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 2 mils.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Comply with manufacturer's written instructions for installing windows, hardware, accessories, and other components.
- B. Separate corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials according to ASTM E 2112, Section 5.12 "Dissimilar Materials."
- C. Adjust operating sashes and ventilators, screens, hardware, and accessories for a tight fit at contact points and weather stripping for smooth operation and weathertight closure.
 - 1. Lubricate hardware and moving parts.
- D. Clean factory-finished steel surfaces immediately after installing windows.
 - 1. Comply with manufacturer's written recommendations for final cleaning and maintenance.
 - 2. Avoid damaging protective coatings and finishes.
- E. Refinish or replace windows with damaged finish.

END OF SECTION

SECTION 08 62 00 SKYLIGHT

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Skylights.
 - 2. Manufacturer designed fastening system.
 - 3. Safety screens.
- B. Related Sections include but are not necessarily limited to:
 - 1. Division 00 Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 01 General Requirements.
 - 3. Section 07 61 13 Metal Roofing.
 - 4. Section 09 91 00 Painting and Protective Coatings.

1.02 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. Aluminum Association (AA):
 - a. DAF 45, Designation System for Aluminum Finishes.
 - 2. ASTM International (ASTM):
 - a. D4802, Standard Specification for Poly(Methyl Methacrylate) Acrylic Plastic Sheet.
 - 3. Occupational Safety and Health Administration (OSHA).
 - 4. FM Global (FM):
 - a. Install per FM Global Property Loss Prevention Data Sheet 1-57, Plastics in Construction.
- B. Qualifications:
 - 1. Installer shall have minimum five (5) years experience installing similar products.

1.03 DEFINITIONS

- A. Installer or Applicator:
 - 1. Installer or applicator is the person actually installing or applying the product in the field at the project site.
 - 2. Installer and applicator are synonymous.

1.04 SUBMITTALS

- A. Submittal Procedures: See Section 01 33 00 Submittal Procedures for requirements for the mechanics and administration of the submittal process.
- B. Leadership in Energy and Environmental Design (LEED[®]) Documentation: Submit the following in accordance with Section 01 81 30 – Sustainability Requirements:
 - 1. Product Data for IEQ 4.2: For paints and coatings used inside the weatherproofing system, documentation including printed statement of VOC content.
 - 2. LEED Materials Tracking Form: Form to be provided in an electronic format to the Contractor to record LEED materials used on the project.
- C. Approval Submittals:
 - 1. Shop Drawings:
 - a. Scaled plan of roof showing location of each unit and anchoring details.
 - 1) Minimum scale of plan: 1/8 IN = 1 FT.
 - 2) Minimum scale of details: 1-1/2 IN = 1 FT.
 - 2. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
- D. Quality Assurance Submittals:
 - 1. Statement of Installer qualifications.
- E. Closeout Submittals:
 - Operation & Maintenance (O&M) Manual Content: Provide O&M manual documentation as required by Section 01 73 00 – Operation and Maintenance Manuals.
 - Extended Warranty: Provide two executed copies of the Extended Warranty required by this Section in accordance with the provisions of Section 01 78 00 – Closeout Procedures.

1.05 EXTENDED WARRANTY

- A. In accordance with the provisions of Section 01 78 00 Closeout Procedures, provide an Extended Warranty for the Work of this Section:
 - 1. Warranty period for Work of this Section is five (5) years commencing on the date of Substantial Completion.
 - a. Warranty to cover repair or replacement in event of leakage; defective design, materials and construction.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. Skylights:
 - a. Major Industries.
 - b. Sunglo Skylight Products.
 - c. Super Sky International Inc.
 - d. Wasco.
 - e. Or approved equal.
- B. Submit request for substitution in accordance with Specification Section 01 60 00 Product Requirements.

2.02 MATERIALS

- A. Curb: Aluminum.
- B. Glazing: Acrylic.
- C. Insulation: Manufacturer's standard.
- D. Fasteners: Stainless steel.
- E. Safety Screens: Aluminum.
- F. Framework: Aluminum.

2.03 FABRICATION

- A. Curb:
 - 1. Integral 9 IN high.
 - 2. Minimum 0.032 IN outer skin and 0.025 IN inner skin.
 - 3. Insulated.
 - 4. Thermally broken.
 - 5. Integral counter flashing.
 - 6. Curb and curb framework shall be manufactured as complete unit.
 - a. Built-up units not acceptable.
- B. Curb Framework:
 - 1. Minimum 0.063 IN extruded aluminum.
 - a. 6063T5 alloy.
 - 2. Built in condensation gutter and weeps.
 - 3. Welded corners.
 - 4. Thermally broken.

- C. Fasteners: 300 series stainless steel.
- D. Glazing:
 - 1. Minimum thickness: 0.125 IN.
 - 2. Dome shaped.
 - 3. White acrylic.
 - 4. Meet ASTM D4802, Category C-2 or CC-2, Type UVA.
 - 5. Finish 1 (smooth or polished).
 - 6. Color:
 - a. Exterior: White.
 - b. Interior: White.
- E. Steel Security Bars:
 - 1. 1/2 IN steel bars 8 IN on center each direction welded and assembled into a 1-1/2 IN x 1-1/2 IN x 1/8 IN steel angle frame.
 - 2. Approved by OSHA as a fall protection device.
- F. Finish:
 - 1. Architectural Class 1 coating per AA DAF 45.
 - 2. AA-M10C22A41 clear anodized.
- G. Design: Support live load of 40 psf and wind load of 40 psf.
- H. Thermal Transmittance: Assembly maximum U-Factor of 0.60.
- I. Fabricate to sizes indicated on the Drawings.
 - 1. Completely shop assembled, to assure proper assembly in field.
 - 2. Disassemble for shipment as required.
 - 3. Properly label each component for accurate field assembly.
- J. Construct components to drain water passing joints and to drain condensation and moisture occurring or migrating within skylight system to the exterior.
 - 1. Provide continuous extruded aluminum frame.
- K. Weld by heliarc process.
 - 1. Grind exposed welds to a minimum of 100 grit finish.
- L. Allow no direct acrylic to metal contact.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
 - 1. Attach to roof structure per manufacturer's designed fastening system.

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- B. Provide all periphery items as required for complete weathertight installation.
- C. Fasten safety screen to skylight frame using stainless steel screws at maximum 12 IN OC with minimum of three (3) screws per side.

END OF SECTION

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SECTION 08 62 50 TUBULAR DAYLIGHT SYSTEM

PART 1 – GENERAL

1.01 SECTION INCLUDES

- A. Tubular Daylighting System, consisting of roof dome, reflective tube, and diffuser assembly; configuration as indicated on the Drawings.
- B. Accessories.
- C. Related Sections include but are not limited to:
 - 1. Division 00 Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 01 General Requirements.
 - 3. Section 07 54 25 Fully Adhered TPO Roofing.

1.02 QUALTIY ASSURANCE

- A. Referenced Standards:
 - 1. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials; 2001.
 - 2. ASTM A 463/A 463M Standard Specification for Steel Sheet, Aluminum Coated, by the Hot Dip Process; 2001a.
 - 3. ASTM A 653/A 653M Standard Specification for Steel Sheet, Zinc Coated (Galvanized), by the Hot Dip Process; 2001a.
 - 4. ASTM E 283 Test Method for Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
 - 5. ASTM D 635 Test Method for Rate of Burning and/or Extent of Time of Burning of Self-Supporting Plastics in a Horizontal Position.
 - 6. ASTM D-1929 Test Method for Ignition Properties of Plastics.
 - 7. UL 181 Factory Made Air Ducts and Air Connectors; 1998.
 - 8. UL 790 Standard for Tests for Fire Resistance of Roof Covering Materials; 1997.
 - 9. ICBO/ICC AC-16 Acceptance Criteria for Plastic Skylights; 2003.

1.03 PERFORMANCE REQUIREMENTS

- A. Completed tubular daylighting system assemblies shall be capable of meeting the following performance requirements:
 - 1. Air Infiltration Test:
 - a. Air infiltration will not exceed 0.30 CF/minute/SQ FT aperture with a pressure delta of 1.57 psf across the tube when tested in accordance with ASTM E 283.

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- 2. Water Resistance Test:
 - a. No uncontrolled water leakage at 16.5 psf pressure differential with water rate of 5 GAL/HRS/SQ FT when tested in accordance with ASTM E 331.
- 3. Uniform Load Test:
 - a. No breakage, permanent damage to fasteners, hardware parts, or damage to make system inoperable or cause permanent deflection of any section in excess of 1 percent of its span at a Positive Load of 110 psf (5.27 kPa) or Negative Load of 60 psf (2.87 kPa).
 - b. All units shall be tested with a safety factor of (3) for positive pressure and (2) for negative pressure, acting normal to plane of roof in accordance with ASTM E 330.
- 4. Fire Testing:
 - a. Class B Burning Brand:
 - The burning brand shall self-extinguish without transferring the fire to the dome Per: U.B.C. Standard 15-2 Class B Burning Brand Test.
 - 2) See ASTM E 108 and UL 790.
 - b. Self-Ignition Temperature:
 - 1) Greater than 650 DegF Per: U.B.C. Standard 26-6.
 - 2) See ASTM D-1929-68 (1975).
 - c. Smoke Density:
 - 1) Rating no greater than 75 Per: U.B.C. Standard 26-5.
 - 2) (See ASTM D-2843-70) or no greater than 450 Per U.B.C. 8-1 (See ASTM Standard E 84-91A) in way intended for use.
 - d. Rate of Burn:
 - 1) Minimum Burning Rate: 2.5 IN/minute (64 mm/min) Classification CC-2: U.B.C. Standard 26-7.
 - a) See ASTM D 635.
- 5. Maximum assembly U-Value = 0.60 (BTU/HR-SF-F).

1.04 SUBMITTALS

- A. Submittal Procedures: See Section 01 33 00 Submittal Procedures for requirements for the mechanics and administration of the submittal process.
- B. Leadership in Energy and Environmental Design (LEED[®]) Documentation: Submit the following in accordance with Section 01 81 30 – Sustainability Requirements.
 - 1. Product Data for MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content; include statement indicating costs for each product having recycled content.

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- 2. Product Data for MR 5: For products and materials required to comply with requirements for regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.
- Product Data for IEQ 4.1: For adhesives and sealants used inside the weatherproofing system, documentation including printed statement of VOC content.
- 4. LEED Materials Tracking Form: Form to be provided in an electronic format to the Contractor to record LEED materials used on the project.
- C. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
- D. Quality Assurance Submittals:
 - 1. Verification Samples: As requested by Project Representative.
 - 2. Test Reports: Independent testing agency or evaluation service reports verifying compliance with specified performance requirements.
- E. Closeout Submittals:
 - Extended Warranty: Provide two executed copies of the Extended Warranty required by this Section in accordance with the provisions of Section 01 78 00 – Closeout Procedures.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Engaged in manufacture of tubular skylights for minimum 10 years.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local Authorities Having Jurisdiction.

1.07 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results.
 - 1. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.08 EXTENDED WARRANTY

- A. In accordance with the provisions of Section 01 78 00 Closeout Procedures, provide an Extended Warranty for the Work of this Section for ten (10) years commencing on the date of Substantial Completion.
 - 1. Tubular Daylighting System: Manufacturer's standard warranty for 10 years.
 - 2. Electrical Parts: Manufacturer's standard warranty for 5 years, unless otherwise indicated.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable Manufacturers:
 - 1. Solatube International, Inc., (<u>www.solatube.com</u>).
 - 2. SolaDesign Systems LLC (www.sola-design.com).
 - 3. Daylighting Systems Inc. (www.daylighting.com).
 - 4. Or approved equal.
- B. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 – Product Requirements.

2.02 MATERIALS

- A. Tubular Daylighting System General:
 - 1. Transparent roof-mounted skylight dome and self-flashing curb, reflective tube, and ceiling level diffuser assembly, transferring sunlight to interior spaces; complying with ICBO/ICC AC-16.
- B. Roof Dome Assembly: Transparent, UV and impact resistant dome with flashing base supporting dome and top of tube.
 - 1. Outer Dome Glazing:
 - a. Type DA, 0.125 IN minimum thickness impact resistant injection molded acrylic classified as CC2 material and meeting characteristics of DR-101 blend.
 - b. Visible light transmission minimum 92 percent.
 - 2. Optional Shock Inner Dome Glazing:
 - a. Type DI, 0.115 IN minimum thickness high impact resistant injection molded acrylic required for high velocity wind zones.
 - 3. Prismatic pattern molded into dome to capture low angle sunlight.
 - 4. Light Tracker Reflector:
 - a. Aluminum sheet, thickness 0.015 IN with Spectralight Infinity.
 - b. Positioned in dome to capture low angle sunlight.

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- 5. Flashing Base: One piece, seamless, leak-proof flashing functioning as base support for dome and top of tube.
 - a. Base Material: Sheet steel, corrosion resistant, meeting ASTM A 653/A 653M or ASTM A 463/A 463M, 0.028 IN thick.
 - b. Base Flat: Flat Type FF4, no pitch 4 IN high.
 - c. Base Flat: Flat Type FF6, no pitch 6 IN high.
 - d. Base Pitched: Pitched Type FPM, 22.5 degrees slope from horizontal, 4 IN high.
 - e. Flashing Insulator: Type F1. Thermal isolation material for use under flashing.
 - f. Dome Edge Protection Band: Type PB, for fire rated roofs.
 - 1) Aluminized steel. Nominal thickness of 0.028 IN.
- 6. Roof Flashing Turret Extensions: Provide manufacturer's standard extensions for applications requiring:
 - a. Additional lengths of 2 IN extension.
- 7. Dome Ring: Attached to top of base section; 0.090 IN nominal thickness injection molded high impact acrylic; to prevent thermal bridging between base flashing and tubing and channel condensed moisture out of tubing.
- 8. Reflective Extension Tube: Aluminum sheet, thickness 0.015 IN.
 - a. Interior Finish:
 - 1) Spectralight Infinity high reflectance specular finish on exposed reflective surface.
 - 2) Visible spectrum (400 nm to 760 nm) greater than 99 percent.
 - 3) Total solar spectrum (400 nm to 2500 nm) less than 93 percent.
 - b. Color: a* and b* (defined by CIE L*a*b* color model) shall not exceed plus 2 or be less than minus 2 as determined in accordance to ASTM E308.
 - c. Tube Diameter: Approximately 14 IN.
- 9. Reflective 30 degree Adjustable tube: Aluminum sheet, thickness 0.015 IN.
 - a. Interior Finish:
 - 1) Spectralight Infinity high reflectance specular finish on exposed reflective surface.
 - 2) Visible spectrum (400 nm to 760 nm) greater than 99 percent.
 - 3) Total solar spectrum (400 nm to 2500 nm) less than 93 percent.
- 10. Ceiling Ring: Injection molded impact resistant acrylic. Nominal thickness is 0.110 IN.

- 11. Dual Glazed Diffuser Assembly:
 - a. Upper glazing:
 - 1) Acrylic plastic classified as CC2 material.
 - 2) The nominal thickness is 0.040 IN.
 - b. Lower glazing (Optiview Fresnel Lens):
 - 1) Molded polycarbonate plastic classified as CC1 material.
 - 2) The nominal thickness is 0.022 IN.
 - c. Lower glazing (Vusion):
 - 1) Acrylic plastic classified as CC2 material.
 - 2) The nominal thickness is 0.090 IN.
 - d. Diffuser Trim Ring: Injection molded acrylic.
 - 1) White Trim (Optiview Fresnel Lens): Type L1.
 - e. Effect Lens:
 - 1) Acrylic plastic classified as CC2 material.
 - 2) The nominal thickness is 0.090 IN.
 - a) Warm Effect Lens: Type WL.

2.03 ACCESSORIES

- A. Fasteners: Same material as metals being fastened, non-magnetic steel, non-corrosive metal of type recommended by manufacturer, or injection molded nylon.
- B. Suspension Wire: Steel, annealed, galvanized finish, size and type for application and ceiling system requirement.
- C. Sealant: Polyurethane or copolymer based elastomeric sealant as provided or recommended by manufacturer.

PART 3 – EXECUTION

3.01 EXAMINATION

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

3.02 PREPARATION

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

3.03 INSTALLATION

- A. Install in accordance with manufacturer's printed instructions.
- B. After installation of first unit, field test to determine adequacy of installation.
 - 1. Conduct water test in presence of Project Representative, or Contractor, or their designated representative.
 - 2. Correct if needed before proceeding with installation of subsequent units.

3.04 PROTECTION

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

END OF SECTION

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SECTION 08 70 00 FINISH HARDWARE

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Finish hardware.
 - 2. Key Lock Box.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Division 00 Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 01 General Requirements.
 - 3. Section 08 41 10 Storefront.
 - 4. Division 26 Electrical.

1.02 QUALITY ASSURANCE

- A. All door hardware shall be provided by the same hardware supplier.
 - 1. Hardware required by doors specified in Specification Section 08 14 16, and Specification Section 08 41 10 is to be provided under this Specification Section unless noted otherwise.
- B. Referenced Standards:
 - 1. Americans with Disabilities Act (ADA):
 - a. Accessibility Guidelines for Buildings and Facilities (ADAAG).
 - 2. American National Standards Institute/Builders Hardware Manufacturers Association (ANSI/BHMA):
 - a. A156.1, Butts and Hinges.
 - b. A156.3, Exit Devices.
 - c. A156.4, Door Controls -Closers.
 - d. A156.6, Architectural Door Trim.
 - e. A156.8, Door Controls Overhead Stops and Holders.
 - f. A156.13, Mortise Locks and Latches Series 1000.
 - g. A156.16, Auxiliary Hardware.
 - h. A156.18, Materials and Finishes.
 - i. A156.21, Thresholds.
 - 3. National Fire Protection Association (NFPA):
 - a. 80, Standard for Fire Doors and Other Opening Protective's.

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- 4. Steel Door Institute (SDI).
- 5. Underwriters Laboratories, Inc. (UL):
 - a. Building Materials Directory.
- 6. Building Code:
 - a. International Code Council (ICC):
 - International Building Code and associated standards, 2009 Edition as amended by the State of Washington, and the City of Bellevue Amendments, referred to herein as Building Code.
- C. Qualifications:
 - 1. Installation shall be performed or inspected by Certified Architectural Hardware Consultant (AHC).

1.03 DEFINITIONS

- A. AHC: Certified Architectural Hardware Consultant.
- B. Installer or Applicator:
 - 1. Installer or applicator is the person actually installing or applying the product in the field at the Project site.
 - 2. Installer and applicator are synonymous.
- C. All weather: Capable of operation from -50 to +120 DegF.
- D. Active Leaf: Right-hand leaf when facing door from keyed side unless noted otherwise on Drawings.
- E. FRP: Fiberglass reinforced plastic.

1.04 SUBMITTALS

- A. Submittal Procedures: See Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
- B. Leadership in Energy and Environmental Design (LEED[®]) Documentation: Submit the following in accordance with Section 01 81 30 – Sustainability Requirements.
 - 1. Product Data for MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content; include statement indicating costs for each product having recycled content.
 - 2. Product Data for MR 5: For products and materials required to comply with requirements for regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.
 - 3. LEED Materials Tracking Form: Form to be provided in an electronic format to the Contractor to record LEED materials used on the project.

- C. Approval Submittals:
 - 1. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 - 2. Schedule of all hardware being used on each door.
 - a. Number hardware sets and door references same as those indicated on Drawings.
 - 3. Technical data sheets on each hardware item proposed for use.
 - 4. Letter from Certified Architectural Hardware Consultant stating all door hardware has been provided per approved Shop Drawings, has been inspected, has been installed in accordance with manufacturer's recommended installation instructions and is in proper working order.
- D. Quality Assurance Submittals:
 - 1. Certified Architectural Hardware Consultant qualifications.
- E. Closeout Submittals:
 - Extended Warranty: Provide two executed copies of the Extended Warranty required by this Section in accordance with the provisions of Section 01 78 00 – Closeout Procedures.

1.05 EXTENDED WARRANTY

- A. In accordance with the provisions of Section 01 78 00 Closeout Procedures, provide an Extended Warranty for the Work of this Section:
 - 1. The warranty period for door closers is ten (10) years commencing on the date of Substantial Completion.
 - 2. The warranty period for mortise locks is ten (10) years commencing on the date of Substantial Completion.
 - 3. The warranty period for electronic locks is five (5) years for mechanical components, and two (2) years for electrical components commencing on the date of Substantial Completion.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. Locksets and latchsets:
 - a. Corbin/Russwin (www.corbinrusswin.com).
 - b. No substitutions permitted.
 - 2. Closers:
 - a. LCN (www.lcnclosers.com).

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- b. Norton (www.nortondoorcontrols.com).
- c. Corbin/Russwin (<u>www.corbinrusswin.com</u>).
- d. Or approved equal.
- 3. Hinges:
 - a. Stanley Works (www.stanleyhardware.com).
 - b. Hager Hinge Co. (www.hagerco.com).
 - c. McKinney Manufacturing Co. (www.mckinneyhinge.com).
 - d. Or approved equal.
- 4. Door stops and holders:
 - a. Trimco (www.trimcobbw.com).
 - b. Rockwood (www.rockwoodmfg.com).
 - c. Ives (www.professional.iveshardware.com).
 - d. Or approved equal.
- 5. Overhead stops:
 - a. Glynn-Johnson Corp. (www.glynn-johnson.com).
 - b. Rockwood (www.rockwoodmfg.com).
 - c. Trimco (www.trimcobbw.com).
 - d. Rixson (www.rixson.com).
 - e. Or approved equal.
- 6. Weatherstripping and thresholds:
 - a. Pemko Manufacturing Co.
 - b. Reese Enterprises, Inc.
 - c. Zero Weatherstripping, Inc.
 - d. National Guard Products, Inc.
 - e. Or approved equal.
- 7. Exit devices:
 - a. Von Duprin, Inc. (www.vonduprin.com).
 - b. Corbin/Russwin (www.corbinrusswin.com).
 - c. Precision (www.precisionhardware.com).
 - d. Sargent (www.sargentlock.com).
 - e. Or approved equal.
- 8. Door bolts, coordinators and strikes:
 - a. lves (www.professional.iveshardware.com).
 - b. Trimco (www.trimcobbw.com).

c. Hager Hinge Co. (www.hagerco.com).

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- d. Rockwood (www.rockwoodmfg.com).
- e. Dorma (www.dorma.com).
- f. Or approved equal.
- 9. Key Lock Boxes:
 - a. GE Security, Inc. (www.gesecurity.com).
 - b. HPC, Inc. (www.hpcworld.com).
 - c. Knox Company (www.knoxbox.com).
 - d. Or approved equal.
- 10. Other materials: As noted.
- B. Submit request for substitution in accordance with Specification Section 01 60 00.

2.02 MATERIALS

- A. Fasteners: Stainless steel or aluminum.
- B. Locking, Latching and Retracting Mechanism and Lock Case:1. Manufacturer's standard.
- C. Closers:
 - 1. Shell: Aluminum or cast iron.
 - 2. Arms and piston: Forged steel.
- D. Kickplates: Stainless steel.
- E. Thresholds: Aluminum.
- F. Overhead Stops and Wall Stops: Stainless steel or aluminum.
- G. Keys: Brass or bronze.
- H. Weatherstripping and Smoke Seals: Polypropylene, neoprene, or EPDM.
- I. Pulls and Push Plates: Stainless steel.

2.03 ACCESSORIES

- A. Closer Mechanism Covers:
 - 1. Match finish of adjacent hardware.
 - 2. Full cover.
 - 3. Manufacturer's standard plastic cover.
- B. Arms, Brackets, and Plates: As required for complete installation of closers.
- C. Strikes:
 - 1. Stainless steel, 630 finish.
 - 2. Provide with curved lips.
 - 3. Extended lips when required.

- 4. Furnish strike boxes.
- 5. Appropriate for function and hardware listed.

2.04 PRODUCTS

- A. Hardware General:
 - 1. Generally prepare for Phillips head machine screw installation.
 - 2. Exposed screws to match hardware finish or, if exposed in surfaces of other work, to match finish of other work as closely as possible.
 - 3. Provide concealed fasteners. Exception: surface-mounted overhead stops and holders.
 - 4. Furnish items of hardware for proper door swing.
 - 5. Furnish lock devices which allow door to be opened from inside room without a key or any special knowledge.
- B. Hardware:
 - 1. Fabricate hardware for fire rated openings in compliance with UL and NFPA 80.
 - a. This requirement takes precedence over other requirements for such hardware.
 - b. Provide only hardware which has been tested and listed by UL for types and sizes of doors.
 - 2. Provide integral serrated knurling on lever for doors leading to the following rooms or areas (grit covered tape applied to lever is not acceptable):
 - a. Mechanical rooms.
 - b. Stairs.
 - c. Electrical rooms.
 - d. Storage rooms.
 - e. Janitor closet.
 - 3. Provide stainless steel dustproof strikes for all doors with automatic or manual flush bolts or other bolts into floor.
 - 4. Provide following ANSI/BHMA A156.18 finishes:
 - a. Locks: 630.
 - b. Door pulls, push bars, push plates: 630.
 - c. Kickplates:
 - 1) 630 (where metal kickplates are specified).
 - d. Exit devices: 630 or 626.
 - e. Conventional hinges: 630.

- f. Door stops, dead locks, mortise bolts, and miscellaneous hardware: 630 if available, 626 if 630 not available.
- g. Door overhead stops: 630.
- h. Closers and components: Provide special rust inhibiting pretreatment.
- i. Continuous gear hinges: Clear anodized satin aluminum.
- C. Mortise Locks and Latches:
 - ANSI/BHMA A156.13, Series 1000, Operational Grade 1, Security Grade.
 Meet requirements of ADA.
 - 2. Antifriction two-piece mechanical latchbolt with stainless steel anti-friction insert.
 - a. One-piece stainless steel deadbolt, minimum 1-1/4 IN x 9/ 16 IN thick with 1 IN throw.
 - b. 2-3/4 IN backset.
 - c. Cylinder: Brass, 6 pin, with interchangeable core. Furnish construction cores.
 - d. ADA compliant thumb turn lever.
 - e. Scheduled trim design: Schlage "03N."
 - f. Electric hardware: 24VDC. Include power supplies.
- D. Door Closers:
 - 1. ANSI/BHMA A156.4, Grade 1.
 - 2. Size door closers to comply with ANSI recommendations for door size and location.
 - 3. Fabricate closers with integral back check.
 - a. Provide all-weather fluid for exterior doors' closers.
- E. Butts and Hinges:
 - 1. ANSI/BHMA A156.1.
 - 2. Hinge numbers:
 - 3. Flat button tips.
 - 4. Butt types:
 - a. Type 1: Provide NRP (non-removable pin) throughout.
 - 5. Butt quantities:
 - a. Doors 61-90 IN in height: Three (3) butts.
- F. Door Stops:
 - 1. Floor or wall types: As scheduled.
- G. Kickplates:
 - 1. ANSI/BHMA A156.6.

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- 2. Dimensions as scheduled.
- 3. Beveled four edges.
- 4. 0.050 IN thick throughout.
- H. Thresholds:
 - 1. ANSI/BHMA A156.21.
 - 2. One-piece unit:
 - a. Maximum 1/2 IN high, meet accessibility requirements.
 - b. As scheduled and per Details.
- I. Exit Devices:
 - 1. ANSI/BHMA A156.3, Grade 1.
 - 2. Type and function as indicated in Hardware Schedule under PART 3.
 - 3. Von Duprin products listed.
 - a. Pairs of doors: use concealed cable type devices, rigid rod type not acceptable.
- J. Gasketing:
 - 1. Finned type with rigid backing and life-of-installation adhesive warranty: DHSI 105 and SA series.
 - 2. Concealed door bottoms: DHSI AMDB series.
 - 3. Surface sweeps where bottom bolts occur: blade type with polyurethane blade.
- K. Keying:
 - 1. Establish keying with Project Representative during Pre-Installation Meeting and obtain written acceptance of system prior to placing key cylinder order.
 - a. Provide and set up complete visible card indexed system with key tags and control slips.
 - b. Tag and identify keys.
 - c. For bidding purposes, figure three keys for each lock or cylinder. Also, include two-hundred key blanks for Owner's use.
 - d. Master key and key in groups as directed.
 - 2. Provide temporary construction cylinders for all new locks.
 - a. Contractor to coordinate with Project Representative for removal and replacement of construction cylinders during Pre-Installation Meeting.
 - Construction cylinders installed as part of Milestone 2 Work shall be removed by Owner during Transition Period and returned to Contractor.

- 2) Construction cylinders installed as part of Milestone 3 Work shall be removed by Owner within 30 days of Milestone 3 Substantial Completion and returned to Contractor.
- b. Contractor to provide permanent cylinders for all specified locksets which require a cyclinder, whether specified or not.
- L. Key Lock Box:
 - 1. Exterior Dimension:
 - a. Surface mount body: 4 IN H x 5 IN W x 3-3/4 IN D.
 - b. Recessed mount flange: 7 IN H x 7 IN W.
 - 2. Surface or Recessed Mount.
 - 3. With/Without UL listed tamper switches.
 - 4. 1/4 IN plate steel housing.
 - 5. 1/2 IN thick solid steel door with interior silicone gasket and stainless steel door hinge.
 - 6. Box UL Listed.
 - 7. Lock:
 - a. UL Listed.
 - b. 1/8 IN thick stainless steel dust cover with tamper seal mounting capability.
 - c. Double-action rotating tumblers and hardened steel pins accessed by a biased cut key.
 - 8. Anti-theft re-locking mechanism with drill resistant hard-plate protector.
 - 9. Finish selected by Project Representative.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Install products in accordance with manufacturer's installation instructions, supervised or inspected by an AHC.
- B. Fit hardware before final door finishing.
- C. Permanently install hardware after door finishing operations are complete.
- D. Use SDI mounting heights for hardware.
- E. Mount closers on push side of doors unless noted otherwise.
 - 1. Provide extended arms and brackets as required.
 - 2. Provide full cover for each closer.
- F. Provide hold-open feature when required by Hardware Schedule.
- G. Provide coordinator when required by hardware specified.

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- H. Floor Mount Door Stops:
 - 1. Typical, unless otherwise scheduled to receive overhead stop or wall stop.
- I. Provide weather seal, door sweep and threshold at exterior doors and where scheduled on interior doors.
 - 1. Set exterior and interior thresholds in a full bed of sealant.
 - 2. Mount door sweeps on exterior face of door.
- J. Provide gasketing at fire rated doors.
- K. Mount kickplates on push side of doors.
- L. Deliver permanent lockset cores to Project Representative.
 - 1. Owner will provide and install permanent lockset cores and remove Contractor installed construction cores and return construction cores to Contractor.
- M. Key Lock Box to be located per Exterior Elevations. Mount Key Lock Box per Manufacturer's recommendations.

3.02 FIELD QUALITY CONTROL

- A. Adjust and check each operating item of hardware to assure proper operation or function.
 - 1. Lubricate moving parts with lubricant recommended by manufacturer.
- B. During week prior to startup, make a final check and adjustment of all hardware items.
 - 1. Clean and lubricate as necessary to assure proper function and operation.
 - 2. Adjust door control devices to compensate for operation of heating and ventilating equipment.

3.03 SCHEDULES

A. HwSet 01: Large exterior roll-up or telescoping sliding door, various dimensions:

Qty 1	EA	Description CYLINDER OR	Catalog Number AS REQ'D, incl temp+perm cores	Finish	Mfr SCH
1	EA	DOOR CONTACT	674-OH	628	SCE

1. Remaining hardware part of the door and frame package.

B. HwSet 02: Single outswing exterior entry door, lockset:

Qty	EA	Description	Catalog Number	Finish	Mfr
1		CONT, HINGE	054HD	628	IVE
1	EA	POWER TRANSFER	EPT10	689	VON
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1	EA	EU STOREROOM LOCK	RX-LV9080TEU 03N L283-239	630	SCH
1	EA	CONVENTIONAL CORE	23-030	626	SCH
1	EA	ARMOR COLLAR	A008794 SERIES	630	FAL
1	EA	LOCK GUARD	LG10	630	IVE
1	EA	SURFACE CLOSER	4111 AVB EDA SRI	689	LCN
1	EA	KICK PLATE	8400 16" X 2" LDW B4E	630	IVE
1	EA	FLOOR STOP/HOLDER	FS42	626	IVE
1	EA	DRIP CAP	16A	CL	NGP
1	EA	SEAL	105 H&J	BLK	DHS
1	EA	DOOR SWEEP	200UA	CL	NGP
1	EA	THRESHOLD	425HD SIA FHSL	GRY	NGP
1	EA	DOOR CONTACT	679-05HM	BL	SCE
1	EA	POWER SUPPLY	PS914	LGR	VON

1. Watertight flush top rail.

C. **HwSet 02-CR-PH:** Single outswing exterior entry door, panic hdw + card access.

Qty		Description	Catalog Number	Finish	Mfr
1	EA	CONT. HINGE	054HD EPT	628	IVE
1	EA	POWER TRANSFER	EPT10	689	VON
1	EA	ELEC PANIC HARDWARE	LX-RX-98-L-E996-03-KN-FSE	626	VON
1	EA	RIM CYLINDER	20-057-ICX	626	SCH
1	EA	SURFACE CLOSER	4111 AVB EDA SRI	689	LCN
1	EA	KICK PLATE	8400 16" X 2" LDW B4E	630	IVE
1	EA	FLOOR STOP/HOLDER	FS42	626	IVE
1	EA	DRIP CAP	16A	CL	NGP
1	EA	SEAL	105 H&J	BLK	DHS
1	EA	DOOR SWEEP	200UA	CL	NGP
1	EA	THRESHOLD	425HD SIA FHSL	GRY	NGP
1	EA	DOOR CONTACT	679-05HM	BLK	SCE
1	EA	POWER SUPPLY	PS914	LGR	VON

1. Watertight flush top rail.

Qty		Description	Catalog Number	Finish	Mfr
1	EA	INTERMEDIATE PIVOT	7227F INT	630	IVE
1	EA	PIVOT SET	7227F SET	630	IVE
2	EA	INTERMEDIATE PIVOT	7237F INT	630	IVE
1	EA	PIVOT SET	7237F SET	630	IVE
1	EA	CHAIN BOLT	0514.00038	689	RIC
1	EA	CANE BOLT	0524.00023	602	RIC
1	EA	STOREROOM LOCK	LV9080T 03N 7/8" LIP EE	630	SCH
1	EA	CONVENTIONAL CORE	23-030	626	SCH
1	EA	SURFACE CLOSER	4111 AVB EDA SRI	689	LCN
1	EA	HYDRAULIC CHECK	4111 AVB EDA ST2687	BLK	LCN
2	EA	KICK PLATE	8400 16" X 1" LDW B4E	630	IVE
2	EA	FLOOR STOP/HOLDER	FS42	626	IVE
1	EA	ASTRAGAL	139SP	600	NGP

D. HwSet 03: Unequal leaf pair: 4 FT active leaf + 8 FT inactive leaf.

1. NOTE: Door needs to be minimum 16GA and 2-1/4 IN thick.

2. Inactive leaf: Locate top of upper intermediate pivot 5 IN from top of door.

E. HwSet 04: PR interior doors:

Qty		Description	Catalog Number	Finish	Mfr
6	EA	HW HINGE	5BB1HW 5 X 4.5 NRP	630	IVE
1	EA	AUTO FLUSH BOLT	FB31T	630	IVE
1	EA	MANUAL FLUSH BOLT	FB457 18"	626	IVE
1	EA	DUST PROOF STRIKE	DP1	626	IVE
1	EA	STOREROOM LOCK	LV9080T 803N 03N 7/8" LIP	630	SCH
1	EA	CONVENTIONAL CORE	23-030	626	SCH
2	EA	DOOR HOLDER	PAH60 SRI	689	LCN
2	EA	FLOOR STOP	FS18S	BLK	IVE
1	EA	SEAL	105 H&J	BLK	DHS
1	EA	MTG STILE SEAL	SA	BLK	DHS
1	EA	ASTRAGAL	139SP	600	NGP
1	EA	THRESHOLD	814 4" BEVELED FHSL	719	NGP

F. HwSet 05: Interior shop to office, etc.

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HINGE	5BB1 4.5 X 4 NRP	630	IVE
1	EA	OFFICE/ENTRY LOCK	LV9050T 03N L583-363	630	SCH
1	EA	CONVENTIONAL CORE	23-030	626	SCH
1	EA	SURFACE CLOSER	4011 H	689	LCN
1	EA	KICK PLATE	8400 16" X 2" LDW B4E	630	IVE
1	EA	FLOOR STOP	FS436	626	IVE
1	EA	SEAL	105 H&J	BLK	DHS
1	EA	DOOR BOTTOM	AMDB-3 + CC	719	DHS
1	EA	THRESHOLD	814 4" BEVELED FHSL	719	NGP

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G. HwSet 06: Exterior pair doors storage room.

Qty		Description	Catalog Number	Finish	Mfr
1	EA	CONT. HINGE	054HD	628	IVE
1	EA	CONT. HINGE	054HD EPT	628	IVE
1	EA	POWER TRANSFER	EPT10	689	VON
1	EA	AUTO FLUSH BOLT	FB31T	630	IVE
2	EA	MANUAL FLUSH BOLT	FB457 18"	626	IVE
1	EA	STOREROOM LOCK	LV9080T 03N 7/8" LIP	630	SCH
1	EA	CONVENTIONAL CORE	23-030	626	SCH
1	EA	SURFACE CLOSER	4111 AVB SHCUSH-SRI	689	LCN
1	EA	HYDRAULIC CHECK	4111 AVB SHCUSH ST2687	BLK	LCN
1	EA	DRIP CAP	16A	CL	NGP
1	EA	SEAL	105 H&J	BLK	DHS
1	EA	MTG STILE SEAL	SA	BLK	DHS
1	EA	ASTRAGAL	139SP	600	NGP
2	EA	DOOR SWEEP	200UA	CL	NGP
1	EA	THRESHOLD	425HD SIA FHSL	GRY	NGP
2	EA	DOOR CONTACT	679-05HM	BLK	SCE
1	EA	POWER SUPPLY	PS902	LGR	SCE

H. HwSet 07: Interior janitor, etc.- includes door closer.

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HINGE	5BB1 4.5 X 4 NRP	630	IVE
1	EA	STOREROOM LOCK	LV9080T 803N 03N	630	SCH
1	EA	CONVENTIONAL CORE	23-030	626	SCH
1	EA	DOOR HOLDER	PAH60 SRI	689	LCN
1	EA	FLOOR STOP	FS18S	BLK	IVE

I. HwSet 08: Interior restroom.

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HINGE	5BB1 4.5 X 4 NRP	630	IVE
1	EA	PRIVACY W/DEADBOLT	L9440 03N L583-363	630	SCH
1	EA	SURFACE CLOSER	4111 HEDA	689	LCN
1	EA	KICK PLATE	8400 16" X 2" LDW B4E	630	IVE
1	EA	SEAL	105 H&J	BLK	DHS
1	EA	THRESHOLD	814 4" BEVELED FHSL	719	NGP
1	EA	COAT AND HAT HOOK	572	626	IVE

Qty		Description	Catalog Number	Finish	Mfr
2	EA	INTERMEDIATE PIVOT	7215 INT	626	IVE
2	EA	PIVOT SET	7215 SET	626	IVE
2	EA	POWER TRANSFER	EPT10	689	VON
1	EA	ELEC PANIC HARDWARE	LX-RX-3549A-EO	626	VON
1	EA	ELEC PANIC HARDWARE	LX-RX-QEL+-3549A-NL-OP-LESS TRIM	626	VON
1	EA	RIM CYLINDER	20-057-ICX	626	SCH
2	EA	90 DEG OFFSET PULL	8190 12" O	630	IVE
2	EA	OH STOP & HOLDER	100H	630	GLY
2	EA	SURFACE CLOSER	4021 DEL MC	MTLPC	LCN
2	EA	MOUNTING PLATE	4020-18	MTLPC	LCN
2	EA	DOOR SWEEP	200UA	CL	NGP
1	EA	THRESHOLD	PER DETAIL, SIA FHSL	GRY	NGP
2	EA	DOOR CONTACT	679-05HM	BL	SCE
1	EA	POWER SUPPLY	PS914	LGR	VON

J. **HwSet 09-CR**: Aluminum storefront entry, narrow stile doors, panic hardware + card reader:

1. Access control system components in Specifications Division 28 – Electronic Safety and Security.

2. Head, jamb, & meeting stile seals: part of frame and door package.

K. HwSet 10-CR-LK: Exterior entry, card access.

Qty		Description	Catalog Number	Finish	Mfr
1	EA	CONT. HINGE	054HD EPT	628	IVE
1	EA	POWER TRANSFER	EPT10	689	VON
1	EA	EU STOREROOM LOCK	RX-LV9080TEU 03N L283-239	630	SCH
1	EA	CONVENTIONAL CORE	23-030	626	SCH
1	EA	ARMOR COLLAR	A008794 SERIES	630	FAL
1	EA	LOCK GUARD	LG10	630	IVE
1	EA	SURFACE CLOSER	4111 AVB EDA SRI	689	LCN
1	EA	KICK PLATE	8400 16" X 2" LDW B4E	630	IVE
1	EA	FLOOR STOP/HOLDER	FS42	626	IVE
1	EA	SEAL	105 H&J	BLK	DHS
1	EA	DOOR BOTTOM	AMDB-3 + CC	719	DHS
1	EA	THRESHOLD	PER DETAIL, SIA FHSL	GRY	NGP
1	EA	DOOR CONTACT	679-05HM	BL	SCE
1	EA	POWER SUPPLY	PS902	LGR	SCE

 Access control system components in Specifications Division 28 – Electronic Safety and Security. L. HwSet 10-CR-PH: Exterior entry, card access, panic hardware.

Qty		Description	Catalog Number	Finish	Mfr
1	EA	CONT. HINGE	054HD EPT	628	IVE
1	EA	POWER TRANSFER	EPT10	689	VON
1	EA	ELEC PANIC HARDWARE	E LX-RX-98-L-E996-03-FSE	626	VON
1	EA	SURFACE CLOSER	4111 AVB EDA SRI	689	LCN
1	EA	KICK PLATE	8400 16" X 2" LDW B4E	630	IVE
1	EA	FLOOR STOP/HOLDER	FS42	626	IVE
1	EA	SEAL	105 H&J	BLK	DHS
1	EA	DOOR BOTTOM	AMDB-3 + CC	719	DHS
1	EA	THRESHOLD	PER DETAIL, SIA FHSL	GRY	NGP
1	EA	DOOR CONTACT	679-05HM	BLK	SCE
1	EA	POWER SUPPLY	PS902	LGR	SCE

1. Access control system components in Specifications Division 28 – Electronic Safety and Security.

M. HwSet 11: Pr drs to mech'l rm, card access.

Qty		Description	Catalog Number	Finish	Mfr
1	EA	CONT. HINGE	054HD	628	IVE
1	EA	CONT. HINGE	054HD EPT	628	IVE
1	EA	POWER TRANSFER	EPT10	689	VON
1	EA	AUTO FLUSH BOLT	FB31T	630	IVE
1	EA	MANUAL FLUSH BOLT	FB457 18"	626	IVE
1	EA	EU STOREROOM LOCK	RX-LV9080TEU 803N 03N 7/8" LIP	630	SCH
			L283-239		
1	EA	CONVENTIONAL CORE	23-030	626	SCH
1	EA	ARMOR COLLAR	A008794 SERIES	630	FAL
1	EA	HYDRAULIC CHECK	4111 AVB EDA ST2687	BLK	LCN
1	EA	SURFACE CLOSER	4111 AVB SHCUSH SRI	689	LCN
2	EA	KICK PLATE	8400 16" X 1" LDW B4E	630	IVE
1	EA	DRIP CAP	16A	CL	NGP
1	EA	SEAL	105 H&J	BLK	DHS
1	EA	MTG STILE SEAL	SA	BLK	DHS
1	EA	ASTRAGAL	139SP	600	NGP
2	EA	DOOR SWEEP	200UA	CL	NGP
1	EA	THRESHOLD	425HD SIA FHSL	GRY	NGP
2	EA	DOOR CONTACT	679-05HM	BL	SCE
1	EA	POWER SUPPLY	PS902	LGR	SCE

1. Access control system components in Specifications Division 28 – Electronic Safety and Security.
| N. | HwSet 12: | Exterior from electrical room, switchload of at least 1200A: | panic |
|----|------------|--|-------|
| | hardware + | Card access. | |

Qty 1	FΔ	Description	Catalog Number	Finish 628	Mfr
1	EA	POWER TRANSFER	EPT10	689	VON
1	EA	ELEC PANIC HARDWARE	LX-RX-98-L-E996-03-KN-FSE-499F	626	VON
1	EA	RIM CYLINDER	20-057-ICX	626	SCH
1	EA	SURFACE CLOSER	4111 AVB EDA SRI	689	LCN
1	EA	KICK PLATE	8400 16" X 2" LDW B4E	630	IVE
1	EA	FLOOR STOP/HOLDER	FS42	626	IVE
1	EA	SEAL	105 H&J	BLK	DHS
1	EA	DOOR BOTTOM	AMDB-3 + CC	719	DHS
1	EA	THRESHOLD	PER DETAIL, SIA FHSL	GRY	NGP
1	EA	DOOR CONTACT	679-05HM	BL	SCE
1	EA	POWER SUPPLY	PS902	LGR	SCE

- 1. Switchload of at least 1200A: Ph req'd.
- 2. Access control system components in Specifications Division 28 Electronic Safety and Security.

O. HwSet 13: Conference room, push/pull non-locking/non-latching.

Qty		Description	Catalog Number	Finish	Mfr
2	EA	PUSH PLATE	3DD1 4.3 A 4 NKP 8200 6"X16"	630	IVE
2	EA	PULL PLATE	8302 10" 4"X16" STD	630	IVE
2	EA	SURFACE CLOSER	4111 HEDAW/62G	689	LCN
2	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
2	EA	FLOOR STOP	FS436	626	IVE
1	EA	MTG STILE SEAL	SA	BLK	DHS
2	EA	CNCLD BTM SEAL	AMDB-3 SWE		DHS
1	EA	THRESHOLD	814 4" BEVELED FHSL	719	NGP

1. Head and jamb seal: Integral part of frame assembly.

P. HwSet 14: Inswinging interior push/pull door, non-locking.

Qty 3 1 1 1	EA EA EA EA	Description HINGE PUSH PLATE PULL PLATE SURFACE CLOSER	Catalog Number 5BB1 4.5 X 4 NRP 8200 6"X16" 8302 10" 4"X16" STD 4011 H	Finish 630 630 630 689 630	Mfr IVE IVE IVE LCN
1 1	EA EA	SURFACE CLOSER KICK PLATE	4011 H 8400 10" X 2" LDW	689 630	LCN IVE
1	EA	FLOOR STOP	FS436	626	IVE

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Q. HwSet 15: Vestibule door, lockable.

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HW HINGE	5BB1HW 4.5 X 4 NRP	630	IVE
1	EA	OFFICE/ENTRY LOCK	L9050T 03N	630	SCH
1	EA	CONVENTIONAL CORE	23-030	626	SCH
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	EA	WALL STOP	WS406/407 CVX	630	IVE
1	EA	AUX SEAL	105 H&J	BLK	DHS
1	EA	CNCLD BTM SEAL	AMDB-3 SWE		DHS
1	EA	THRESHOLD	814 4" BEVELED FHSL	719	NGP

R. HwSet 15-P/P: Vestibule door, push/pull - non-locking.

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HW HINGE	5BB1HW 4.5 X 4 NRP	630	IVE
1	EA	PUSH PLATE	8200 6" X 16"	630	IVE
1	EA	PULL PLATE	8302 10" 4" X 16"	630	IVE
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	EA	WALL STOP	WS406/407 CVX	630	IVE
1	EA	AUX SEAL	105 H&J	BLK	DHS
1	EA	CNCLD BTM SEAL	AMDB-3 SWE		DHS
1	EA	THRESHOLD	814 4" BEVELED FHSL	719	NGP

S. HwSet 16: Storage closet, locking.

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HINGE	5BB1 4.5 X 4 NRP	630	IVE
1	EA	OFFICE/ENTRY LOCK	L9050T 03N	630	SCH
1	EA	CONVENTIONAL CORE	23-030	626	SCH
1	EA	MOP PLATE	8400 4" X 1" LDW B4E	630	IVE
1	EA	FLOOR STOP	FS436	626	IVE
1	EA	SEAL	105 H&J	BLK	DHS

T. HwSet 17: Admin area telephone / data / mechanical / electrical / janitor.

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HINGE	5BB1 4.5 X 4 NRP	630	IVE
1	EA	STOREROOM LOCK	LV9080T 803N 03N	630	SCH
1	EA	CONVENTIONAL CORE	23-030	626	SCH
1	EA	SURFACE CLOSER	4011 H	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	EA	FLOOR STOP	FS436	626	IVE

Qty		Description	Catalog Number	Finish	Mfr
2	EA	HINGE	5BB1 4.5 X 4 NRP	630	IVE
1	EA	ELECTRIC HINGE	5BB1 4.5 X 4 TW4	630	IVE
1	EA	ELECTRIC PANIC HARDWARE	LX-RX-98-L-E996-03-KN-FSE	626	VON
1	EA	RIM CYLINDER	20-057-ICX	626	SCH
1	EA	SURFACE CLOSER	4011 H	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	EA	FLOOR STOP	FS436	626	IVE
1	EA	DOOR CONTACT	679-05HM	BLK	SCE
1	EA	POWER SUPPLY	PS902	LGR	SCE

U. **HwSet 18**: Electrical room, switchload at least 1200A: ph required, card access.

V. HwSet 19: Restroom / lockers.

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HW HINGE	5BB1HW 4.5 X 4 NRP	630	IVE
1	EA	PUSH PLATE	8200 6"X16"	630	IVE
1	EA	PULL PLATE	8302 10" 4"X16" STD	630	IVE
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	EA	WALL STOP	WS406/407 CVX	630	IVE
1	EA	AUX SEAL	105 H&J	BLK	DHS
1	EA	GRANITE THRSHLD	(SEE SECTION 09 30 13)		

W. HwSet 20: Equipment room at roof access stair.

Qty		Description	Catalog Number	Finish	Mfr
2	EA	HINGE	5BB1 4.5 X 4 NRP	630	IVE
1	EA	SURFACE CLOSER	4111 EDA	689	LCN
1	EA	KICK PLATE	8400 16" X 2" LDW B4E	630	IVE
1	EA	FLOOR STOP	FS436	626	IVE
1	EA	SEAL	105 H&J	BLK	DHS

X. HwSet 21: Access to roof from roof access stair.

Qty		Description	Catalog Number	Finish	Mfr
1	EA	CONT. HINGE	054HD	628	IVE
1	EA	SURFACE CLOSER	4111 AVB SHCUSH SRI	689	LCN
1	EA	KICK PLATE	8400 16" X 2" LDW B4E	630	IVE
1	EA	DRIP CAP	16A	CL	NGP
1	EA	SEAL	105 H&J	BLK	DHS
1	EA	DOOR BOTTOM	AMDB-3 + CC	719	DHS
1	EA	THRESHOLD	PER DETAIL, SIA FHSL	GRY	NGP
1	EA	DOOR CONTACT	679-05HM	BL	SCE

1. Watertight flush top rail.

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Y. **HwSet 22**: Single out swing exterior entry door, ph (hazardous materials), threshold for spill containment.

Qty		Description	Catalog Number	Finish	Mfr
1	EA	CONT. HINGE	054HD	628	IVE
1	EA	PANIC HARDWARE	98-L-BE-996-03-KN	626	VON
1	EA	SURFACE CLOSER	4111 AVB EDA SRI	689	LCN
1	EA	KICK PLATE	8400 16" X 2" LDW B4E	630	IVE
1	EA	FLOOR STOP/HOLDER	FS42	626	IVE
1	EA	DRIP CAP	16A	CL	NGP
1	EA	SEAL	105 H&J	BLK	DHS
1	EA	DOOR BOTTOM	AMDB-3 + CC	719	DHS
1	EA	THRESHOLD	425HD SIA FHSL	GRY	NGP
1	EA	DOOR CONTACT	679-05HM	BLK	SCE

1. Watertight flush top rail.

Z. HwSet 23: In swinging single-occupancy restroom.

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HINGE	5BB1 4.5 X 4 NRP	630	IVE
1	EA	PRIVACY W/DEADBOLT	L9440 03N L583-363	630	SCH
1	EA	SURFACE CLOSER	4011 H	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	EA	MOP PLATE	8400 4" X 1" LDW B4E	630	IVE
1	EA	WALL STOP	WS406/407 CVX	630	IVE
1	EA	SEAL	105 H&J	BLK	DHS
1	EA	COAT AND HAT HOOK	572	626	IVE

AA.HwSet 24: Sort area to janitor.

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HINGE	5BB1 4.5 X 4 NRP	630	IVE
1	EA	STOREROOM LOCK	LV9080T 803N 03N	630	SCH
1	EA	CONVENTIONAL CORE	23-030	626	SCH
1	EA	SURFACE CLOSER	4011 H	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	EA	FLOOR STOP	FS436	626	IVE
1	EA	SEAL	105 H&J	BLK	DHS

BB.**HwSet 25**: Single out swing exterior utility door, panic hardware,.

Qty		Description	Catalog Number	Finish	Mfr
1	EA	CONT. HINGE	054HD	628	IVE
1	EA	ARMOR COLLAR	A008794 SERIES	630	FAL
1	EA	LOCK GUARD	LG10	630	IVE
1	EA	HYDRAULIC CHECK	4111 AVB EDA ST2687	BLK	LCN
1	EA	KICK PLATE	8400 16" X 2" LDW B4E	630	IVE
1	EA	FLOOR STOP/HOLDER	FS42	626	IVE
1	EA	DRIP CAP	16A	CL	NGP
1	EA	SEAL	105 H&J	BLK	DHS
1	EA	DOOR BOTTOM	AMDB-3 + CC	719	DHS
1	EA	DOOR SWEEP	200UA	CL	NGP
1	EA	THRESHOLD	425HD SIA FHSL	GRY	NGP
1	EA	DOOR CONTACT	679-05HM	BL	SCE
		1 Matartiabt fluch tan ro			

1. Watertight flush top rail.

CC. HwSet 26: In swinging 180 degrees office/breakroom, non-locking.

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HINGE	5BB1 5 X 5 NRP	630	IVE
1	EA	PASSAGE SET	L9010 03N	630	SCH
1	EA	SURFACE CLOSER	4011 H	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	EA	MOP PLATE	8400 4" X 1" LDW B4E	630	IVE
1	EA	WALL STOP	WS406/407 CVX	630	IVE
1	EA	SEAL	105 H&J	BLK	DHS
1	EA	COAT AND HAT HOOK	572	626	IVE

DD. HwSet 27: Outswinging changing room, privacy lock, limited outswing.

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HW HINGE	5BB1HW 4.5 X 4 NRP	630	IVE
1	EA	PRIVACY W/DEADBOLT	L9440 03N L583-363	630	SCH
1	EA	SURFACE CLOSER	4111 AVB SHCUSH SRI	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	EA	MOP PLATE	8400 4" X 1" LDW B4E	630	IVE
1	EA	SEAL	105 H&J	BLK	DHS
1	EA	COAT AND HAT HOOK	572	626	IVE

EE.HwSet 28: Swap room, non-locking.

Qty 3	EA	Description HW HINGE	Catalog Number 5BB1HW 4.5 X 4 NRP	Finish 630	Mfr IVE
1	EA	PASSAGE SET	L9010 03N	630	SCH
1	EA	SURFACE CLOSER	4011 H	689	LCN
1	EA	KICK PLATE	8400 16" X 2" LDW B4E	630	IVE
1	EA	MOP PLATE	8400 4" X 1" LDW B4E	630	IVE
1	EA	FLOOR STOP	FS436	626	IVE
1	EA	SEAL	105 H&J	BLK	DHS

FF. HwSet 29: Outswinging exterior to swap room, panic hardware.

Qty 1	EA	Description CONT. HINGE	Catalog Number 054HD EPT	Finish 628	Mfr IVE
1	EA	ELECTRIC PANIC HARDWARE	LX-RX-98-L-E996-03-KN-FSE	626	VON
1	EA	ARMOR COLLAR	A008794 SERIES	630	FAL
1	EA	SURFACE CLOSER	4011 SRI	689	LCN
1	EA	KICK PLATE	8400 16" X 2" LDW B4E	630	IVE
1	EA	FLOOR STOP/HOLDER	FS42	626	IVE
1	EA	SEAL	105 H&J	BLK	DHS
1	EA	DOOR BOTTOM	AMDB-3 + CC	719	DHS
1	EA	THRESHOLD	425HD SIA FHSL	GRY	NGP
1	EA	DOOR CONTACT	679-05HM	BLK	SCE
1	EA	POWER SUPPLY	PS902	LCR	SCE

GG.	HwSet	: 30 :	Fire-rated	exterior pa	air, electro	mag h.o.,	fire/life-safety	system
inte	erface.	Note	: Not an e	xit.				

Qty		Description	Catalog Number	Finish	Mfr
1	EA	CONT. HINGE	054HD	628	IVE
1	EA	CONT. HINGE	054HD EPT	628	IVE
1	EA	POWER TRANSFER	EPT10	689	VON
1	SET	AUTO FLUSH BOLT	FB32	630	IVE
1	EA	STOREROOM LOCK	LV9080T 803N 7/8" LIP	630	SCH
1	EA	CONVENTIONAL CORE	23-030	626	SCH
1	EA	ARMOR COLLAR	A008794 SERIES	630	FAL
1	EA	COORDINATOR	COR7G	626	IVE
2	EA	SURFACE CLOSER	4111 AVB EDA SRI	689	LCN
2	EA	KICK PLATE	8400 16" X 1" LDW B4E	630	IVE
2	EA	MOP PLATE	8400 4" X 1" LDW B4E	630	IVE
2	EA	MAG HOLDER, WALL	SEM 7800 SERIES	689	LCN
1	EA	SEAL	105 H&J	BLK	DHS
1	EA	MTG STILE SEAL	SA	BLK	DHS
1	EA	ASTRAGAL	139SP	600	NGP
2	EA	DOOR BOTTOM	AMDB-3 + CC	719	DHS
1	EA	THRESHOLD	425HD SIA FHSL	GRY	NGP
2	EA	DOOR CONTACT	679-05HM	BLK	SCE
1	EA	POWER SUPPLY	PS902	LGR	SCE

1. Doors can be placed in hold-open position, and will release to automatically self-close and positively latch in a fire/life-safety alarm condition.

HH. **HwSet 31**: Storage, limited outswing.

	Description	Catalog Number	Finish	Mfr
EA	HW HINGE	5BB1HW 4.5 X 4 NRP	630	IVE
EA	STOREROOM LOCK	LV9080T 03N	630	SCH
EA	CONVENTIONAL CORE	23-030	626	SCH
EA	SURFACE CLOSER	4111 AVB SHCUSH SRI	689	LCN
EA	KICK PLATE	8400 16" X 2" LDW B4E	630	IVE
EA	MOP PLATE	8400 4" X 1" LDW B4E	630	IVE
EA	SEAL	105 H&J	BLK	DHS
	EA EA EA EA EA EA	DescriptionEAHW HINGEEASTOREROOM LOCKEACONVENTIONAL COREEASURFACE CLOSEREAKICK PLATEEAMOP PLATEEASEAL	DescriptionCatalog NumberEAHW HINGE5BB1HW 4.5 X 4 NRPEASTOREROOM LOCKLV9080T 03NEACONVENTIONAL CORE23-030EASURFACE CLOSER4111 AVB SHCUSH SRIEAKICK PLATE8400 16" X 2" LDW B4EEAMOP PLATE8400 4" X 1" LDW B4EEASEAL105 H&J	DescriptionCatalog NumberFinishEAHW HINGE5BB1HW 4.5 X 4 NRP630EASTOREROOM LOCKLV9080T 03N630EACONVENTIONAL CORE23-030626EASURFACE CLOSER4111 AVB SHCUSH SRI689EAKICK PLATE8400 16" X 2" LDW B4E630EAMOP PLATE8400 4" X 1" LDW B4E630EASEAL105 H&JBLK

II. **HwSet 32-HO:** Ph, non-locking, fire-rated, hazardous material, electromagnetic h.o.

Qty		Description	Catalog Number	Finish	Mfr
2	EA	CONT. HINGE	054HD	628	IVE
2	EA	FIRE EXIT HARDWARE	9849-L-BE-F-996-06	626	VON
2	EA	SURFACE CLOSER	4111 AVB EDA SRI	689	LCN
2	EA	KICK PLATE	8400 16" X 1" LDW B4E	630	IVE
2	EA	FLOOR STOP	FS18S	BLK	IVE
2	EA	MAG HOLDER, WALL	SEM 7800 SERIES	689	LCN
1	EA	SEAL	105 H&J	BLK	DHS
1	EA	MTG STILE SEAL	SA	BLK	DHS
2	EA	DOOR BOTTOM	AMDB-3 + CC	719	DHS
1	EA	THRESHOLD	425HD SIA FHSL	GRY	NGP

JJ. HwSet 33: Bulking room.

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HINGE	5BB1 4.5 X 4 NRP	630	IVE
1	EA	PASSAGE SET	L9010 03N	630	SCH
1	EA	SURFACE CLOSER	4111 AVB EDA SRI	689	LCN
1	EA	KICK PLATE	8400 16" X 2" LDW B4E	630	IVE
1	EA	MOP PLATE	8400 4" X 1" LDW B4E	630	IVE
1	EA	FLOOR STOP/HOLDER	FS42	626	IVE
1	EA	SEAL	105 H&J	BLK	DHS

END OF SECTION

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SECTION 08 81 00 GLASS AND GLAZING

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes: Glass and glazing.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Division 00 Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 01 General Requirements.
 - 3. Section 07 92 00 Joint Sealants.
 - 4. Section 08 11 00 Metal Doors and Frames and Borrowed Light Frames.
 - 5. Section 08 41 10 Storefront.
 - 6. Section 08 44 13 Curtain Wall System (Thermally Broken).

1.02 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. American National Standards Institute (ANSI):
 - a. Z97.1, Glazing Materials Used in Buildings Safety Performance Specifications and Methods of Test.
 - 2. ASTM International (ASTM):
 - a. C1036, Standard Specification for Flat Glass.
 - b. C1048, Standard Specification for Heat-Treated Flat Glass-Kind HS, Kind FT Coated and Uncoated Glass.
 - c. E119, Standard Test Methods for Fire Tests of Building Construction and Materials.
 - d. E2190, Standard Specification for Insulating Glass Unit Performance and Evaluation.
 - 3. Code of Federal Regulations (CFR):
 - a. Title 16 Commercial Practices, Chapter ii Consumer Product Safety Commission (CPSC), Subchapter B - Consumer Product Safety Act Regulations:
 - 1) 16 CFR 1201, Safety Standard for Architectural Glazing Materials.
 - 4. Glass Association of North America (GANA):
 - a. Glazing Manual.
 - 5. Insulating Glass Certification Council (IGCC).

- 6. Insulating Glass Manufacturers Alliance (IGMA):
 - a. TM-3000, North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use.
- 7. National Fire Protection Association (NFPA).
 - a. 257, Standard on Fire Test for Window and Glass Block Assemblies.
- 8. Underwriters Laboratories, Inc. (UL):
 - a. 9, Standard for Fire Tests of Window Assemblies.
- 9. Building Code:
 - a. International Code Council (ICC):
 - International Building Code and associated standards, 2009 Edition as amended by the State of Washington, and the City of Bellevue Amendments, referred to herein as Building Code.
- B. Safety glazing shall be provided in all locations where required by the Building Code and CPSC 16 CFR 1201.
- C. Fire-Protection-Rated Glazing Labeling: Permanently mark fire-protectionrated glazing with certification label of a testing agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, test standard, whether glazing is for use in fire doors or other openings, whether or not glazing passes hose-stream test, whether or not glazing has a temperature rise rating of 450 DegF, and the fire-resistance rating in minutes.

1.03 DEFINITIONS

- A. Installer or Applicator:
 - 1. Installer or applicator is the person actually installing or applying the product in the field at the Project site.
 - 2. Installer and applicator are synonymous.
- B. Specialty Glass: Glass as specified in the Contract Documents and treated/modified by a specialty artisan trade.
- C. Specialty Glass Sponsor (King County): 4Culture I Public Art (4Culture).
 1. Tamar Benzikry-Stern; 101 Prefontaine PI S Seattle, WA 98104. Phone 206.296.8692; Tamar.Benzikry-Stern@4culture.org.
- D. Glazing Artisan:
 - 1. Vendor responsible for etching glass panels.
 - a. Etching work by Glassworks, Inc. will be paid for under a separate contract with the Owner.

1.04 SUBMITTALS

A. Submittal Procedures: See Section 01 33 00 – Submittal Procedures for requirements for the mechanics and administration of the submittal process.

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- B. Leadership in Energy and Environmental Design (LEED[®]) Documentation: Submit the following in accordance with Section 01 81 30 – Sustainability Requirements.
 - 1. Product Data for MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content; include statement indicating costs for each product having recycled content.
 - 2. Product Data for MR 5: For products and materials required to comply with requirements for regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.
 - 3. Product Data for IEQ 4.1: For adhesives and sealants used inside the weatherproofing system, documentation including printed statement of VOC content.
 - 4. LEED Materials Tracking Form: Form to be provided in an electronic format to the Contractor to record LEED materials used on the project.
- C. Approval Submittals:
 - 1. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 - c. Certification that glass has been tested and approved for use in fire rated doors or walls.
 - 1) Copies of all test criterions.
 - d. Specialty Glass layout Drawings indicating size and location of all glass.
 - 2. Certification that insulated glass units meet requirements of IGCC and are certified by IGCC to ASTM E2190.
 - 3. Samples:
 - a. 12 IN x 12 IN sample of each type, color, and thickness specified except clear glass (glass Type 1 and 2).
- D. Closeout Submittals:
 - Extended Warranty: Provide two executed copies of the Extended Warranty required by this Section in accordance with the provisions of Section 01 78 00 – Closeout Procedures.

1.05 EXTENDED WARRANTY

- A. In accordance with the provisions of Section 01 78 00 Closeout Procedures, provide an Extended Warranty for the Work of this Section:
 - 1. Warranty period for Work of this Section is five (5) years commencing on the date of Substantial Completion.

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PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. Clear glass tempered, float and heat strengthened:
 - a. PPG. (www.ppg.com).
 - b. Viracon(www.viracon.com).
 - c. Pilkington (<u>www.pilkington.com</u>).
 - d. Or approved equal.
 - 2. Tinted glass tempered, float and heat strengthened:
 - a. PPG.(www.ppg.com).
 - b. Viracon (www.viracon.com).
 - c. Pilkington (<u>www.pilkington.com</u>).
 - d. Or approved equal.
 - 3. Insulating glass units tinted and clear:
 - a. PPG.(www.ppg.com).
 - b. Viracon (www.viracon.com).
 - c. Pilkington (<u>www.pilkington.com</u>).
 - d. Or approved equal.
 - 4. Fire rated glass:
 - a. SAFTI.(www.safti.com).
 - b. Pilkington Pyrostop (www.pilkington.com).
 - c. Or approved equal.
 - 5. Specialty Glass, as modified by 4Culture.
 - a. 4Culture will coordinate with Glazing Artisan, Glassworks, Inc. at 927 Rainler Ave.S, Seattle, W.A. 98144 or <u>www.glassworksinc.com</u>, regarding etching of glass.
 - 6. Gaskets, glazing compounds, setting blocks, spacers, sealant, sealant tape, etc., as recommended by glass manufacturer, glass unit fabricator, or as required by NFPA.
- B. Submit request for substitution in accordance with Specification Section 01 60 00 Product Requirements.

2.02 MATERIALS

- A. Clear and Tinted Float Glass:
 - 1. 1/4 IN thick.
 - 2. ASTM C1036.

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- 3. Clear glass:
 - a. Type I, Class I, Quality q3.
- 4. Tinted glass:
 - a. Type I, Class II, Quality q3.
 - b. Color: See schedule in PART 3.
- B. Clear Tempered Float Glass:
 - 1. 1/4 IN thick.
 - 2. ASTM C1048.
 - a. Kind FT, Condition A, Type 1, Class I.
 - 3. ANSI Z97.1.
- C. Tinted Tempered Float Glass:
 - 1. 1/4 IN thick.
 - 2. ASTM C1048.
 - a. Kind FT, Condition A, Type I, Class 2.
 - 3. ANSI Z97.1.
 - 4. Color: See schedule in PART 3.
- D. Insulating Glass Units:
 - 1. ASTM E2190, Class A.
 - 2. Two (2) sheets of 1/4 IN thick glass separated by a 1/2 IN dehydrated air space hermetically sealed.
 - 3. Color: See schedule in PART 3.
- E. Insulated, Low E, Translucent Glass Units:
 - 1. ASTM E2190, Class A.
 - 2. Two (2) sheets of 1/4 IN thick, heat strengthened glass separated by a 1/2 IN dehydrated air space hermetically sealed.
 - 3. Exterior glass: 1/4 IN clear, heat strengthened with Low E coating on #2 surface.
 - 4. Interior glass: 1/4 IN clear, heat strengthened screen #3058 with V1085 simulated acid etch on the #3 surface.
 - 5. Glass specification number based on Viracon:
 - a. Exterior glass: 1/4 IN clear, heat strengthened with VE85 on #2 surface.
 - b. 1/2 IN air space.
 - c. Interior glass: 1/4 IN clear, heat strengthened screen #3058 with V1085 simulated acid etch on the #3 surface.

- 6. Provide alternate glass type to meet safety glazing requirements of the Building Code, CPSC 16 CFR 1201, and any other applicable glazing safety rules, codes, laws, etc.
- F. Film-Faced Ceramic Glazing: Clear, ceramic flat glass; 3/16-inch nominal thickness; faced on one surface with a clear glazing film; complying with testing requirements in 16 CFR 1201 for Category II materials.
 - 1. Fire protected rated glazing
 - a. 60 minute fire resistive with hose-stream test.
 - b. Comprised of inboard and outboard tempered lites protecting a fire resistive interlayer.
 - c. Thickness: 1-1/8 IN standard.
 - d. Weight: 8 LBS/SQ IN in 1-1/8 IN standard profile.
 - e. NFRC Certifications in conjunction with fire rated framing.
 - f. Must meet NFRC 100 rated U-Factor of 0.39 when insulated with Solarban 60.
 - g. Must meet NFRC 200 rated SHGC of 0.31 when insulated with Solarban 60.
 - h. Must meet NFRC 500 rated Condensation Resistance of 57 when insulated with Solarban 60.
 - i. Sound Transmission Rating: Must provide a minimum of STC 42 rating in 1-1/8 IN (29 mm) standard profile.
 - j. Appearance: Must be tint-free, optically clear fire rated glazing.
 - k. Fire Rating: Must be fire rated to 60 minutes with hose stream and meet ASTM E-119.
 - I. Impact Safety Resistance: CPSC 16 CFR 1201 Cat. I & II.
 - 2. Each piece of fire-rated glazing material shall be labeled with a permanent logo including name of product, manufacturer, testing laboratory, fire rating period and safety glazing standards.
 - 3. Glazing shall be installed in an equally rated framing system.
 - 4. Submit request for substitution in accordance with Specification Section 01 60 00.
- G. Specialty Glass:
 - 4Culture will coordinate etch glass per exhibits in Section 3.04 Schedule and Poem Glass Etching Artwork Renderings provided as Available Information only in accordance with Section 01 10 00 – Summary of Work.
- H. Glazing Compounds:
 - 1. Non-sag, non-stain type.
 - 2. Pigmented to match frame units not requiring painting.
 - 3. Compatible with adjacent surfaces.

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- 4. One- or two-part polyurethane or silicone sealant for use in setting glass.
 - a. Provide glazing compounds which will not be affected by chemicals stored in rooms where glazing compounds are used.
- I. Sealant Tape: Butyl rubber sealant tape or ribbon having a continuous neoprene shim.
- J. Gaskets:
 - 1. Flexible polyvinyl chloride or neoprene.
 - a. Provide gaskets which will not be affected by chemicals stored in rooms where gaskets are used.
 - 2. Extruded of profile and hardness required to receive glass and provide a watertight installation.
 - 3. Provide gaskets in accordance with NFPA in fire rated glazing.
- K. Setting Blocks and Spacers:
 - 1. Neoprene or EPDM, compatible with sealants used.
 - 2. Setting blocks: 70-90 durometer.
 - 3. Spacers: 40-50 durometer.
- L. Compressible Filler Stock: Closed-cell jacketed rod stock of synthetic rubber or plastic foam.
- M. Shims, Clips, Springs, Angles, Beads, Attachment Screws and Other Miscellaneous Items: As required by condition.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Install in accordance with recommendations of manufacturer, GANA Glazing Manual and IGMA TM-3000.
- B. Install setting blocks in adhesive or sealant.
- C. Install spacers inside and out, of proper size and spacing, for all glass sizes larger than 50 united inches, except where gaskets are used for glazing.
- D. Provide 1/8 IN minimum bite of spacers on glass.
- E. Spacer thickness to equal sealant width.
- F. Prevent sealant exudation from glazing channels of insulating glass which is more than 1/2 IN thick; colored, heat absorbing, coated or laminated glass sizes larger than 75 united IN; and other glass more than 9/32 IN thick or larger than 125 united IN.
 - 1. Leave void at heel (or install filler) at jambs and head.
 - 2. Do not leave void (or install filler) at sill.
- G. Miter cut and bond gasket ends together at corners.

- H. Immediately after installation, attach crossed streamers to framing held away from glass.
- I. Use polysulfide-based glazing sealants in window assembly and as perimeter sealant around frames in areas which may be exposed to chlorine gas or chlorine liquid splash or spillage.
 - 1. See Specification Section 07 92 00 Joint for sealants.
- J. Specialty Glass:
 - 1. Contractor shall schedule and coordinate with 4Culture for etching of glass.
 - a. 4Culture is responsible to coordinate layout and poem details with Glazing Artisan.
 - 2. Contractor shall deliver glass components to Glazing Artisan.
 - 3. Contractor shall pick-up etched glass components from Glazing Artisan and delivery to installer for final shop fabrication.
 - 4. Contractor shall install Specialty Glass.

3.02 FIELD QUALITY CONTROL

- A. Do not install glass with edge damage.
- B. Do not apply anything to surfaces of glass.
- C. Remove and replace damaged glass.

3.03 CLEANING

- A. Maintain glass reasonably clean during construction, so that it will not be damaged by corrosive action and will not contribute to deterioration of other materials.
- B. Wash and polish glass on both faces not more than seven (7) days prior to acceptance of work in each area.
 - 1. Comply with glass manufacturer's recommendations.

3.04 SCHEDULES

- A. Glass Type 1: Clear float glass.
- B. Glass Type 2: Clear, tempered float glass.
- C. Glass Type 3: Tinted float glass.1. Bronze.
- D. Glass Type 4: Tinted, tempered float glass.1. Bronze.

- E. Glass Type 6: Insulating glass.
 - 1. Outside glass: Type 3 or 4.
 - 2. Inside glass: Type 1 or 2.
- F. Specialty Glass:
 - 1. Exhibits below illustrates text layout concept:
 - a. Contact 4Culture for final layout.





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END OF SECTION

SECTION 08 90 00 LOUVERS AND VENTS

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes: Louvers and vents.
- B. Related Sections include but are not necessarily limited to:
 - 1. Division 00 Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 01 General Requirements.
 - 3. Section 07 62 00 Flashing and Sheet Metal.
 - 4. Section 07 92 00 Joint Sealants.

1.02 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. Aluminum Association (AA):
 - a. DAF 45, Designation System for Aluminum Finishes.
 - 2. Air Movement and Control Association (AMCA).
 - 3. ASTM International (ASTM):
 - a. B221, Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

1.03 SUBMITTALS

- A. Submittal Procedures: See Section 01 33 00 Submittal Procedures for requirements for the mechanics and administration of the submittal process.
- B. Leadership in Energy and Environmental Design (LEED[®]) Documentation: Submit the following in accordance with Section 01 81 30 – Sustainability Requirements:
 - 1. Completed LEED Materials Submittal Form.
- C. Approval Submittals:
 - 1. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 - c. Color chart showing manufacturer's full line of colors including exotic and special colors for color selection by Project Representative.

- 2. Shop Drawings:
 - a. Show location of each louver or vent, indicating size and arrangement of blank off plates if required.
- D. Quality Assurance Submittals:
 - 1. Statement of Manufacturer's Qualifications.
 - 2. Statement of Installer Qualifications.
- E. Closeout Submittals:
 - Operation and Maintenance (O&M) Manual Content: Provide O&M Manual documentation as required by Section 01 73 00 – Operation and Maintenance Manuals.
 - 2. Extended Warranty: Provide two executed copies of the Extended Warranty required by this Section in accordance with the provisions of Section 01 78 00 Closeout Procedures.

1.04 EXTENDED WARRANTY

- A. In accordance with the provisions of Section 01 78 00 Closeout Procedures, provide an Extended Warranty for the Work of this Section:
 - 1. Warranty period for Work of this Section in two (2) years commencing on the date of Substantial Completion.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. Louvers:
 - a. Airolite Co.
 - b. Construction Specialties, Inc.
 - c. Ruskin Manufacturing.
 - d. Industrial Louvers, Inc.
 - e. American Warming.
 - f. Or approved equal.
- B. Submit request for substitution in accordance with Specification Section 01 60 00 – Product Requirements.

2.02 MANUFACTURED UNITS

- A. Louvers:
 - 1. 4 IN deep.
 - 2. Drainable with blades at 37-1/2 degrees.
 - 3. Continuous blade appearance.

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- 4. ASTM B221 extruded aluminum, alloy 6063T5, minimum 0.081 IN thick.
- 5. Minimum free area: 8.58 SF for 4 x 4 FT louver.
- 6. Maximum pressure drop: 0.10 IN of water at 700 fpm.
- 7. Water penetration: 0.01 OZ/SF at 873 fpm.
- 8. AMCA certified.
- 9. Insect screen:
 - a. 18-16 mesh aluminum.
 - b. Install in standard aluminum frame.
- B. Anchors, Fasteners, Reinforcing: Aluminum or stainless steel.
- C. Finish:
 - 1. Architectural Class 1 coating per AA DAF 45.
 - a. Color to match building finish
- D. Size: Refer to Mechanical Drawings for louver size, and refer to Architectural Drawings for louver shapes.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install anchoring and bracing accessories as required.
- C. Seal around perimeter on exterior and interior.1. See Section 07 92 00 Joint Sealants.
- D. Install 0.040 IN aluminum flashing at sill to match louver.
 - 1. See Section 07 62 00 Flashing and Sheet Metal.

END OF SECTION

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SECTION 09 22 16 NON-LOAD-BEARING WALL FRAMING SYSTEMS

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes: Non-load-bearing wall framing construction.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Division 00 Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 01 General Requirements.
 - 3. Section 09 29 00 Gypsum Board.

1.02 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. ASTM International (ASTM):
 - A653, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - b. C645, Standard Specification for Nonstructural Steel Framing Members.
 - 2. Underwriters Laboratories, Inc. (UL):
 - a. Building Materials Directory.
 - b. Fire Resistance Directory.
 - 3. Building Code:
 - a. International Code Council (ICC):
 - International Building Code and associated standards, 2009 Edition as amended by the State of Washington, and the City of Bellevue Amendments, referred to herein as Building Code.
- B. Wherever a fire-resistance classification is indicated on the Drawings for walls or partitions, provide metal studs and accessories of type tested and listed for construction indicated.
 - 1. Fire rated partitions to comply with UL head of wall joint system requirements for rating indicated.

1.03 SUBMITTALS

A. Submittal Procedures: See Section 01 33 00 for requirements for the mechanics and administration of the submittal process.

- B. Leadership in Energy and Environmental Design (LEED[®]) Documentation:
 - 1. Product Data for MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content; include statement indicating costs for each product having recycled content.
 - 2. Product Data for MR 5: For products and materials required to comply with requirements for regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.
 - 3. LEED Materials Tracking Form: Form to be provided in an electronic format to the Contractor to record LEED materials used on the project.
- C. Approval Submittals:
 - 1. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 - c. Manufacturer's load tables for style indicated.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. Non-load-bearing framing components:
 - a. Dietrich Industries(www.clarkdietrich.com).
 - b. California Expanded Metal Products Co. (CEMCO). (www.cemcosteel.com).
 - c. Allied Studco. (www.studcosystems.com).
 - d. Custom Stud Inc.(www.customstud.com).
 - e. Marino\WARE. (www.marinoware.com).
 - f. The Steel Network.(<u>www.steelnetwork.com</u>).
 - g. Or approved equal.
- B. Submit request for substitution in accordance with Specification Section 01 60 00.

2.02 MANUFACTURED UNITS

- A. Screw-Type Metal Studs:
 - 1. ASTM C645.
 - 2. Roll-formed channel tracks and 'C' type studs.

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- 3. Flanges: Minimum 1-5/8 IN wide.
- 4. ASTM A653 Grade A, G60 galvanized.
- 5. Size indicated on Drawings.
- B. Vertical Deflection Device:
 - 1. Factory premade device manufactured specifically to permit frictionless vertical movement of stud wall system.
 - 2. Rigid attachment to structure and screw attachment to stud web using step-bushings.
 - 3. Minimum thickness of bushings:
 - a. Exterior wall: 68 mils.
 - b. Interior wall: 36 mils.
 - 4. UL listed for fire-rated walls.
- C. Wire Ties: 18 GA soft annealed, galvanized.
- D. Fasteners for Runners: Power-driven type to withstand minimum 190 LB shear when driven.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Provide 25 GA studs except as follows:
 - 1. At jambs of openings, use two 20 GA studs.
 - 2. Where partition height requires provide heavier section to accommodate span within I:360 deflection at load of 5 psf.
 - a. Provide minimum 20 GA studs at all walls with hanging loads such as wall cabinets, shelving, equipment.
 - b. Provide minimum 20 GA studs at all walls with moisture-resistent, or abuse resistant wallboard
- C. Provide continuous runner tracks sized to match studs.
 - 1. Align runners accurately at both floor and top.
 - 2. Secure runner tracks to structure at maximum 24 IN OC.
 - 3. Secure at all corners, ends, and door openings.
 - 4. Thickness of runner tracks shall be minimum one (1) gage heavier than studs unless noted otherwise.
 - a. Provide heavier section as required to meet the deflection criteria specified.
 - 5. Provide fire rated assembly at all fire partition locations.

- D. Where partitions abut structural elements, allow for a minimum of 1/2 IN deflection of primary frame.
 - 1. Provide vertical deflection device.
- E. Where partition is fire rated, extend studs to bottom of deck above to comply with Building Code and UL requirements for cyclical movement at head-of-wall.
- F. Space studs maximum 16 IN OC.
 - 1. Provide additional studs at corners, partition intersections, terminations each side of control joints, door and window openings and any other opening in partitions.
 - 2. Provide continuous stud backing at all gypsum board corners.
 - 3. Provide continuous 20 GA stud horizontal backing at all toilet accessory mounting locations.
 - a. Weld or screw horizontal stud backing to vertical wall studs.
 - b. Extend backing minimum one (1) full stud space beyond the toilet accessory fastener location in each direction.
- G. Use full length studs between runners.
- H. Friction fit studs to runners except at partition corners, intersections, behind wall supported casework or equipment and at openings.
 - 1. At those locations, positively attach studs to runners with 3/8 IN selftapping screws on both flanges of each stud, top and bottom.
- I. At all openings provide two full length studs, back to back, at each jamb.
 - 1. For wall areas above and below openings, cut track to length, split flanges and bend webs at ends.
 - 2. Overlap and screw attach to jamb studs.
 - 3. Install cut to length intermediate studs between jamb studs at head and sill sections at same spacing as full length studs.
 - 4. To provide for control joints at openings, install additional stud, maximum 1/2 IN from jamb studs.
 - a. Do not fasten extra stud to track or jamb stud.
 - 5. Securely attach jamb studs to door and window frames.
- J. Align stud openings to facilitate running of wires, conduit, and piping.

END OF SECTION

SECTION 09 25 00 TEXTURED FINISH COATING

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes: Textured finish coating work.
- B. Related Sections include but are not necessarily limited to:
 - 1. Division 00 Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 01 General Requirements.

1.02 QUALITY ASSURANCE

- A. Qualifications: Applicator licensed or approved by manufacturer.
- B. Mock-Ups:
 - Construct nominal 4 FT X 4 FT sample panel incorporating all components specified, or required for system, for Project Representative's review and approval.
 - a. Sample panel to include stepped construction showing each phase of application and shall also show sample of each different type joint and or other accessory.
 - 2. Construct additional sample panels as required until acceptable to Project Representative.
 - 3. Approved sample panel to serve as minimum standard of quality for actual construction.
 - 4. Maintain sample panel during construction.
 - 5. Remove when directed by Project Representative.

1.03 DEFINITIONS

- A. Installer or Applicator:
 - 1. Installer or applicator is the person actually installing or applying the product in the field at the Project site.
 - 2. Installer and applicator are synonymous.

1.04 SUBMITTALS

- A. Submittal Procedures: See Section 01 33 00 Submittal Procedures for requirements for the mechanics and administration of the submittal process.
- B. Approval Submittals:
 - 1. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.

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- b. Manufacturer's installation instructions.
- 2. Samples:
 - a. Manufacturer standard color and texture sample(s) for Project Representative's selection.
- C. Quality Assurance Submittals:
 - 1. Certification of applicator qualifications.
- D. Closeout Submittals:
 - Extended Warranty: Provide two (2) executed copies of the Extended Warranty required by this Section in accordance with the provisions of Section 01 78 00 – Closeout Procedures.

1.05 EXTENDED WARRANTY

- A. In accordance with the provisions of Section 01 78 00 Closeout Procedures, provide an Extended Warranty for the Work of this Section:
 - 1. Warranty period for Work of this Section is five (5) years commencing on the date of Substantial Completion.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. Textured finish coating materials:
 - a. Thoro System Products.
 - b. Tamms Industries Co.
 - c. Bonsal.
 - d. Or approved equal.
- B. Submit request for substitution in accordance with Specification Section 01 60 00 Product Requirements.

2.02 MATERIALS

- A. Nonshrink Patching Material: Manufacturer's standard.
- B. Waterproof Coating: Acrylic.
- C. Bonding Agent: Acrylic polymers and modifiers, designed for use as an additive to improve adhesion and mechanical properties.
- D. Waterproof Textured Finish: Acrylic.
- E. Textured Coating: Ready mix non-cementitious, 100 percent acrylic resin.

2.03 MIXES

A. Mix waterproof textured finish coating with bonding agent and water in accordance with manufacturer's instructions.

PART 3 – EXECUTION

3.01 APPLICATION

- A. Apply and cure all materials in accordance with manufacturer's recommendations.
- B. Finish Coats:
 - 1. Apply light trowel coat of waterproof textured finish over all surfaces as required to prevent shadowing of struck or deep joints or areas of unequal absorption.
 - a. Allow first coat to cure for five (5) days.
 - Apply finish trowel and float coats of waterproof textured finish as recommended by manufacturer to produce overall thickness of 1/4 IN minimum.

END OF SECTION

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SECTION 09 29 00 GYPSUM BOARD

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes: Gypsum board work.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Division 00 Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 01 General Requirements.
 - 3. Section 07 92 00 Joint Sealants.
 - 4. Section 09 22 16 Non-Load-Bearing Wall Framing Systems.
 - 5. Section 09 91 00 Painting and Protective Coatings.

1.02 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. American National Standards Institute (ANSI):
 - a. A108.11, Specification for Interior Installations of Cementitious Backer Units.
 - 2. ASTM International (ASTM):
 - A653, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - b. C475, Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.
 - c. C840, Standard Specification for Application and Finishing of Gypsum Board.
 - d. C1396, Standard Specification for Gypsum Board.
 - e. E119, Standard Test Methods for Fire Tests of Building Construction and Materials.
 - 3. Gypsum Association (GA):
 - a. GA-214, Recommended Levels of Gypsum Board Finish.
 - 4. Underwriters Laboratories, Inc. (UL):
 - a. Building Materials Directory.
 - b. Fire Resistance Directory.

1.03 DEFINITIONS

A. Wet Area: Toilets, showers, laboratories, janitor closets (or areas around janitor sink), and areas around emergency eye wash/showers.

1.04 SUBMITTALS

- A. Submittal Procedures: See Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
- B. Leadership in Energy and Environmental Design (LEED[®]) Documentation: Submit the following in accordance with Section 01 81 30 – Sustainability Requirements.
 - 1. Product Data for MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer content; include statement indicating costs for each product having recycled content.
 - 2. Product Data for MR 5: For products and materials required to comply with requirements for regional materials. Provide documentation indicating location and distance from Project of material manufacturer and point of extraction, harvest or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.
 - 3. Product Data for IEQ 4.1: For adhesives and sealants used inside the weatherproofing system, documentation including printed statement of VOC content.
 - 4. LEED Materials Tracking Form: Form to be provided in an electronic format to the Contractor to record LEED materials used on the project.
- C. Approval Submittals:
 - 1. Shop Drawings:
 - a. Drawings of unusual conditions.
 - 1) Control joint layout.
 - 2. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 - 3. Manufacturer's adhesive, sealer, joint treatment compound and tape recommendations.

1.05 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.
 - 1. Stack panels flat to prevent sagging.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. Gypsum board and accessories:
 - a. Georgia Pacific (www.gp.com/build).
 - b. National Gypsum (www.nationalgypsum.com).
 - c. U.S. Gypsum Co. (www.usg.com).
 - d. Or approved equal.
 - 2. Cement board and accessories:
 - a. U.S. Gypsum Co. (www.usg.com).
 - b. National Gypsum (www.nationalgypsum.com).
 - c. Or approved equal.
 - 3. Gypsum board suspension system:
 - a. Chicago Metallic Corp. (www.chicagometallic.com/index.php/category/drywall_ceiling_suspen sion).
 - b. U.S. Gypsum Co (<u>www.usg.com/usg-drywall-suspension-system</u>).
 - c. Or approved equal.
- B. Submit request for substitution in accordance with Specification Section 01 60 00.

2.02 MATERIALS

- A. Gypsum Board (GB):
 - 1. ASTM C1396.
 - 2. Furnish in maximum available lengths, consistent with installation requirements.
 - a. Long Edge: Tapered.
 - b. Short Ends: Square.
 - 3. Regular board: 5/8 IN thick.
 - 4. Fire-rated board: 5/8 IN thick.
- B. Cement Backer Board:
 - 1. UL listed.
 - 2. 5/8 IN thickness.
 - 3. Moisture-resistant treated gypsum core, glass mats (both sides), vinyl, water barrier coating on finished side.
 - a. Rot, warp and delaminate resistant.

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- b. For use on walls or floors.
- 4. Acceptable to ceramic tile manufacturer.
 - a. See Specification Section 09 30 13 for ceramic tile.
- C. Fire-rated board (conventional, Type X core, with paper facers):
 - 1. Applications: Use for fire rated walls, fire rated ceilings and joint backing at fire rated ceilings.
 - 2. Thickness: 5/8 IN.
- D. Water-Resistant (WR) Gypsum Board:
 - 1. ASTM C1396.
 - 2. 5/8 IN thick.
 - 3. Mold-resistance score: 1- per ASTM-D3273.
- E. Gypsum Ceiling Board:
 - 1. ASTM C 1396/C 1396M.
 - 2. Thickness: 1/2 IN thick.
 - 3. Long Edges: Tapered.
- F. Adhesive: As recommended by board manufacturer.
- G. Sealers for Water Resistant Board: Recommended by board manufacturer.
- H. Joint Treatment Compound:1. ASTM C475.
 - 2. Recommended by manufacturer for specified board type and location.
 - 3. Do not use self-adhesive fiber mesh tape.
- I. Joint Tape:
 - 1. ASTM C475.
 - 2. Recommended by manufacturer for specified board type and location.

2.03 ACCESSORIES

- A. General:
 - 1. ASTM A653, galvanized G90.
- B. Corner Bead:
 - 1. Standard type with perforated flanges.
- C. Casing and Trim Bead: Manufacturer's standard product.
- D. Control and Expansion Joints: Manufacturer's standard product.
- E. Fasteners:
 - 1. Gypsum board:
 - a. Self-drilling Type S, corrosion-resistant bugle head screws.
 - b. Provide stainless steel fasteners in wet areas.

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- 2. Cement backer board:
 - a. Self-drilling, corrosion resistant wafer head screws with strip-out prevention ribs.
 - b. Do not use drywall screws.
- F. Foam Tape: PVC, 1/2 IN x 1/4 IN pressure sensitive.
- G. Tie Wire and Suspension Wire:
 - 1. Galvanized, soft annealed 12 GA minimum.
 - Use soft stainless steel wire of same gage in all wet areas and/or exterior areas.
- H. Gypsum Board Suspension System: Direct hung factory fabricated heavy duty rated, single web system.
 - 1. Hangars:
 - a. Steel wire or rods, sizes to comply with requirements of ASTM C754 for ceiling or soffit area and loads to be supported.
 - b. 2. Wire: ASTM A 641, soft, Class 1 galvanized.
 - c. 3. Rods and flats:
 - 1) Mild steel components.
 - 2) Finish: Electro-Galvanized or painted with rust-inhibitive paint for interior work.
 - 2. Framing System:
 - a. 1. Main runners:
 - 1) Cold-rolled, "C" shaped steel channels, 16 gauge minimum.
 - 2) Finish: Galvanized with G40 hot-dip galvanized coating per ASTM A525 for exterior work; galvanized or painted with rust-inhibitive paint for other interior work.
 - Cross furring: Hat-shaped steel furring channels, ASTM C645, 7/8 IN high, 25 gage, galvanized.
 - 3. Furring anchorages: 16 gage galvanized wire ties, manufacturer's standard wire-type clips, bolts, nails or screws recommended by furring manufacturer and complying with ASTM C754.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. General:
 - 1. Install board in fire-rated walls in accordance with UL requirements.
 - a. Self-adhesive applied fire rated tape is not acceptable for use on board joints in fire rated walls.

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- b. Tape all joints using conventional fire rated joint tape and joint treatment compound.
- 2. Erect all board vertically with edges over supporting members.
 - a. See Specification Section 09 22 16 for non-loading bearing metal studs.
- 3. Secure to each support or framing member with screws.
- 4. In areas having gypsum board ceilings and walls, install ceiling first.
- 5. Bring boards into contact, but do not force into place.
- 6. Fit neatly and carefully.
- 7. Stagger edge joints on opposite side of a partition so they occur on different framing members.
- 8. Hold board in firm contact with support while fasteners are being driven.
- 9. Proceed with attachment from center of board toward ends and edges.
- 10. Scribe board prior to cutting.
- 11. Seal ends, cutouts and screw penetrations with W/R sealant where type WR board is used.
- B. Application:
 - 1. Gypsum board:
 - a. Use fire-rated gypsum board for fire rated wall. Gypsum board type and thickness per wall fire rated assembly indicated on the drawings.
 - b. Use non-rated gypsum board unless noted otherwise.
 - 2. Gypsum Board, Type X:
 - a. Use 5/8 IN thick board for fire-rated construction where noted on Drawings.
 - 3. Gypsum board for use in ceilings:
 - a. Dry area ceilings: Provide 5/8 IN thick fire-rated board best suited and recommended by manufacturer for intended use.
 - b. Wet area ceilings (showers and other areas where ceilings will be exposed to direct water contact or condensation): Provide 5/8 IN thick fire-rated board approved by manufacturer for use in high humidity areas.
 - c. Where ceilings abutt a concrete or masonry wall provide 3/8 IN joint between edge of wall and ceiling board.
 - 1) Provide continuous solid casing bead trim on edge of board.
 - 2) Seal joint with sealant and backer rod.
 - 3) See Specification Section 07 92 00 for sealant.

- 4. Cement backer board:
 - a. Install in accordance with ANSI A108.11 and manufacturer's recommendations.
 - b. Use in areas where ceramic or quarry tile is final wall finish.
 - c. Provide fire-rated board in fire-rated walls.
- 5. Water-resistant (WR) gypsum board:
 - a. Use in wet locations such as janitor closets, toilet rooms, around emergency eye wash and deluge showers.
 - b. Provide fire-rated board in fire-rated walls.
- 6. Gypsum liner panel:
 - a. Use WR boards in walls common to wet areas.
- 7. Casing and trim bead:
 - a. Where bead abuts exterior window or other metal components, separate from other material using foam tape.
- 8. Fasteners:
 - a. Provide fasteners of sufficient length to penetrate framing member or stud not less than 3/8 IN.
- 9. In curved wall or ceiling applications use 1/4 IN thick board specifically designed for use in radius construction.
 - a. Apply in multiple layers as required to meet minimum drywall thickness specified.
- C. Installation (Single-Layer System):
 - 1. Set fasteners between 3/8 and 1/2 IN from edges and 2 IN in from board corner.
 - a. Space maximum of 12 IN OC at edges and in field of board.
 - b. Where board butts at wall/ceiling juncture, hold fasteners back 6 IN from edges.
 - c. Space fasteners closer if required by UL.
 - 2. Install fasteners, in gypsum board, so that head rests in a slight dimple without cutting face paper or fracturing core or as recommended by board/panel manufacturer.
 - 3. Install screws, in cement backer board, flush with board surface.
 - a. Do not countersink screws.
- D. Control Joints:
 - 1. Install prefabricated control joints to provide following maximum unjointed lengths or areas:
 - a. Control joints: #093 zinc coated control joint.

- b. Partitions: 30 FT, maximum straight run, and at lock side of jamb from head of each door opening to top of partition.
- c. Ceilings: 50 FT maximum in one (1) direction, and at change of direction or irregular shapes.
- d. Ceiling area: 2500 SF, maximum.
- 2. Calk control joints.
 - a. Use color to match wall or ceiling color as closely as possible.
- 3. Where control or expansion joints occur in fire or sound rated assemblies, install suitable backing material to maintain required rating.
- 4. Where a partition or ceiling abuts a structural element or dissimilar wall or ceiling, install corner bead, casing bead or other trim as required.
- E. Board Finishing:
 - 1. Securely attach continuous corner beads to all external corners in accordance with manufacturer's recommendations.
 - 2. Provide the following minimum levels of gypsum board finish in accordance with GA-214.
 - a. Areas exposed to view:
 - 1) Surfaces to receive vinyl wall covering: Level #4.
 - 2) Surfaces to receive painted finish: Level #5.
 - b. Areas not exposed to view:
 - 1) Fire rated partitions: Level #2 unless a higher grade of finish is required by UL.
 - 2) Non-fire rated partitions: Level #2.
 - c. Provide additional coats of joint compound as required to completely conceal joints, fasteners and accessories.
 - 1) Joint photographing will not be acceptable.
 - 3. Sand each coat to remove excess joint compound.
 - a. Avoid roughing paper facing on board.
 - 4. Finish surface shall be smooth and free of tool marks and ridges.
 - 5. After primer has been applied to wall surface in accordance with Specification Section 09 91 00 repair and refinish all areas which show defects.
 - 6. Comply with additional finishing requirements contained in ASTM C840.
- F. Install ceiling suspension system in accordance with manufacturer's recommendations.

END OF SECTION

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SECTION 09 30 13 CERAMIC TILE (CT)

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. See Paragraph 1.3.B. for types of tile included in this Specification Section.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Division 00 Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 01 General Requirements.
 - 3. Section 07 92 00 Joint Sealants.
 - 4. Section 09 29 00 Gypsum Board.

1.02 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. American National Standards Institute (ANSI):
 - a. A108.1, Specification for the Installation of Ceramic Tile.
 - b. A137.1, Standard Specifications for Ceramic Tile.
 - 2. ASTM International (ASTM):
 - 3. Tile Council of North America (TCNA):
 - a. TCA Handbook for Ceramic Tile Installation.
 - 4. Porcelain Enamel Institute (PEI) Wear Ratings:
 - a. Class 1 Very Light traffic.
 - b. Class 2 Light Traffic.
 - c. Class 3 Light to Moderate Traffic.
 - d. Class 4 Moderate to Heavy Traffic.
 - e. Class 5+ Heavy to Extra Heavy Traffic.
- B. Qualifications:
 - 1. Installer must have minimum five (5) years experience installing similar products with similar substrates.
- C. Single Source Responsibility:
 - 1. Obtain each type and color of tile from a single source.
 - 2. Obtain each type and color of mortar, adhesive and grout from the same source.

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1.03 DEFINITIONS

- A. Installer or Applicator:
 - 1. Installer or applicator is the person actually installing or applying the product in the field at the Project site.
 - 2. Installer and applicator are synonymous.
- B. Ceramic Tile: For purposes of this Specification Section, the term "ceramic tile" is intended to include ceramic, porcelain, granite, and terrazzo tiles.

1.04 SYSTEM DESCRIPTION

- A. Unless noted otherwise on the Drawings, floor tile selection shall be made from complete range of available sizes within a PEI Class 4 durability rating.
 - 1. Tile colors, styles and profiles and associated trim pieces to be selected from manufacturer's complete line including premium and custom offerings.

1.05 SUBMITTALS

- A. Submittal Procedures: See Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
- B. Leadership in Energy and Environmental Design (LEED[®]) Documentation: Submit the following in accordance with Section 01 81 30 – Sustainability Requirements:
 - 1. Product Data for MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer content; include statement indicating costs for each product having recycled content.
 - 2. Product Data for MR 5: For products and materials required to comply with requirements for regional materials. Provide documentation indicating location and distance from Project of material manufacturer and point of extraction, harvest or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.
 - 3. Product Data for IEQ 4.1: For adhesives and sealants used inside the weatherproofing system, documentation including printed statement of VOC content.
 - 4. LEED Materials Tracking Form: Form to be provided in an electronic format to the Contractor to record LEED materials used on the project.
- C. Approval Submittals:
 - 1. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.

- 2. Letter from grout and adhesive manufacturer stating that grout and tile adhesive being used is compatible with cement backer board specified in Specification Section 09 29 00.
- 3. Samples:
 - a. Complete range of tile samples per Article 1.04 SYSTEM DESCRIPTION for selection by Project Representative.
 - 1) Tile trim may be contrasting color.
 - 2) Complete range of grout color samples.
 - b. After selection of colors, types, patterns and sizes, and prior to ordering tile, provide minimum 16 x 16 IN sample palette or two (2) full tiles if 12 x 12 IN (or larger) tile are specified, in color, pattern, blend and type for Project Representative's final approval.
 - 1) Include selected grout color as part of sample.
- 4. Mock-Ups:
 - a. Provide a sample wall and/or floor area minimum 4 x 4 FT each using specified tile, grout, special shapes and trim pieces.
 - 1) Sample area substrate shall be of same construction as actual project condition.
 - b. Construct additional sample areas as required until accepted by Project Representative.
 - c. Sample area will constitute minimum acceptable standard of quality for actual construction.
 - d. Sample area shall not be built into permanent construction.
 - e. Remove sample when directed by Project Representative.
- D. Quality Assurance Submittals: Certification of installer qualifications.
- E. Closeout Submittals:
 - 1. O&M Manual Content: Provide O&M manual documentation as required by Section 01 73 00 Operation and Maintenance Manuals.
 - a. Maintenance and cleaning recommendations.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. Ceramic tile:
 - a. American Olean Tile Co. (AOT) (americanolean.com).
 - b. Dal-Tile Corp. (DTC) (www.daltile.com).
 - c. Esquire (ESQ) (www.esquire-tile.com).

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- d. Or approved equal.
- 2. Adhesives, mortars, grouts and leveling compounds:
 - a. Bonsal Co (www.bonsalamerican.com).
 - b. Bostik Construction Products (www.bostik-us.com).
 - c. H.B. Fuller (TEC) (www.hbfuller.com).
 - d. Or approved equal.
- B. Submit request for substitution in accordance with Specification Section 01 60 00.

2.02 MATERIALS

- A. Adhesives for Setting Tile:
 - 1. Dry-set Portland cement mortars: ANSI A108.1.
 - 2. Latex-Portland cement mortars: ANSI A108.1.
 - 3. Assure adhesives are compatible with cement backer board.
 - 4. Waterproofing:
 - a. Trowel applied elastomeric compound.
 - b. Acceptable to tile manufacturer.
 - c. Compatible with backing material and setting adhesive.
 - d. Fiber mesh reinforcing: As recommended by waterproofing manufacturer.
- B. Grout: Portland cement-based material, containing quartz aggregate, colorfast pigments and Portland cement.
- C. Sealant: Two component polyurethane sealant, ASTM-C920, Type M (self-leveling) for horizontal joints, Type II (non-sag) for vertical joints as specified in Specification Section 07 92 00.
- D. Setting Buttons: Plastic buttons of thickness required for joint size indicated to maintain uniform joint width.
- E. Ceramic Tile: A minimum 15 percent post-consumer recycled content, or minimum 40 percent pre-consumer recycled content at Contractor's option.
- F. Leveling Compounds: As recommended by tile manufacturer.

2.03 MANUFACTURED UNITS

- A. Wall Tile:
 - 1. Ceramic units conforming to ANSI A137.1.
 - 2. 5/16 IN thick.
 - 3. Size(s): 1 x 1 IN.

- 4. Tile selections shall be made by the Project Representative from Color Group 3 and may include:
 - a. Designer accents.
 - b. Matt.
 - c. Textured.
 - d. Bright.
 - e. Crystal.
 - f. Satin.
 - g. High gloss smooth glaze.
 - h. Designer strips/rounded moldings.
 - i. Granite look.
 - j. Scored design.
- B. Ceramic Mosaic Tile:
 - 1. Ceramic mosaic units conforming to ANSI A137.1.
 - 2. 1/4 IN thick.
 - 3. Size(s): 2 x 2 IN.
 - 4. Cushion edge unglazed.
 - 5. Slip-resistant units for shower floors and restrooms.
- C. Tile Base and Associated Trim:
 - 1. Factory made trim shapes for all curbs, caps, corners, bullnose, bases, coves, beads, depressions, moldings, chair rails, etc.
 - a. Cove base: 1 x 1 IN.
- D. Non-Ceramic Trim: Material and finish, style and dimensions to suit application, for setting using tile mortar or adhesive; use in the following locations:
 - 1. Transition between floor finishes of different heights.
 - 2. Thresholds at door openings.
- E. Transition Joint Strips: Profile and height as indicated; with integral perforated anchoring leg for setting the strip into the setting material:
 - 1. Transition strip profile:
 - a. Sloped, variable height: If adjacent flooring level is different than tile.
 - 1) Schluter-RENO-V.
 - 2) Armstrong VT3.
 - 3) Or approved equal.
 - b. Flat, smooth profile. If adjacent flooring level is same as tile.
 - 1) Schluter-RENO-T.

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- 2) Armstrong VT3.
- 3) Or approved equal.
- 2. Height:
 - a. As required to suit application.
 - b. Maximum change in level: 0-1/2 IN.
 - c. Maximum slope: 1:2.
- 3. Material: Granite.
 - a. Finish and color: As selected by Project Representative from manufacturer's standards.

2.04 MAINTENANCE MATERIALS

- A. Extra Material:
 - 1. Furnish Project Representative with the following extra materials:
 - a. 2 percent of each different size, pattern, style and/or color of tile used including trim shapes with minimum of one (1) full size tile of each for maintenance purposes.
 - b. Enough extra grout mix of each different color and/or type to allow for full 2 percent of tile to be replaced.

PART 3 – EXECUTION

3.01 PREPARATION

- A. Locate expansion joints prior to product installation.
- B. Verify that substrate is ready to accept tile installation.
 - 1. Correct surface defects or conditions which may interfere with or prevent a satisfactory installation.

3.02 INSTALLATION

- A. General:
 - 1. 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.
 - a. Verify that substrates for setting tile are firm, dry, clean, free of coatings that are incompatible with tile-setting materials including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.
 - 2. Fill cracks, holes and depressions in concrete substrates for tile floors installed with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.

- 3. Install products in accordance with manufacturer's instructions and ANSI A108.1.
- 4. Install shower liner:
 - a. Coordinate with shower drain: See Specification Section 22 20 00.
- 5. Place tile in pattern as shown on Drawings.
- 6. Align tile joints on adjoining walls/floors.
- 7. Lay out and center tile in both directions in each space or on each wall area.
- 8. Avoid use of tile less than 1/2 size.
- 9. Adjust tile to minimize cutting.
- 10. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make joints watertight, without voids, cracks, excess mortar, or excess grout
- 11. Form internal angles square and external angles bullnosed.
- 12. Install ceramic accessories rigidly in prepared openings.
- 13. Install non-ceramic trim in accordance with manufacturer's instructions.
- 14. Install thresholds where indicated.
- 15. Provide leveling beds as required.
- 16. Provide edging at exposed edges where there is a change of level.
- 17. Sound tile after setting, replace hollow sounding units.
- 18. Allow tile to set for a minimum of 48 HRS prior to grouting.
- 19. Grout tile joints. Use standard grout unless otherwise indicated.
- B. Install expansion joints where indicated on Drawings:
 - 1. If not indicated on Drawings, place joints 12-16 FT OC or on column lines each way (whichever is smaller).
 - a. Provide expansion joints in accordance with TCA Handbook.
 - 2. Install over construction or expansion joints in backing.
 - 3. Install where backing material changes.
 - 4. Install where floors abut vertical surface.
 - 5. Maintain nominal 1/4 IN wide joint at perimeter of tiled floor areas and calk with sealant.
- C. Installation of Tile on Floors and Walls Over Waterproofing and Setting Adhesive:
 - 1. Provide waterproofing for all tile installed on:
 - a. Floors in toilet rooms, showers, locker rooms, vestibules and any other floor in a wet area.
 - 1) Extend up walls to height of base.

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- b. Walls in shower rooms:
 - 1) Install full height of tile.
 - 2) Completely cover all curb surfaces to receive tile.
- 2. Installation of Waterproofing Membrane:
 - a. Prepare substrate in accordance with manufacturer's published recommendations.
 - b. Apply base membrane with flat trowel.
 - 1) Maximum thickness: 5/64 IN per coat or as recommended by manufacturer.
 - 2) Allow membrane to cure between coats in accordance with manufacturer's instructions.
 - c. Apply second coat with v-notch trowel and immediately flatten with flat trowel to a smooth, membrane, free of voids.
 - d. Embed fiber mesh reinforcing into fresh membrane at all inside corners, vertical/horizontal intersections and where required for crack control.
 - 1) Do not bridge expansion joints with reinforcing or membrane.
 - e. Apply additional coat (s) of membrane per manufacturer's published instructions to completely encapsulate fiber mesh reinforcing.
- 3. After waterproofing has cured/dried in accordance with manufacturer's recommendations, install tile using setting adhesive in accordance with manufacturer's recommendations.
- 4. Provide 10 percent additional tile in each color and size to client for future maintenance.

3.03 CLEANING

A. After installation, clean in accordance with manufacturer's instructions.

3.04 PROTECTION

A. Permit no traffic on floors for 72 HRS after grouting and protect installed tile work with minimum 0.125 IN thick nonstaining covering during construction to prevent damage.

END OF SECTION

SECTION 09 51 00 ACOUSTICAL MATERIALS

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes: Lay-in acoustical ceiling tile materials (ACT).
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Division 00 Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 01 General Requirements.
 - 3. Section 09 53 00 Acoustic Suspension System.

1.02 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. ASTM International (ASTM):
 - a. E1264, Standard Classification for Acoustical Ceiling Products.
 - 2. Underwriters Laboratories, Inc. (UL):
 - a. Building Materials Directory.
- B. Source Limitations for Ceiling Units: Obtain each acoustical ceiling panel from one source with resources to provide products of consistent quality in appearance and physical properties without delaying the Work.
 - 1. Obtain both acoustical ceiling panels and suspension system from the same manufacturer.

1.03 SUBMITTALS

- A. Submittal Procedures: See Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
- B. Leadership in Energy and Environmental Design (LEED[®]) Documentation: Submit the following in accordance with Section 01 81 30 – Sustainability Requirements:
 - 1. Product Data for MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content; include statement indicating costs for each product having recycled content.
 - 2. Product Data for MR 5: For products required to comply with requirements for regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

- 3. Product Data for IEQ 4.1: For sealants and sealant primers used inside the weatherproofing system, documentation including printed statement of VOC content.
- 4. LEED Materials Tracking Form: Form to be provided in an electronic format to the Contractor to record LEED materials used on the project.
- C. Approval Submittals:
 - 1. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. Acoustical ceiling tile materials (ACT):
 - a. Mineral fiber ceiling tile:
 - 1) Armstrong (www.armstrong.com/commceilingsna).
 - 2) Certain Teed (www.certainteed.com/products/ceilings).
 - 3) U.S. Gypsum Co (<u>www.usg.com</u>).
 - 4) Or approved equal.
- B. Submit request for substitution in accordance with Specification Section 01 60 00.

2.02 MANUFACTURED UNITS

- A. Mineral Fiber Acoustical Ceiling Tile (ACT):
 - 1. ASTM E1264.
 - 2. Factory applied vinyl latex paint finish.
 - 3. Antimicrobial Treatment: Treat with manufacturer's standard antimicrobial solution consisting of a synergistic blend of substituted ammonium salts of alkylated phosphoric acids admixed with free alkylated phosphoric acid that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria
 - 4. Light reflectance: Not less than 0.75.
 - 5. Noise reduction coefficient: Minimum 0.65.
 - 6. Ceiling Attenuation Class: Not less than CAC 35.
 - 7. Class A non-combustible units.
 - 8. Fire-rated units (when used): UL labeled.

- 9. Edges uniformly fabricated, true, square, and undamaged.
- 10. Sizes as required to fit suspension system and as indicated on Schedule in PART 3.
- 11. Lay-in style: 3/4 IN thick.

12. Pattern as scheduled in PART 3.

2.03 MAINTENANCE MATERIALS

A. Extra Materials:

- 1. Furnish Project Representative with the following extra materials:
 - a. Minimum of 10 percent of material used for project.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Do not install acoustical panel 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.
- B. Coordinate layout and installation of acoustical panels 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.
- C. Install into suspension system in accordance with manufacturer's instructions.
- D. Perform field cutting as required to fit materials to grid. Make all cuts square and true.
- E. Paint field-cut panel edges. See Section 09 91 00 Painting and Protective Coatings.
- F. Protect lighting fixtures and air ducts to comply with requirements indicated for fire-resistance-rated assembly.
- G. See Section 07 92 00 for acoustical joint sealant.
- H. See Section 09 53 00 for ceiling suspension system.

3.02 SCHEDULES

- A. Schedule of Lay-In Acoustical Ceiling Tile:
 - 1. ACT 1: Fissured mineral fiber ceiling tile, lay-in, 24 x 48 IN.
 - a. Color: White.

END OF SECTION

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SECTION 09 53 00 ACOUSTIC SUSPENSION SYSTEM

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes: Metal acoustic suspension systems.
- B. Related Sections include but are not necessarily limited to:
 - 1. Division 00 Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 01 General Requirements.
 - 3. Section 09 51 00 Acoustical Materials.

1.02 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. ASTM International (ASTM):
 - a. C635, Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-In Panel Ceilings.
 - b. C636, Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels.
 - 2. Certification that system being used has been tested and approved to meet all seismic requirements as specified in the International Building Code and associated standards, 2009 Edition as amended by the State of Washington, and the City of Bellevue Amendments.

1.03 SUBMITTALS

- A. Submittal Procedures: See Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
- B. Leadership in Energy and Environmental Design (LEED[®]) Documentation: Submit the following in accordance with Section 01 81 30 – Sustainability Requirements:
 - 1. Product Data for MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content; include statement indicating costs for each product having recycled content.
 - 2. Product Data for MR 5: For products and materials required to comply with requirements for regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

- 3. Product Data for IEQ 4.1: For sealants and sealant primers used inside the weatherproofing system, documentation including printed statement of VOC content.
- 4. LEED Materials Tracking Form: Form to be provided in an electronic format to the Contractor to record LEED materials used on the project.
- 5. Product Data for IEQ 4.2: For paints and coatings used inside the weatherproofing system, documentation including printed statement of VOC content.
- C. Approval Submittals:
 - 1. Stamped certification from a Registered Professional Engineer that the restraint system meets the seismic requirements of the Authorities having jurisdiction.
 - 2. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 - 3. Samples:
 - a. Samples of each product being used minimum 6 IN long in color specified.
 - b. Sample of intersecting grid connection system.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. Acoustical suspension systems (steel):
 - a. Armstrong World Industries (www.armstrong.com/commceilingsna).
 - b. Chicago Metallic Corp (www.chicago-metallic.com).
 - c. Donn (www.usg.com/ceilings/acoustical-suspension-systems).
 - d. Or approved equal.
- B. Submit request for substitution in accordance with Specification Section 01 60 00.

2.02 COMPONENTS

- A. Acoustical Suspension Systems General:
 - 1. Heavy duty rated systems, ASTM C635.
 - 2. Main runner jointing by spliced, interlocking ends, tab locks, pin locks, or other suitable connections.
 - 3. Cross runners interlocking with main runners.

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- B. Hangers:
 - 1. Galvanized, soft annealed steel wire for general use.
 - 2. Soft stainless steel wire for use with aluminum systems and in wet areas.
- C. Non-Rated Exposed Grid System:
 - 1. Direct hung.
 - 2. Electrogalvanized double-web steel main and cross runners.
 - 3. Finish on exposed surfaces: Smooth, flat white.
 - 4. Chicago Metallic "SNAP-GRID 200" or "FIRE FRONT 1250."
 - a. Or approved Manufacturers System as listed in Section 2.01.

2.03 MAINTENANCE MATERIALS

- A. Extra Material:
 - 1. Provide Project Representative with 8 LF of main runner and 8 LF of cross runner of each different finish and type of grid specified.
 - 2. Supply minimum 2 OZ of touch-up paint for each color of grid used.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Install in accordance with ASTM C636 and ASTM E580 and manufacturer's instructions.
- B. Provide all hangers and inserts necessary to support acoustical ceilings.
 - 1. Where placement of ducts or other obstructions limits hanging wires, provide additional supporting members.
 - 2. Provide supplementary rough suspension system and trapezing where necessary to support acoustical ceilings beneath pipes, ducts, equipment, etc.
 - 3. Do not suspend any part of rough suspension system or acoustical ceilings from ducts, pipes, conduit, equipment, etc.
 - 4. Provide structural members sized as required to span ducts, etc.
- C. Hang suspension systems from structural supporting and framing members, floor deck, or rough suspension system.
 - 1. Locate hangers to avoid contact with insulation covering ducts and pipes.
 - 2. Splay hangers only where obstructions or other conditions preclude plumb, vertical installation.
 - 3. Offset horizontal forces of splayed hangers by countersplaying, bracing or other approved methods.

- D. Space hangers to prevent loads from items in or on ceiling from causing eccentric deflection and rotation of main runners exceeding limits specified in manufacturer's technical data.
 - 1. Provide additional hangers at each corner of recessed light fixture.
 - 2. Provide hangers not more than 6 IN from ends of main runners.
 - 3. Support main runners directly from hangers.
 - 4. Space main runners to support ceiling units and other work resting in or on ceiling.
- E. Install moldings where ceilings meet walls, partitions, other vertical elements, and other types of ceilings.
 - 1. Support runners and border units on moldings.
 - 2. Secure moldings to wall construction by fastening through holes drilled in web.
 - 3. Space holes not more than 3 IN from each end and not more than 16 IN on center.
 - 4. Draw up fasteners for tight set against vertical surfaces.
 - 5. Miter cut inside and outside corners.
 - 6. Level to tolerances in accordance with ASTM C636.
 - 7. Install moldings with exposed leg supporting bottom flange of exposed runners.
 - 8. Where ceiling mounted fixtures have integral flange trim, no additional trim is required.
- F. Leave suspension system ready to accept installation of acoustic materials. See Section 09 51 00.

END OF SECTION

SECTION 09 65 00 VINYL COMPOSITION TILE FLOORING AND RESILIENT BASE

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Vinyl composition tile (VCT).
 - 2. Resilient base (RB).
- B. Related Sections include but are not necessarily limited to:
 - 1. Division 00 Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 01 General Requirements.

1.02 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. ASTM International (ASTM):
 - a. E648, Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source.
 - b. F710, Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.
 - c. F970, Standard Test Method for Static Load Limit.
 - d. F1066, Standard Specification for Vinyl Composition Floor Tile.
 - e. F1861, Standard Specification for Resilient Wall Base.
 - f. F2034, Standard Specification for Sheet Linoleum Floor Covering.
 - 2. National Fire Protection Association (NFPA):
 - a. 253, Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source.
 - b. 258, Recommended Practice for Determining Smoke Generation of Solid Materials.
 - 3. FloorScore Compliance: Resilient tile flooring shall comply with requirements of FloorScore certification.

1.03 SUBMITTALS

A. Submittal Procedures: See Section 01 33 00 for requirements for the mechanics and administration of the submittal process.

- B. Leadership in Energy and Environmental Design (LEED[®]) Documentation:
 - 1. Product Data for MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content; include statement indicating costs for each product having recycled content.
 - 2. Product Data for MR 5: For products and materials required to comply with requirements for regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.
 - 3. Product Data for IEQ 4.1: For adhesives and sealants used inside the weatherproofing system, documentation including printed statement of VOC content.
 - 4. Product Data for IEQ 4.3: For adhesives, documentation including printed statement of VOC content.
 - 5. Product Data for IEQ 4.3: For resilient tile flooring, documentation from an independent testing agency indicating compliance with the FloorScore Standard.
 - 6. LEED Materials Tracking Form: Form to be provided in an electronic format to the Contractor to record LEED materials used on the project.
- C. Approval Submittals:
 - 1. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 - c. Recommendations on adhesives, primers and leveling and patching compounds.
 - 2. Samples:
 - a. Full range of colors and patterns for Project Representative's color selection of each component specified.
- D. Closeout Submittals:
 - 1. O&M Manual Content: Provide O&M Manual documentation as required by Section 01 73 00 Operation and Maintenance Manuals.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. VCT:
 - a. Armstrong World Industries (www.armstrong.com/flooring).
 - b. Azrock (www.azrock.com).

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- c. Congoleum (www.congoleum.com).
- d. Or approved equal.
- 2. RB:
 - a. Armstrong World Industries (www.armstrong.com).
 - b. Azrock (www.azrock.com).
 - c. Burkemercer Flooring Products (www.burkeflooring.com).
 - d. Or approved equal.
- 3. Edging strips, reducers and joiners:
 - a. Burkemercer Flooring Products (www.burkeflooring.com).
 - b. Roppe Rubber Corp (www.roppe.co).
 - c. Johnsonite (www.johnsonite.com).
 - d. Or approved equal.
- B. Submit request for substitution in accordance with Specification Section 01 60 00.

2.02 MANUFACTURED UNITS

- A. VCT:
 - 1. 12 IN SQ x 1/8 IN.
 - 2. ASTM F1066, Comp 1, Class 2.
- B. RB:
 - 1. Vinyl, top set, coved type.
 - 2. 1/8 x 4 IN, 1/4 IN wide at bottom.
 - 3. Factory-formed external and internal corners.
 - 4. Continuous rolls, minimum 95 FT long.
 - 5. ASTM F1861.
 - 6. Color: Project Representative to select from manufacturers standard color selection.
- C. Leveling compound as recommended by manufacturer compatible with adhesives.
- D. Adhesives and primers as recommended by manufacturer.
- E. Sheet Vinyl Accent Stripes: 1/8 x 1 IN plain color homogeneous vinyl with backing.
- F. Edging Strips, Reducers and Joiners: Match adjacent tile material.

2.03 MAINTENANCE MATERIALS

- A. Extra Materials:
 - 1. Furnish Project Representative the following extra material:
 - a. One (1) carton of each type and color of vinyl composition tile.
 - b. Minimum 12 LF of resilient linoleum sheet flooring and enough welding rod to install all 12 LF of material.
 - c. Remaining portion of one (1) partially used roll of resilient base material with a minimum of 10 LF of each height, color and type.
 - 2. Package and label extra materials to protect material during storage.

PART 3 – EXECUTION

3.01 PREPARATION

- A. Prepare surfaces in accordance with manufacturer's recommendations and ASTM F710.
- B. Acclimate tile to area in which it is to be installed for minimum 72 HRS at 68 DegF prior to installation.
 - 1. Provide manufacturer's recommended relative humidity levels.
- C. Fill cracks, joints (except specified expansion joints), etc., in floors with a water-resistant non-crumbling patching and leveling compound.
 - 1. Trowel level.
 - 2. Verify moisture content in concrete substrate is within acceptable limits per the floor covering manufacturer.
 - a. Conduct one (1) test for every 1000 SF of flooring per room or area in accordance with manufacturer's recommendation.
 - b. Provide necessary measures to dry out the substrate in accordance with flooring manufacturer's recommendations and retest until acceptable moisture levels are obtained.
- D. Where tile flooring abuts other finish flooring materials and finished surfaces do not align, install and feather leveling compound for approximately 6 IN so that finished surfaces will align.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Floors to be free of all dust, paint, grease, oils, solvents, curing and hardening compounds, sealers and any other deleterious material which may affect the bonding of the adhesive used to install the floor coverings.
- C. Ensure recommended minimum installation temperatures are maintained before, during and after installation as required by the manufacturer.
- D. General:
 - 1. Apply primer and adhesive as recommended by manufacturer.

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- 2. Maintain minimum temperature of 68 DegF for a minimum of 72 HRS prior to, during and after installation.
- E. VCT:
 - 1. Lay in pattern selected by Project Representative.
 - 2. Bond tile to floor, flush, tight, and in true alignment with adjacent tiles and with finished surface.
 - 3. Fit neatly into breaks and recesses, against walls, around pipes, and other obstructions.
 - 4. Install edging strips where tile edge is exposed or where flooring terminates.
 - 5. Lay out tile to avoid less than one-half tile at permanent perimeter walls.
 - 6. Perform any cutting or drilling of tile as required.
 - 7. Install accent strips in all door openings directly under door when in closed position.
 - 8. Roll entire floor.
 - 9. Immediately after application and rolling, remove surplus adhesive.
- F. RB:
 - 1. Install base after wall material has thoroughly dried out.
 - 2. Provide base at intersections of floor and all vertical surfaces in areas scheduled to receive base, where intersection is exposed to view.
 - 3. Set base straight and true.
 - 4. Fit into breaks and recesses.
 - 5. Provide factory-formed internal and external corners.
 - 6. Scribe to trim at door frames.
 - 7. Make joints tight.
 - 8. Install with top and bottom edge in firm contact with wall and floor.

3.03 CLEANING

- A. Clean floors in accordance with manufacturer's recommendations.
- B. Prior to final acceptance, wash, wax and buff floors.
 - 1. After thorough cleaning, apply two (2) coats of wax recommended by flooring manufacturer.
 - 2. After each coat, buff floor.

3.04 PROTECTION

- A. Protect with non-staining non-sticking building paper as may be necessary to prevent dirt and damage.
- B. Protect traffic areas with fiberboard or plywood laid over non-staining, nonsticking building paper.

END OF SECTION

SECTION 09 77 61 FIBERGLASS REINFORCED PLASTIC (FRP) PANELS

PART 1 – GENERAL

1.01 SUMMARY

- A. Furnish all labor, materials, tools, equipment, and services for Fiberglass Reinforced Plastic Panels, as indicated, in accordance with provisions of Contract Documents.
- B. Completely coordinate with work of other trades.

1.02 QUALITY ASSURANCE

- A. ASTM Standards:
 - 1. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials.
 - 2. ASTM D570 Standard Test Method for Water Absorption of Plastics.
- B. FM Global (FM):
 - 1. Install FM Global approved panels.

1.03 SUBMITTALS

- A. Submittal Procedures: See Section 01 33 00 Submittal Procedures for requirements for the mechanics and administration of the submittal process.
- B. Leadership in Energy and Environmental Design (LEED[®]) Documentation: Submit the following in accordance with Section 01 81 30 – Sustainability Requirements:
 - Product Data for MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content; include statement indicating costs for each product having recycled content.
 - 2. Product Data for IEQ 4.1: For sealants and adhesives used inside the weatherproofing system, documentation including printed statement of volatile organic content (VOC) content.
 - 3. Product Data for IEQ 4.2: For paints and coatings used inside the weatherproofing system, documentation including printed statement of VOC content.
 - 4. LEED Materials Tracking Form: Form to be provided in an electronic format to the Contractor to record LEED materials used on the project.
- C. Approval Submittals:
 - 1. Product Data:
 - a. Manufacturer's literature indicating material and fire test information in compliance with Specifications.

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- 2. Samples:
 - a. 12 IN square pieces of each pattern and color specified on the Finish Schedule(s).
- D. Closeout Submittals:
 - Operation & Maintenance (O&M) Manual Content: Provide O&M manual documentation as required by Section 01 73 00 - Operation and Maintenance Manuals.
 - a. Maintenance data.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. Crane Composites (www.cranecomposites.com).
 - 2. Marlite (www.marlite.com).
 - 3. Glasteel (www.glasteel.com).
 - 4. Nudo (www.nudo.com).
 - 5. Or approved equal.
- B. Other manufacturers desiring approval comply with Section 01 60 00 Product Requirements.

2.02 MATERIALS

- A. Class A Fiberglass Reinforced Plastic (FRP) Wall Panels:
 - 1. Panel thickness:
 - a. 0.09 IN.
 - 2. Barcol hardness not greater than 50.
 - 3. Interior Finish rating: FM Approval Standard 4880.
 - 4. Water absorption no greater than 0.20 percent at 24 HRS at 77 DegF in accord with ASTM D570.
 - 5. Identify boards by manufacturer's standard marking on reverse side of panel.
 - 6. Finish: Scored FRP Panel.
 - a. Pattern and Groove configuration to be approved by Project Representative.
 - 7. Color: Ivory.
 - 8. Adhesives shall have a VOC content no greater than 80 g/L.
 - 9. Sealants shall have a VOC content no greater than 250 g/L.

B. Moldings: Manufacturer's standard extruded vinyl trim.

PART 3 – EXECUTION

3.01 PREPARATION

- A. Verify suitability of substrate to accept installation.
- B. Correct unsatisfactory conditions.
- C. Start of installation indicates acceptance of responsibility for performance.

3.02 INSTALLATION - WALL PANELS

- A. Install in accordance with manufacturer's recommendations and approved Shop Drawings.
- B. Install moldings to panels prior to erection.
 - 1. Apply moldings to all panel edges.
 - 2. Apply silicone sealant to manufacturer's recommendations.
- C. Apply adhesive full coverage at panel back.1. Brace installation until adhesive completely cured.

3.03 CLEANING

- A. Remove excessive sealant and adhesive with cleaner recommended by panel manufacturer.
- B. Clean entire surface prior to closeout.

END OF SECTION

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SECTION 09 91 00 PAINTING AND PROTECTIVE COATINGS

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. High performance industrial coatings (HPIC).
 - 2. Any other coating, thinner, accelerator, inhibitor, etc., specified or required as part of a complete System specified in this Specification Section.
 - 3. Minimum surface preparation requirements.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Division 00 Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 01 General Requirements.
 - 3. Section 03 31 32 Concrete Finishing and Repair of Surface Defects.
 - 4. Section 05 50 00 Metal Fabrications.
 - 5. Section 10 14 00 Identification Devices.
 - 6. Section 40 05 05 Equipment: Basic Requirements.

1.02 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. ASTM International (ASTM):
 - a. D4258, Standard Practice for Surface Cleaning Concrete for Coating.
 - b. D4259, Standard Practice for Abrading Concrete.
 - c. D4261, Standard Practice for Surface Cleaning Concrete Unit Masonry for Coating.
 - d. D4262, Standard Test Method for pH of Chemically Cleaned or Etched Concrete Surfaces.
 - e. D4263, Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method.
 - f. E84, Standard Test Method for Surface Burning Characteristics of Building Materials.
 - 2. National Association of Pipe Fabricators (NAPF):
 - a. 500-03, Surface Preparation Standard for Ductile Iron Pipe and Fittings in Exposed Locations Receiving Special External Coatings and/or Special Internal Linings:
 - 1) 500-03-04, Abrasive Blast Cleaning for Ductile Iron Pipe.

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- 2) 500-03-05, Abrasive Blast Cleaning for Cast Ductile Iron Fittings.
- 3. National Bureau of Standards (NBS):
 - a. Certified Coating Thickness Calibration Standards.
- 4. National Fire Protection Association (NFPA):
 - a. 101, Life Safety Code.
- 5. NSF International (NSF).
- Steel Door Institute/American National Standards Institute (SDI/ANSI):
 - a. A250.10, Test Procedure and Acceptance Criteria For Prime Painted Steel Surfaces for Steel Doors and Frames.
- 7. The Society for Protective Coatings (SSPC):
 - a. PA 2, Measurement of Dry Coating Thickness with Magnetic Gages.
 - b. SP-1, Solvent Cleaning.
 - c. SP- 2, Hand Tool Cleaning.
 - d. SP- 3, Power Tool Cleaning.
 - e. SP- 5, No, 1 White Metal Blast Cleaning.
 - f. SP-6, No. 3Commercial Blast Cleaning.
 - g. SP-7, No. 4 Brush-off Blast Cleaning.
 - h. SP -10 No. 2, Near-White Blast Cleaning.
 - i. SP- 13, No. 6, Surface Preparation of Concrete.
- B. Qualifications:
 - 1. Coating manufacturer's authorized representative shall provide written statement attesting that applicator has been instructed on proper preparation, mixing and application procedures for coatings specified.
 - 2. Applicators shall have minimum of ten (10) years experience in application of similar products on similar project.
 - a. Provide references for minimum of three (3) different projects completed in last five (5) years with similar scope of work.
 - b. Include name and address of project, size of project in value (painting) and contact person.

- C. Miscellaneous:
 - 1. Furnish paint through one (1) manufacturer unless noted otherwise.
 - 2. Coating used in all corridors and stairways shall meet requirements of NFPA 101 and ASTM E84.
- D. Deviation from specified mil thickness or product type is not allowed without written authorization of Project Representative.
- E. Material shall not be thinned unless approved, in writing, by paint manufacturer's authorized representative.

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- F. The use of accelerants and extenders are forbidden, unless specifically approved in writing by the Project Representative.
- G. Contractor to accommodate the Owner's third-party coating inspector in the field and in shop facilities.

1.03 DEFINITIONS

- A. Installer or Applicator:
 - 1. Installer or applicator is the person actually installing or applying the product in the field at the Project site.
 - 2. Installer and applicator are synonymous.
- B. Approved Factory Finish: Finish on a product in compliance with the finish specified in the Specification Section where the product is specified or in Specification Section 40 05 05 Equipment: Basic Requirements.
- C. Corrosive Environment: Immersion in, or not more than 6 IN above, or subject to condensation, spillage or splash of a corrosive material such as water, wastewater, or chemical solution; or exposure to corrosive, caustic or acidic agent, chemicals, chemical fumes, chemical mixture, or solutions with pH range of 5 to 9. Entire interior of Transfer Station is considered corrosive.
- D. Exposed Exterior Surface:
 - 1. Surface which is exposed to weather but not necessarily exposed to view as well as surface exposed to view.
 - 2. Exterior surfaces are considered corrosive environment.
- E. Finished Area: An area that is listed in or has finish called for on Room Finish Schedule or is indicated on Drawings to be painted.
- F. Paint includes the following:
 - 1. Fillers, primers, sealers, emulsions, oils, alkyds, latex, enamels, thinners, stains, epoxies, vinyls, chlorinated rubbers, urethanes, shellacs, varnishes, and any other applied coating specified within this Section.
- G. Surface Hidden from View: Surfaces such as those within pipe chases, surfaces between top side of ceilings (including drop-in tile ceilings) and underside of floor or roof structures above, surfaces under overhanging walkways if over 5 FT above adjacent walking surfaces.
- H. VOC: Volatile Organic Compound.
- I. Shop Coating:
 - 1. Coordinate shop primer, surface preparation and coating with field applied primers and coatings where specified.
 - 2. Provide suitable methods of handling and transporting painted steel to avoid damage to coating.
 - 3. Do not coat the following surfaces:
 - a. Machined surfaces, surfaces adjacent to field welds, and surfaces fully embedded in concrete.
 - b. All other members for which no coating is specified.

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- c. Contact surfaces at bolted slip-critical connections, unless surface condition conforms to the RCSC Specification for Structural Joints, Part 3.b.
- 4. Clean thoroughly all surfaces not coated before shipping.
 - a. Remove loose mill scale, rust, dirt, oil and grease.
 - b. Protect machined surfaces.

1.04 SUBMITTALS

- A. Submittal Procedures: See Section 01 33 00 Submittal Procedures for requirements for the mechanics and administration of the submittal process.
- B. Leadership in Energy and Environmental Design (LEED[®]) Documentation: Submit the following in accordance with section 01 81 30 - Sustainability Requirements:
 - 1. Product Data for IEQ 4.2: For paints and coatings used inside the weatherproofing system, documentation including printed statement of VOC content.
 - 2. LEED Materials Tracking Form: Form to be provided in an electronic format to the Contractor to record LEED materials used on the project.
- C. Approval Submittals:
 - 1. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's application instructions.
 - c. Manufacturer's surface preparation instructions.
 - d. If products being used are manufactured by Company other than listed in the MATERIALS Article of this Specification Section, provide complete individual data sheet comparison of proposed products with specified products including application procedure, coverage rates and verification that product is designed for intended use.
 - e. Contractor's written plan of action for containing airborne particles created by blasting operation and location of disposal of spent contaminated blasting media.
 - f. Coating manufacturer's recommendation on abrasive blasting.
 - g. Manufacturer's recommendation for universal barrier coat.
 - h. Manufacturer's recommendation for providing temporary or supplemental heat or dehumidification or other environmental control measures.
 - 2. Manufacturer's statement regarding applicator instruction on product use.
 - 3. Samples:
 - a. Manufacturer's full line of colors for Project Representative's preliminary color selection.

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- b. After preliminary color selection by Project Representative provide 3 IN x 5 IN samples of each final color selected.
- D. Quality Assurance Submittals:
 - 1. Applicator experience qualifications.
 - a. No submittal information will be reviewed until Project Representative has received and approved applicator qualifications.
 - 2. Certification that Coating Systems proposed for use have been reviewed and approved by the Manufacturer's Senior Corrosion Specification Specialist employed by the coating manufacturer.
 - 3. Applicator's daily records:
 - a. Submit daily records at end of each week in which painting work is performed unless requested otherwise by Project Representative.
- E. Closeout Submittals:
 - 1. Approval of application equipment.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver in original containers, labeled as follows:
 - 1. Name or type number of material.
 - 2. Manufacturer's name and item stock number.
 - 3. Contents, by volume, of major constituents.
 - 4. Warning labels.
 - 5. VOC content.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, only the following manufacturers are acceptable:
 - 1. High performance industrial coatings (HPIC):
 - a. ICI Devoe (<u>www.devoe.com</u>).
 - b. Ellis Paint Company (www.ellispaint.com).
 - c. Carboline Protective Coatings (www.carboline.com).
 - d. Sherwin Williams (www.sherwin-williams.com).
 - e. Dampney Company, Inc. (www.dampney.com).
 - f. PPG Industries/Amercoat (<u>www.ppg.com/coatings</u>).
 - g. Tnemec Company, Inc (www.tnemec.com).
 - h. Dunn Edwards (www.dunnedwards.com).
 - i. Or approved equal.

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- B. Submit request for substitution in accordance with Specification Section 01 60 00 Product Requirements.
 - 1. Product VOC content will be an important factor when determining acceptability of substitution.

2.02 MATERIALS

- A. For unspecified materials such as thinner, provide manufacturer's recommended products.
- B. Paint Systems General:
 - 1. P = prime coat.
 - 2. F1, F2 . . . Fn = first finish coat, second finish coat nth finish coat, color as selected by Project Representative.
 - 3. If two (2) finish coats of same material are required, Contractor may, at his option and by written approval from paint manufacturer, apply one (1) coat equal to mil thickness of two (2) coats specified.
 - 4. Refer to Definitions for Shop Coating specifications.
- C. Paint Systems (Systems not shown are not used. All mils thicknesses listed are measured after curing and are dry thicknesses):
 - 1. HPIC SYSTEM #1 Polyamidoamine Epoxy Primer with Polyamidoamine Epoxy or Waterborne Acrylic Polyurethane Finish Coat(s) for structural steel and miscellaneous ferrous metals subject to non-corrosive environment.
 - a. Prime coat:
 - 1) P1 = 1 coat, 3 mils.
 - a) Series L69 Epoxoline (Polyamidoamine Epoxy).
 - b) Ellis Engard 460HS Epoxy.
 - c) Or approved equal.
 - b. Finish coat(s):
 - 1) Interior:
 - a) F1 = 1 coat, 3 mils.
 - i Series L69 Epoxoline (Polyamidoamine Epoxy).
 - ii Ellis Engard 460HS Epoxy.
 - iii Or approved equal.
 - b) F2 = 1 coat, 3 mils.
 - i Series L69 Epoxoline (Polyamidoamine Epoxy).
 - ii Ellis Engard 460HS Epoxy.
 - iii Or approved equal.

- 2) Exterior:
 - a) $F1 = 1 \operatorname{coat}, 3 \operatorname{mils}.$
 - i Series L69 Epoxoline (Polyamidoamine Epoxy).
 - ii Ellis Engard 460HS Epoxy).
 - iii Or approved equal.
 - b) F2 = 1 coat, 2.5 mils.
 - i Series 1080 Endura-Shield (Waterborne Acrylic Polyurethane).
 - ii Ellis Decade Solventborne Urethane.
 - iii Or approved equal.
- 2. HPIC SYSTEM #2 Zinc-Rich Urethane Primer with Polyamidoamine Epoxy or Waterborne Acrylic Polyurethane Finish Coat(s) for ferrous metals subject to corrosive environment.
 - a. Prime coat:
 - 1) P1 = 1 coat, 3.5 mils, Series 90-97 Tneme-Zinc (Zinc-Rich Urethane).
 - 2) PPG Amercoat 68MCZ.
 - 3) Or approved equal.
 - b. Finish coat(s):
 - 1) Interior:
 - a) F1 = 1 coat, 6 mils, Series L69 Epoxoline (Polyamidoamine Epoxy).
 - b) PPG Amerlock 2/400.
 - c) Or approved equal.
 - 2) Exterior:
 - a) F1 = 1 coat, 6 mils, Series L69 Epoxoline (Polyamidoamine Epoxy).
 - b) PPG Amerlock 2/400.
 - c) Or approved equal.
 - d) F2 = 1 coat, 2.5 mils, Series 1080 Endura-Shield W.B.(Waterborne Acrylic Polyurethane).
 - e) PPG Amercoat 450.
 - f) PPG Amerishield.
 - g) Or approved equal.
- 3. HPIC SYSTEM #3 Polyamidoamine Epoxy Primer with Polyamidoamine Epoxy or Waterborne Acrylic Polyurethane Top Coat(s) for all copper, brass and assembled galvanized steel items; aluminum and aluminum flashing specifically indicated on the Drawings to be painted.
 - a. Prime coat:
 - 1) P1 = 1 coat, 5 mils.
 - a) Series L69 Epoxoline (Polyamidoamine Epoxy).
 - b) Ellis Engard 460HS Epoxy.
 - c) Or approved equal.
 - b. Finish coat(s):
 - 1) Interior:
 - a) F1 = 1 coat, 5 mils.
 - i Series L69 Epoxoline (Polyamidoamine Epoxy).
 - ii Ellis Engard 460HS Epoxy.
 - iii Or approved equal.
 - 2) Exterior:
 - a) F1 = 1 coat, 2.5 mils.
 - i Series 1080 Endura-Shield W.B. (Waterborne Acrylic Polyurethane).
 - ii Ellis Decade Urethane.
 - iii Or approved equal.
- 4. HPIC SYSTEM #5 Modified Polyamidoamine Epoxy Primer with Polyamidoamine Epoxy or Waterborne Acrylic Polyurethane or Ellis Selfpriming Solventborne Urethane Top Coat(s) for field painting of factory finished ferrous metal items and equipment subject to non-corrosive environment.
 - a. Prime coat:
 - 1) P1 = 1 coat, 2.0 mils.
 - a) Series 135 Chembuild (Modified Polyamidoamine Epoxy).
 - b) Ellis Engard 460HS Epoxy primer.
 - c) Or approved equal.
 - b. Finish coat(s):
 - 1) Interior:
 - a) F1 = 1 coat, 2.5 mils.
 - i Series L69 Epoxoline (Polyamidoamine Epoxy).
 - ii Ellis Paint Company or Engard 460HS Epoxy Coating.
 - iii Or approved equal.

- 2) Exterior:
 - a) F1 = 1 coat, 2.0 mils.
 - i Series 1080 Endura-Shield W.B. (Waterborne Acrylic Polyurethane).
 - ii Ellis Decade Solventborne Polyurethane.
 - iii Or approved equal.
- 5. HPIC SYSTEM #5.1 Cycloaliphatic Amine Epoxy Primer with Aliphatic Polyester Polyurethane Top Coat(s) for hollow metal doors and frames subject to corrosive environment.
 - a. Prime coat:
 - 1) P1 = 1 coat, 10 mils:
 - a) Series 104 H.S. Epoxy (Amine Epoxy).
 - b) PPG Amerlock 2/400.
 - c) Or approved equal.
 - b. Finish coat:
 - 1) F1 = 1 coat, 3.0 mils.
 - a) Series 290 CRU (Aliphatic Polyester Polyurethane).
 - b) PPG Amercoat 450.
 - c) PPG Amershield.
 - d) Or approved equal.
- 6. HPIC SYSTEM #6 Modified Polyamidoamine Epoxy Primer with Polyamidoamine Epoxy or Waterborne Acrylic Polyurethane Top Coat(s) for all interior and exterior factory primed steel joists not included under paint SYSTEM #9.
 - a. Prime coat:
 - 1) P1 = 1 coat, 3 mils.
 - a) Series 135 Chembuild (Modified Polyamidoamine Epoxy).
 - b) Ellis Engard 460HS Epoxy Primer.
 - c) Or approved equal.
 - b. Finish coat(s):
 - 1) Interior:
 - a) $F1 = 1 \operatorname{coat}, 4 \operatorname{mils}.$
 - i Series L69 Epoxoline (Polyamidoamine Epoxy).
 - ii Ellis Engard 460HS Epoxy.
 - iii Or approved equal.

- 2) Exterior:
 - a) F1 = 1 coat, 3 mils.
 - i Series 1080 Endura-Shield W.B. (Waterborne Acrylic Polyurethane).
 - ii Ellis Decade Urethane.
 - iii Or approved equal.
- 7. HPIC SYSTEM #7 Zinc-Rich Urethane Primer with Polyamidoamine Epoxy or Waterborne Acrylic Polyurethane Top Coat(s) for all interior and exterior structural steel not included under paint SYSTEM #9, including miscellaneous structural steel items subject to corrosive environment.
 - a. Prime coat:
 - 1) P1 = 1 coat, 2.5 mils
 - a) Series 90-97 Tneme-Zinc (Zinc-Rich Urethane).
 - b) PPG Amercoat 68MCZ.
 - c) Or approved equal.
 - b. Finish coat(s):
 - 1) Interior:
 - a) F1 = 1 coat, 5 mils
 - i Series L69 Epoxoline (Polyamidoamine Epoxy).
 - ii PPG Amerlock 2/400.
 - iii Or approved equal.
 - 2) Exterior:
 - a) F1 = 1 coat, 3.0 mils
 - i Series 1080 Endura-Shield W.B. (Waterborne Acrylic Polyurethane).
 - ii PPG Amercoat 450.
 - iii PPG Amershield.
 - iv Or approved equal.
- 8. HPIC SYSTEM #8 Air Dry Silicone Copolymer Primer with Silicone Copolymer Top Coat for blower and air piping systems such as furnace flues subject to maximum high temperatures of 400 Deg F.
 - a. Prime coat:
 - 1) P1 = 1 coat, 2.0 mils.
 - a) Dampney Thurmalox 260C Series (Air Dry Silicone Copolymer).
 - b) PPG Hi-Temp 500V.
 - c) Or approved equal.

- b. Finish coat:
 - 1) Interior or exterior:
 - a) F1 = 1 coat, 2.0 mils:
 - i Dampney Thurmalox 260C Series (Air Dry Silicone Copolymer).
 - ii PPG Hi-Temp 500V.
 - iii Or approved equal.
- 9. HPIC SYSTEM #9 Modified Polyamidoamine Epoxy for factory applied prime coat only for interior structural steel, steel bar joists and other ferrous metal surfaces not in corrosive environment, including miscellaneous structural steel items.
 - a. Prime coat:
 - 1) P1 = 1 coat, 3 mils:
 - a) Series 135 Chembuild (Modified Polyamidoamine Epoxy).
 - b) PPG Amerlock 2/400.
 - c) Or approved equal.
- 10. HPIC SYSTEM #10 Modified Silicone Co-Polymer Primer with Modified Silicone Co-Polymer Top Coat(s) for high temperature surfaces that require coatings that will withstand temperatures from 500 DegF.
 - a. Prime coat:
 - 1) P1 = 1 coat, 4.0 to 5.0 mils:
 - a) Dampney Thurmalox 225 HD (Modified Silicone Co-Polymer).
 - b) PPG Hi-Temp 1027.
 - c) Or approved equal.
 - b. Finish coat(s):
 - 1) F1 = 1 coat, 2.5 to 3.0 mils:
 - a) Dampney Thurmalox 230C.
 - b) PPG Hi-Temp 1000.
 - c) Or approved equal.
- 11. HPIC SYSTEM #12 HDP Acrylic Polymer Primer and Top Coat for surface of pipe and duct insulation.
 - a. Prime coat:
 - 1) P1 = 1 coat, 2.5 mils:
 - a) Series1029 Enduratone (HDP Acrylic Polymer).
 - b) PPG Pitt Tech Plus Primer 90-912.
 - c) Or approved equal.

- b. Finish coat:
 - 1) Interior:
 - a) F1 = 1 coat, 2.5 mils:
 - i Series1029 Enduratone (HDP Acrylic Polymer).
 - ii PPG Pitt Tech Plus Satin DTM 90-1110.
 - iii Or approved equal.
- 12. HPIC SYSTEM #14 Waterborne Modified Polyamine Epoxy Primer with Specialized Acrylate Waterborne Top Coats for interior or dry areas over gypsum wall board.
 - a. Prime coat:
 - 1) P1 = 1 coat, 1.5 mils:
 - a) Series 151 Elasto-Grip FC (Waterborne Modified Polyamine Epoxy).
 - b) PPG Perma-Crete Alkali Resistant Primer 4-603.
 - c) Or approved equal.
 - b. Finish coat(s):
 - 1) Interior:
 - a) F1 = 1 coat, 6.5 to 7.5 mils:
 - i Series 158 Bio-Lastic (Specialized Waterborne Acrylate).
 - ii PPG Perma-Crete High Build Acrylic 4-22.
 - iii Or approved equal.
 - b) F2 = 1 coat, 6.5 to 7.5 mils:
 - i Series 158 Bio-Lastic (Specialized Waterborne Acrylate).
 - ii PPG Perma-Crete High Build Acrylic 4-22.
 - iii Or approved equal.
- 13. HPIC SYSTEM #19 Polyamidoamine Epoxy Coating for adjoining dissimilar metals or for aluminum buried in concrete.
 - a. Prime coat:
 - 1) P1 = 1 coat, 5 mils:
 - a) Series L69 Epoxoline (Polyamidoamine Epoxy).
 - b) Amerlock 2/400.
 - c) Or approved equal.

- 14. HPIC SYSTEM #21 Modified Polyamidoamine Epoxy for touching up pipe threads and other aluminum colored finishes where top coat is not required.
 - a. Prime coat:
 - 1) P1 = 1 coat, 5 mils:
 - a) 135-1243 Chembuild (Modified Polyamidoamine Epoxy).
 - b) Amerlock 2/400 (Low VOC)
 - c) Or approved equal.
- 15. HPIC SYSTEM #41 Touch-up of galvanized surfaces not requiring a top coat.
 - a. Refer to Specification Section 05 50 00 Metal Fabrications.
- 16. HPIC SYSTEM #42 Alkyd wood stain with water-based polyurethane varnish top coats.
 - a. Apply washcoat uniformly to wood at manufacturer's recommended application rate.
 - b. Wood stain: Color to be selected.
 - c. First coat of water-based polyurethane varnish: Gloss.
 - d. Second coat of water-based polyurethane varnish: Satin.
 - e. Third coat of water-based polyurethane varnish: Satin.
- 17. HPIC SYSTEM #43 Polyamidoamine Epoxy Primer with Polyamidoamine Epoxy Top Coat for field painting factory coated fusion bonded epoxy piping, valves, etc.
 - a. Prime coat:
 - 1) P1 = 1 coat, 2.5 mils:
 - a) Series L69 Epoxoline (Polyamidoamine Epoxy).
 - b) PPG Amerlock (Low VOC version)
 - c) Or approved equal.
 - b. Finish coat:
 - 1) Interior:
 - a) F1 = 1 coat, 3 mils, Series L69 Epoxoline (Polyamidoamine Epoxy).
 - b) PPG Amerlock 2/400 (Low VOC version).
 - c) Or approved equal.

2.03 MAINTENANCE MATERIALS

- A. Extra Material:
 - 1. Provide 5 GAL of each paint color installed in the field color to the Project Representative.

2. Provide 5 GAL of each primer and intermediate coating installed to the Project Representative.

PART 3 – EXECUTION

3.01 ITEMS TO BE PAINTED

- A. General:
 - 1. Paint the following surfaces in a corrosive, whether exposed to view or not:
 - a. Conduit.
 - b. Ducts.
 - c. Galvanized metal surfaces.
- B. Exposed Exterior Surfaces including:
 - 1. Structural steel members.
 - a. Roof Beams.
 - b. Girder/beam extensions.
 - c. Vertical framing.
 - 2. Galvanized metal surfaces:
 - a. Roof panels(underside and overhangs only).
 - b. Roof purlins.
 - c. Secondary framing for metal wall panels.
 - 3. Equipment supports, pipe supports.
 - 4. Wall louvers.
 - 5. Overhead doors.
 - a. Coiling Doors.
 - b. Rolling Doors.
 - 6. Piping, valves, fittings, and hydrants and supports.
 - 7. Conduit, device boxes, junction boxes and covers, pull boxes and covers and supports when attached to a surface required to be painted or to a prefinished surface.
 - 8. Miscellaneous ferrous metal surfaces.
 - 9. Hollow metal doors and frames.
 - 10. Steel pipe bollards (not galvanized).
 - 11. Steel lintels.
 - a. Steel components shall be completely painted (with both prime and finish coats) prior to installing in the wall.
 - 12. Copper and brass surfaces.

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- 13. Gas appliance flue vents and cast iron pipe plumbing vents.
- C. Interior Finished Areas:
 - 1. Refer to Room Finish Schedule on Drawings.
 - 2. If room is scheduled in the Room Finish Schedule, the space is considered to be a finished area, therefore, paint all appurtenant surfaces within the space unless specifically noted not to be painted in the Contract Documents.
 - a. If walls are not required to be painted, appurtenant concrete surfaces are not required to be painted unless specifically noted otherwise.
 - b. Appurtenant surfaces include:
 - Concrete columns, equipment pads, pipe supports, and equipment supports, underside of overhead concrete slabs which are exposed, semi-exposed or concealed from view but still exposed to the adjacent atmosphere.
 - 2) Piping, valves, fittings and hydrants except when covered by pipe jacketing and supports.
 - a) All bituminous coated ductile iron pipe to have coating completely removed prior to painting.
 - 3) Miscellaneous ferrous metal surfaces.
- D. Surfaces in Areas Not Considered Finished:
 - 1. Paint following surfaces in areas not considered as finished area:
 - a. Piping, valves, fittings, and hydrants and supports.
 - b. Structural Steel and steel joists (including bridging)
 - c. Miscellaneous ferrous metal surfaces as noted.
 - d. Steel lintels (plain or galvanized).
 - 1) Steel components shall be completely painted (with both prime and finish coats) prior to installing in the wall.
 - e. Hollow metal doors and frames.

3.02 ITEMS NOT TO BE PAINTED

- A. General: Do not paint items listed in this Article unless specifically noted in the Contract Documents to be painted.
- B. Items with Approved Factory Finish: These items may require repair of damaged painted areas or painting of welded connections. Project Representative to verify items prior to repair and/or painting of welded connections.
- C. Electrical Equipment:
 - 1. Do not field paint electrical equipment except where painting is specifically stated elsewhere in these Contract Documents, or where the equipment is subject to a corrosive environment and is specifically noted to be painted.

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- D. Other Items:
 - 1. Stainless steel surfaces except:
 - a. Piping where specifically noted to be painted.
 - b. Banding as required to identify piping.
 - 2. Aluminum surfaces except:
 - a. Where specifically shown in the Contract Documents.
 - b. Where in contact with concrete.
 - c. Where in contact with dissimilar metals.
 - 3. Fiberglass surfaces except:
 - a. Fiberglass piping where specifically noted to be painted.
 - b. Piping supports where specifically noted to be painted.
 - 4. Interior of pipe, ductwork, and conduits.
 - 5. Moving parts of mechanical and electrical units where painting would interfere with the operation of the unit.
 - 6. Code labels and equipment identification and rating plates.
 - 7. Structural steel or steel deck required to be fireproofed.
 - 8. Prefinished wood doors. Prefinished wood trim.
 - a. Provide touch-up painting to damaged areas of prefinished surfaces.
 - 9. Metal roof, fascia, trim, and roof accessories per Section 07 61 13 Metal Roofing.
 - 10. Contact surfaces of friction-type connections.
 - 11. Cable trays and IT cables.

3.03 SCHEDULE OF ITEMS TO BE PAINTED AND PAINTING SYSTEMS

- A. Wood:
 - 1. Interior stain and varnish: HPIC SYSTEM #42.
- B. Steel:
 - 1. Structural:
 - a. Non-immersion surfaces subject to corrosive environment: HPIC SYSTEM #7.
 - b. All other surfaces (non-corrosive dry environment): HPIC SYSTEM #1.
 - 2. Joists:
 - a. Exposed: HPIC SYSTEM #6.
 - b. Above lay-in acoustical or suspended GWB ceiling: HPIC SYSTEM #9.

- C. Miscellaneous ferrous metals (non-corrosive dry environment): HPIC SYSTEM #1.
 - 1. Not for coating galvanized steel, steel (hollow metal) doors, steel (hollow metal) door and window frames, and products with approved factory finishes.
- D. Ferrous metals subject to corrosive environment: HPIC SYSTEM #2.
 - 1. Includes ferrous metal components of equipment located in corrosive environments such as bare steel handrails and guardrails, piping, stairs, tank or equipment bridges, pumps, and similar items.
 - 2. Galvanized components should be prepped prior to coating.
 - 3. Field touch-up where required and approved by Project Representative.
 - 4. Does not include items subject to contact with potable water.
- E. Galvanized Metals:
 - 1. Field touch-up where top coat is required: HPIC SYSTEM #3, prime and first finish coat only.
 - a. Prime paint only the damaged area.
 - 2. Assembled galvanized steel items: HPIC SYSTEM #3.
 - 3. Field touch-up of galvanized surfaces not requiring a finish top coat: HPIC SYSTEM #41.
 - a. Paint only damaged areas.
 - 4. Galvanized pipe bollards: HPIC SYSTEM #3.
- F. Steel (hollow metal) doors and frames primed in the factory in accordance with SDI/ANSI A250.10.
 - 1. For doors and frames in non-corrosive environments: HPIC SYSTEM #5.
 - 2. For doors and frames in corrosive areas: HPIC SYSTEM #5.1.
 - a. Specifically including all chemical room door openings having fiberglass reinforced plastic doors with hollow metal frames.
- G. Steel equipment with existing paint coating or factory-applied prime or finish coating not complying with this Specification Section: HPIC SYSTEM #5.
 - 1. Includes equipment specifically indicated in the Contract Documents to be painted.
 - 2. Factory-applied coats to remain.
- H. Non-ferrous metals (except galvanized): HPIC SYSTEM #3.
 - 1. Includes copper, brass, aluminum and aluminum flashing specifically indicated on the Drawings to be painted.
- I. Plastic Surfaces:
 - 1. PVC, FRP, and CPVC surfaces: HPIC SYSTEM #3.
 - a. Includes tankage and piping.

- J. Electrical Conduit:
 - 1. Galvanized: HPIC SYSTEM #3.
 - 2. PVC coated: HPIC SYSTEM #3.
- K. Pipe, Valves, and Fittings:
 - 1. Bare steel pipe bollards: HPIC SYSTEM #2.
 - 2. Steel, cast-iron, and uncoated ductile iron: HPIC SYSTEM #2.
 - 3. Stainless steel: HPIC SYSTEM #1.
 - 4. Brass and bronze: HPIC SYSTEM #3.
 - 5. Steel aeration piping: HPIC SYSTEM #8.
- L. Pipe and duct insulation: HPIC SYSTEM #12.
- M. Aluminum buried in concrete, between dissimilar metals and dissimilar materials: HPIC SYSTEM #19.
- N. Aluminum colored pipe thread touch-up, and aluminum colored finish where top coat is not required: HPIC SYSTEM #21.
 1. Not for coating aluminum material.
- O. Steel pipe, ducts, and equipment subject to maximum high temperatures of 400 DegF: HPIC SYSTEM #8.
- P. Emergency generator engine exhaust piping: HPIC SYSTEM #10.
- Q. Interior gypsum board: HPIC SYSTEM #14.
- R. Field painting of fusion bonded epoxy coated piping, valves, couplings, etc.: HPIC SYSTEM #43.

3.04 PREPARATION

- A. General:
 - 1. Verify that atmosphere in area where painting is to take place is within paint manufacturer's acceptable temperature, humidity and sun exposure limits.
 - 2. Galvanized components should be prepped prior to coating.
- B. Protection:
 - 1. Protect surrounding surfaces not to be coated.
 - 2. Remove and protect hardware, accessories, plates, fixtures, finished work, and similar items; or provide ample in-place protection.
- C. Prepare and paint before assembly all surfaces which are inaccessible after assembly.
- D. Ferrous Metal:
 - 1. Prepare ductile iron pipe in accordance with pipe manufacturer's recommendations and AWWA.

- 2. Complete fabrication, welding or burning before beginning surface preparation.
 - a. Chip or grind off flux, spatter, slag or other laminations left from welding.
 - b. Remove mill scale.
 - c. Grind smooth rough welds and other sharp projections.
- 3. All interior and exterior surfaces:
 - a. Minimum commercial blast clean in accordance with SSPC SP 6 No. 3.
- 4. Surfaces subject to high temperatures.
 - a. Heat in excess of 600 DegF: SSPC SP 10/NACE No. 2.
 - b. Heat in excess of 200 DegF but less than 600 DegF: SSPC SP 6/NACE No. 3.
- 5. Restore surface of field welds and adjacent areas to original surface preparation.
- 6. All surfaces of steel lintels and steel components of concrete lintels used in wall construction shall be completely painted with both prime and finish coats prior to placing in wall.
- E. Hollow Metal:
 - 1. Clean in accordance with SSPC SP 1 and in accordance with hollow metal manufacturer.
- F. Galvanized Steel and Non-ferrous Metals:
 - 1. Solvent clean in accordance with SSPC SP 1 followed by brush-off blast clean in accordance with SSPC SP 16 to remove zinc oxide and other foreign contaminants.
 - a. Provide uniform 1 mil profile surface.
- G. Gypsum Wallboard :
 - 1. Repair minor irregularities left by finishers.
 - 2. Avoid raising nap of paper face on gypsum wallboard.
 - 3. Verify moisture content is less than 8 percent before painting.
 - 4. Provide all special preparation required for SC application..

3.05 APPLICATION

- A. General:
 - 1. Thin, mix and apply coatings by brush, roller, or spray in accordance with manufacturer's installation instructions.
 - a. Application equipment must be inspected and approved in writing by coating manufacturer.
 - b. Hollow metal shall be spray applied only.

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- 2. Temperature and weather conditions:
 - a. Do not paint surfaces when surface temperature is below 50 DegF unless product has been formulated specifically for low temperature application and application is approved in writing by Project Representative and paint manufacturer's authorized representative.
 - b. Avoid painting surfaces exposed to hot sun.
 - c. Do not paint on damp surfaces.
- 3. Immediately after surface has been inspected and accepted by NACE certified coatings inspector, apply structural steel and miscellaneous steel and steel truss prime coat in the factory.
 - a. Finish coats shall be applied in the field.
 - b. Prime coat referred to here is prime coat as indicated in this Specification.
 - Structural steel and miscellaneous steel and steel joist and miscellaneous steel prime coating applied in factory (shop) as part of Fabricator's standard rust inhibiting and protection coating is not acceptable as replacement for specified prime coating.
- 4. Provide complete coverage to mil thickness specified.
 - a. Thickness specified is dry mil thickness.
 - b. All paint systems are "to cover." In situations of discrepancy between manufacturer's square footage coverage rates and mil thickness, mil thickness requirements govern.
 - c. When color or undercoats show through, apply additional coats until paint film is of uniform finish and color.
- 5. If so directed by Project Representative, do not apply consecutive coats until Project Representative has had an opportunity to observe and approve previous coats.
- 6. Apply materials under adequate illumination.
- 7. Evenly spread to provide full, smooth coverage.
- 8. Work each application of material into corners, crevices, joints, and other difficult to work areas.
- 9. Avoid degradation and contamination of blasted surfaces and avoid intercoat contamination.
 - a. Clean contaminated surfaces before applying next coat.
- 10. Smooth out runs or sags immediately, or remove and recoat entire surface.
- 11. Allow preceding coats to dry before recoating.
 - a. Recoat within time limits specified by coating manufacturer.
 - b. If recoat time limits have expired re-prepare surface in accordance with coating manufacturer's printed recommendations.

- 12. Allow coated surfaces to cure prior to allowing traffic or other work to proceed.
- 13. Coat all aluminum in contact with dissimilar materials.
- 14. When coating rough surfaces which cannot be backrolled sufficiently, hand brush coating to work into all recesses.
- 15. Backroll concrete and masonry and gypsum board surfaces with a roller if paint coatings are spray applied.
- B. Prime Coat Application:
 - 1. Prime all surfaces indicated to be painted.
 - a. Apply prime coat in accordance with coating manufacturer's written instructions and as written in this Specification Section.
 - 2. Ensure field-applied coatings are compatible with factory-applied coatings.
 - a. Ensure new coatings applied over existing coatings are compatible.
 - b. Employ services of coating manufacturer's qualified technical representative.
 - 1) Certify through material data sheets.
 - 2) Perform test patch.
 - c. If field-applied coating is found to be not compatible, require the coating manufacturer's technical representative to recommend, in writing, product to be used as barrier coat, thickness to be applied, surface preparation and method of application.
 - d. At Contractor's option, coatings may be removed, surface reprepared, and new coating applied using appropriate paint system listed in the MATERIALS Article, Paint Systems paragraph of this Specification Section.
 - 1) All damage to surface as result of coating removal shall be repaired to original condition or better by Contractor at no additional cost to Owner.
 - Prime ferrous metals embedded in concrete to minimum of 1 IN below exposed surfaces.
 - 4. After application of primer to gypsum board surfaces, inspect surface and repair in accordance with the PREPARATION Article of this Specification Section.
 - a. Re-prime repaired surfaces to uniform finish before application of finish coat(s).
 - 5. Apply zinc-rich primers while under continuous agitation.
 - 6. Ensure abrasive blasting operation does not result in embedment of abrasive particles in paint film.
 - 7. Brush or spray bolts, welds, edges and difficult access areas with primer prior to primer application over entire surface.

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- 8. Touch up damaged primer coats prior to applying finish coats.
 - a. Restore primed surface equal to surface before damage.
- 9. All surfaces of steel lintels and steel components of concrete lintels used in wall construction shall be completely painted with both prime and finish coats prior to placing in wall.
- C. Finish Coat Application:
 - 1. Apply finish coats in accordance with coating manufacturer's written instructions and in accordance with this Specification Section; manufacturer instructions take precedent over these Specifications.
 - 2. Touch up damaged finish coats using same application method and same material specified for finish coat.
 - a. Prepare damaged area in accordance with the PREPARATION Article of this Specification Section.

3.06 COLOR CODING

- A. Color and band piping in accordance with the SCHEDULE Article of this Specification Section.
 - 1. Band piping using maximum of three (3) different colors at 20 FT maximum centers.
 - 2. Factory painted piping shall be color banded in the factory per the Schedule in the SCHEDULE Article of this Specification Section.
 - 3. Place bands:
 - a. Along continuous lines.
 - b. At changes in direction.
 - c. At changes of elevation.
 - d. On both sides of an obstruction (e.g., wall, ceiling) that painted item passes through.
 - 4. Band width for individual colors (pipe diameter measured to outside of insulation, if applicable):
 - a. Piping up to 8 IN DIA: 2 IN minimum.
 - b. Piping greater than 8 IN up to 24 IN DIA: 4 IN minimum.
 - c. Piping greater than 24 IN up to 48 IN DIA: 6 IN minimum.
 - d. Piping greater than 48 IN DIA: 8 IN minimum.

3.07 FIELD QUALITY CONTROL

- A. Contractor to provide protection for surfaces painted with epoxy coatings to prevent chalking.
 - 1. Surfaces showing chalking will not be accepted regardless of condition of paint film.

- B. Maintain Daily Records:
 - 1. Record the following information during application of each coat of paint applied:
 - a. Date, starting time, end time, and all breaks taken by painters.
 - b. For exterior painting:
 - 1) Sky condition.
 - 2) Wind speed and direction.
 - c. Air temperature.
 - d. Relative humidity.
 - e. Moisture content and surface temperature of substrate prior to each coat.
 - f. Provisions utilized to maintain work area within manufacturer's recommended application parameters including temporary heating, ventilation, cooling, dehumidification and provisions utilized to mitigate wind blown dust and debris from contaminating the wet paint film.
 - g. Record environmental conditions, substrate moisture content and surface temperature information not less than once every four (4) HRS during application.
 - 1) Record hourly when temperatures are below 50 DegF or above 100 DegF.
 - 2. Record the following information daily for the paint manufacturer's recommended curing period:
 - a. Date and start time of cure period for each item or area.
 - b. For exterior painting:
 - 1) Sky conditions.
 - 2) Wind speed and direction.
 - c. Record environmental conditions not less than once every 12 HRS.
 - 1) Record once every four (4) HRS when ambient temperature is below 35 DegF.
 - d. Provisions utilized to protect each item or area and to maintain areas within manufacturer's recommended curing parameters.
 - 3. Format for daily record to be computer generated.
- C. Measure wet coating with wet film thickness gages.
- D. Measure coating dry film thickness in accordance with SSPC PA 2 using Mikrotest gage calibrated against NBS "Certified Coating Thickness Calibration Standards."
 - 1. Project Representative may measure coating thickness at any time during project to assure conformance with these Specifications.

- E. Measure surface temperature of items to be painted with surface temperature gage specifically designed for such.
- F. Measure substrate humidity with humidity gage specifically designed for such.
- G. Provide wet paint signs.

3.08 CLEANING

- A. Clean paint spattered surfaces.
 - 1. Use care not to damage finished surfaces.
- B. Upon completion of painting, replace hardware, accessories, plates, fixtures, and similar items.
- C. Remove surplus materials, scaffolding, and debris. Leave areas broom clean.

3.09 SCHEDULE

- A. Piping and Pipe Banding Color Schedule:
 - 1. Match existing piping and banding colors.
 - 2. Piping systems shown in italics with no paint color shown for the pipe but having paint colors shown for the banding color are systems that will be banded using material other than paint.
 - a. Refer to Specification Section 10 14 00 Identification Devices for the piping system and banding material and refer to this Specification Section and this Schedule for the banding colors.

END OF SECTION

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SECTION 10 11 00 MARKERBOARDS AND TACKBOARDS

PART 1 – GENERAL

1.01 SUMMARY

- A. Furnish all labor, materials, tools, equipment, and services for Markerboards and Tackboards, as indicated, in accordance with provisions of Contract Documents.
- B. Completely coordinate with work of other trades.

1.02 SUBMITTALS

- A. Submittal Procedures: See Section 01 33 00 Submittal Procedures for requirements for the mechanics and administration of the submittal process.
- B. Leadership in Energy and Environmental Design (LEED[®]) Documentation: Submit the following in accordance with Section 01 81 30 – Sustainability Requirements.
 - 1. Completed LEED Materials Submittal Form.
 - 2. Product Data for MR 7: Chain of Custody Certificates
 - 3. Product Data for IEQ 4.1: For adhesives and sealants used inside the weatherproofing system, documentation including printed statement of VOC content.
 - 4. Product Data for IEQ 4.4: For composite wood and agrifiber products used on the inside of the weatherproofing system, documentation including printed statement that product contains no added urea-formaldehyde resins.
 - 5. LEED Materials Tracking Form: Form to be provided in an electronic format to the Contractor to record LEED materials used on the project.
- C. Approval Submittals:
 - 1. Shop Drawings:
 - a. Include dimensional plans, elevations and details, large-scale sections of typical members, and other components. Show anchors, grounds, reinforcement and layout, and indicate finishes.
 - b. Include setting Drawings, templates, and directions for installing anchor bolts and other anchorages to be installed as a unit of Work in other Sections.
 - 2. Project Data:
 - a. Provide copies of manufacturer's specifications and installation instructions for each type of material and accessory required.
 - b. Where fire resistance classification is indicated, submit copies of nationally recognized testing laboratory listings of products proposed for use.

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- c. Include data required to show Specification compliance.
- 3. Samples:
 - a. Manufacturer's color charts showing full range of colors and textures for board and sheet finishes.
 - b. Aluminum trim and accessories: 4 IN long sections of extrusions.
 - c. Sheet materials: 8 IN x 10 IN samples.
- D. Quality Assurance Submittals:
 - 1. Statement of Installer qualifications.
 - 2. Product certificates: Signed by manufacturers of vinyl-fabric-faced cork tackboards certifying that products furnished comply with requirements specified for fire-test-response ratings.
- E. Closeout Submittals:
 - Operation & Maintenance (O&M) Manual Content: Provide O&M manual documentation as required by Section 01 73 00 – Operation and Maintenance Manuals.
 - Extended Warranty: Provide two executed copies of the Extended Warranty required by this Section in accordance with the provisions of Section 01 78 00 – Closeout Procedures.

1.03 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver completely assembled whenever possible.
- B. Where dimensions exceed available panel size, provide 2 or more pieces of length acceptable to Project Representative.
- C. When dimensions require delivery in separate units, prefit at factory, disassemble for delivery, and make final joint at site.
- D. Provide all required packing and unpacking at site.

1.04 EXTENDED WARRANTY

- A. In accordance with the provisions of Section 01 78 00 Closeout Procedures, provide an Extended Warranty for the Work of this Section:
 - 1. Warranty period for Work of this Section is Ten (10) years commencing on the date of Substantial Completion.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Markerboards, Tackboards and Chalkboards:
 - 1. Claridge Products & Equipment (www.claridgeproducts.com).
 - 2. ADP Lemco (<u>www.adplemco.com</u>).
 - 3. Marsh Industries, Inc. (<u>www.marsh-ind.com</u>).

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- 4. Or approved equal.
- B. Other manufacturers desiring approval comply with Section 01 60 00 Product Requirements.

2.02 MATERIAL

- A. Furnish all Markerboards, Tackboards and chalkboards by one manufacturer for entire project.
- B. Markerboard, metal (MB):
 - 1. Balanced, high pressure laminated, 3-ply laminated construction, with facing sheet, core, and backer.
 - a. MB-1: 4 FT high x 6 FT wide.
 - 2. Finish:
 - a. Type A porcelain enamel over ground coat on writing surface with seal coat on reverse side.
 - b. Comply with Porcelain Enamel Institute Specification PEI 1001.
 - 3. Face sheet:
 - a. Enameling steel, minimum 22 GA.
 - b. Finish to accommodate dry and liquid markers without residual staining.
 - 4. Core: Minimum 1/4 IN thick plywood or hardboard.
 - 5. Backer: Minimum 26 GA zinc plated steel, 28 GA random porcelain coil, or 0.015 IN aluminum sheet.
 - 6. Backing panel: Moisture FSC certified resistant plywood or hardboard 1/4 IN thick, with 1/4 IN backing; or, may be one piece 1/2 IN thick.
- C. Frames and trim:
 - 1. Minimum 0.062 IN thick aluminum.
 - 2. Size and shape as indicated.
 - 3. Single length units to minimize joints.
 - 4. Miter all corners to a neat, hairline closure.
 - 5. Satin anodized finish, AA-M30C22A31.
 - 6. Manufacturer's standard "narrow" trim, approximately 1/2 IN wide.
 - 7. When structural support accessories are required for boards in addition to normal trim, provide such additional support or modify trim as required to provide necessary support.
- D. Troughs:
 - 1. Continuous, for each board.
 - 2. Box type, with slanted front and cast aluminum end closures.

- E. Display rail, install at top of each unit with:
 - 1. Continuous 2 IN with integral cork strip.
 - 2. End stops: One at each end.
 - 3. Display hooks: One per 2 FT of rail.
 - 4. Display hooks with flexible metal clips: 1 per 2 FT of display rail or fraction thereof.

PART 3 – EXECUTION

3.01 INSPECTION

- A. Verify suitability of substrate to accept installation.
- B. Insure that adequate Wall Backing has been installed.
- C. Metal Wall Backing: Specified in Section 09 22 16 Non-Load-Bearing Wall Framing Systems.
- D. Coordinate and direct installation of backing where required.
- E. Correct unsatisfactory conditions.
- F. Installation constitutes acceptance of responsibility for performance.

3.02 INSTALLATION

- A. Provide trim at joints between Markerboards and Tackboards.
- B. Trim out vertical joints with aluminum H type divider bars.
- C. Provide additional backing as indicated or necessary to properly stiffen and support boards.
- D. Install at locations indicated in accordance with manufacturer's instructions.
- E. Install with concealed hangers, plumb and level.
- F. Locate with top 6 FT AFF if board is 36 IN high or less.
- G. Locate with top 7 FT AFF if board is greater than 36 IN high.
- H. Coordinate job assembled units with grounds, trim, and accessories.
- I. Join all parts with neat, precision fit.
- J. In addition to requirements of these specifications, comply with manufacturer's instructions and recommendations.
- K. Protect after installation until accepted by Project Representative.

END OF SECTION

SECTION 10 14 00 IDENTIFICATION DEVICES

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Tag, tape and stenciling systems for equipment, piping, valves, pumps, ductwork and similar items, and hazard and safety signs.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Division 00 Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 01 General Requirements.

1.02 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. American Society of Mechanical Engineers (ASME):
 - a. A13.1, Scheme for the Identification of Piping Systems.
 - 2. Instrumentation, Systems, and Automation Society (ISA).
 - 3. National Electrical Manufacturers Association/American National Standards Institute (NEMA/ANSI):
 - a. Z535.1, Safety Color Code.
 - b. Z535.2, Environmental and Facility Safety Signs.
 - c. Z535.3, Criteria for Safety Symbols.
 - d. Z535.4, Product Safety Signs and Labels.
 - 4. National Fire Protection Association (NFPA):
 - a. 70, National Electrical Code (NEC).
 - 5. Occupational Safety and Health Administration (OSHA):
 - a. 29 CFR 1910.145, Specification for Accident Prevention Signs and Tags.

1.03 SUBMITTALS

- A. Submittal Procedures: See Section 01 33 00 Submittal Procedures for requirements for the mechanics and administration of the submittal process.
- B. Approval Submittals:
 - 1. Product technical data including:
 - a. Catalog information for all identification systems.
 - b. Acknowledgement that products submitted meet requirements of standards referenced.

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PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. W.H. Brady Co.
 - 2. Panduit.
 - 3. Seton.
 - 4. National Band and Tag Co.
 - 5. Carlton Industries, Inc.
 - 6. Or approved equal.
- B. Submit request for substitution in accordance with Specification Section 01 60 00 – Product Requirements.

2.02 MANUFACTURED UNITS

- A. Type A1 Round Metal Tags:
 - 1. Materials:
 - a. Aluminum or stainless steel.
 - b. Stainless steel shall be used in corrosive environments.
 - 2. Size:
 - a. Diameter: 1-1/2 IN minimum.
 - b. Thickness: 0.035 IN (20 GA) minimum.
 - 3. Fabrication:
 - a. 3/16 IN minimum mounting hole.
 - b. Legend: Stamped and filled with black coloring.
 - 4. Color: Natural.
- B. Type A2 Rectangle Metal Tags:
 - 1. Materials: Stainless steel.
 - 2. Size:
 - a. 3-1/2 IN x 1-1/2 IN minimum.
 - b. Thickness: 0.036 IN (20 GA) minimum.
 - 3. Fabrication:
 - a. 3/16 IN minimum mounting hole.

b. Legend: Stamped and filled with black coloring.

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- 4. Color: Natural.
- C. Type A3 Metal Tape Tags:
 - 1. Materials: Aluminum or stainless steel.
 - 2. Size:
 - a. Width 1/2 IN minimum.
 - b. Length as required by text.
 - 3. Fabrication:
 - a. 3/16 IN minimum mounting hole.
 - b. Legend: Embossed.
 - 4. Color: Natural.
- D. Type B1- Square Non-Metallic Tags:
 - 1. Materials: Fiberglass reinforced plastic.
 - 2. Size:
 - a. Surface: 2 x 2 IN minimum.
 - b. Thickness: 100 mils.
 - 3. Fabrication:
 - a. 3/16 IN mounting hole with metal eyelet.
 - b. Legend: Preprinted and permanently embedded and fade resistant.
 - 4. Color:
 - a. Background: Manufacturer standard or as specified.
 - b. Lettering: Black.
- E. Type B2 Non-Metallic Signs:
 - 1. Materials: Fiberglass reinforced or durable plastic.
 - 2. Size:
 - a. Surface: As required by text.
 - b. Thickness: 60 mils minimum.
 - 3. Fabrication:
 - a. Rounded corners.
 - b. Drilled holes in corners with grommets.
 - c. Legend: Preprinted, permanently embedded and fade resistant for a 10 year minimum outdoor durability.
 - 4. Color:
 - a. Background: Manufacturer standard or as specified.
 - b. Lettering: Black.

- 5. Standards for OSHA signs: NEMA/ANSI Z535.1, NEMA/ANSI Z535.2, NEMA/ANSI Z535.3, NEMA/ANSI Z535.4, OSHA 29 CFR 1910.145.
- F. Type C Phenolic Name Plates:
 - 1. Materials: Phenolic.
 - 2. Size:
 - a. Surface: As required by text.
 - b. Thickness: 1/16 IN.
 - 3. Fabrication:
 - a. Two (2) layers laminated.
 - b. Legend: Engraved through top lamination into bottom lamination.
 - c. Two (2) drilled side holes, for screw mounting.
 - 4. Color: Black top surface, white core, unless otherwise indicated.
- G. Type D Self-Adhesive Tape Tags and Signs:
 - 1. Materials: Vinyl tape or vinyl cloth.
 - 2. Size:
 - a. Surface: As required by text.
 - b. Thickness: 5 mils minimum.
 - 3. Fabrication:
 - a. Indoor/Outdoor grade.
 - b. Weather and UV resistant inks.
 - c. Permanent adhesive.
 - d. Legend: Preprinted.
 - e. Wire markers to be self-laminating.
 - 4. Color: White with black lettering or as specified.
 - 5. Standards for OSHA signs: NEMA/ANSI Z535.1, NEMA/ANSI Z535.2, NEMA/ANSI Z535.3, NEMA/ANSI Z535.4, OSHA 29 CFR 1910.145.
- H. Type E Heat Shrinkable Tape Tags:
 - 1. Materials: Polyolefin.
 - 2. Size: As required by text.
 - 3. Fabrication:
 - a. Legend: Preprinted.
 - 4. Color: White background, black printing.
- I. Type F Underground Warning Tape:
 - 1. Materials: Polyethylene.

- 2. Size:
 - a. 6 IN wide (minimum).
 - b. Thickness: 3.5 mils.
- 3. Fabrication:
 - a. Legend: Preprinted and permanently imbedded.
 - b. Message continuous printed.
 - c. Tensile strength: 1,750 psi.
- 4. Color: As specified.
- J. Type G Stenciling System:
 - 1. Materials:
 - a. Exterior type stenciling enamel.
 - b. Either brushing grade or pressurized spray can form and grade.
 - 2. Size: As required.
 - 3. Fabrication:
 - a. Legend: As required.
 - 4. Color: Black or white for best contrast.
- K. Underground Tracer Wire:
 - 1. Materials:
 - a. Wire:
 - 1) 12 GA AWG.
 - 2) Solid.
 - b. Wire nuts: Waterproof type.
 - c. Split bolts: Brass.

2.03 ACCESSORIES

- A. Fasteners:
 - 1. Bead chain: #6 brass, aluminum or stainless steel.
 - 2. Plastic strap: Nylon, urethane or polypropylene.
 - 3. Screws: Self-tapping, stainless steel.
 - 4. Adhesive, solvent activated.

2.04 MAINTENANCE MATERIALS

A. Where stenciled markers are provided, clean and retain stencils after completion and include in extra stock, along with required stock of paints and applicators.

PART 3 – EXECUTION

3.01 GENERAL INSTALLATION

- A. Install identification devices at specified locations.
- B. All identification devices to be printed by mechanical process, hand printing is not acceptable.
- C. Attach tags to equipment with sufficient surface or body area with solvent activated adhesive applied to back of each tag.
- D. Attach tags with 1/8 IN round or flat head screws to equipment without sufficient surface or body area, or porous surfaces.
 - 1. Where attachment with screws should not or cannot penetrate substrate, attach with plastic strap.
- E. Single items of equipment enclosed in a housing or compartment to be tagged on outside of housing.
 - 1. Several items of equipment mounted in housing to be individually tagged inside the compartment.
- F. Tracer Wire:
 - 1. Attach to pipe at a maximum of 10 FT intervals with tape or tie-wraps.
 - 2. Continuous pass from each valve box and above grade at each structure.
 - 3. Coil enough wire at each valve box to extend wire a foot above the ground surface.
 - 4. 1,000 FT maximum spacing between valve boxes.
 - 5. If split bolts are used for splicing, wrap with electrical tape.
 - 6. If wire nuts are used for splicing, knot wire at each splice point leaving 6 IN of wire for splicing.
 - 7. Use continuous strand of wire between valve box where possible.
 - a. Continuous length shall be no shorter than 100 FT.

3.02 SCHEDULES

- A. Process Systems:
 - 1. General:
 - a. Provide arrows and markers on piping.
 - 1) At 20 FT maximum centers along continuous lines.
 - 2) At changes in direction (route) or obstructions.
 - 3) At valves, risers, "T" joints, machinery or equipment.
 - 4) Where pipes pass through floors, walls, ceilings, cladding assemblies and like obstructions provide markers on both sides.

- b. Position markers on both sides of pipe with arrow markers pointing in flow direction.
 - 1) If flow is in both directions use double headed arrow markers.
- c. Apply tapes and stenciling in uniform manner parallel to piping.
- 2. Trenches with piping:
 - a. Tag type: Type F Underground Warning Tape.
 - b. Location: Halfway between top of piping and finished grade.
 - c. Letter height: 1-1/4 IN minimum.
 - d. Potable water:
 - 1) Color: Blue with black letters.
 - 2) Legend:
 - a) First line: "CAUTION CAUTION CAUTION"
 - b) Second line: "BURIED WATER LINE BELOW"
 - e. Storm and sanitary sewer lines:
 - 1) Color: Green with black letters.
 - 2) Legend:
 - a) First line: "CAUTION CAUTION CAUTION"
 - b) Second line: "BURIED SEWER LINE BELOW"
 - f. (Nonpotable) water piping:
 - 1) Color: Green with black letters.
 - 2) Legend:
 - a) First line: "CAUTION CAUTION CAUTION"
 - b) Second line: "BURIED NONPOTABLE WATER LINE BELOW"
 - g. Other piping (e.g., compressed air, irrigation, refrigerant, heating water, etc.):
 - 1) Color: Yellow with black letters.
 - 2) Legend:
 - a) First line: "CAUTION CAUTION CAUTION"
 - b) Second line: "BURIED PIPE LINE BELOW"
- 3. Yard valves, buried, with valve box and concrete pad:
 - a. Tag type: Type A2 Rectangle Metal Tags.
 - b. Fastener: 3/16 IN x 7/8 IN plastic screw anchor with 1 IN #6 stainless steel pan head screw.
 - c. Legend:
 - 1) Letter height: 1/4 IN minimum.

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- 2) Valve designation as indicated on the Drawings (e.g., "V-xxx").
- 4. Valves and slide gates:
 - a. Tag type:
 - 1) Outdoor locations: Type B1 Square Non-Metallic Tags.
 - 2) Indoor non-corrosive:
 - a) Type A1 Round Metal Tags.
 - b) Type B1 Square Non-Metallic Tags.
 - 3) Indoor corrosive:
 - a) Stainless steel Type A1 Round Metal Tags.
 - b) Type B1 Square Non-Metallic Tags.
 - b. Fastener:
 - 1) Type A1: Chain of the same material.
 - 2) Type B1: Stainless steel chain.
 - c. Color: Per ASME A13.1 corresponding to the piping system.
 - d. Legend:
 - 1) Letter height: 1/4 IN minimum.
 - 2) Valve designation as indicated on the Drawings (e.g., "V-xxx").
- 5. Process equipment (e.g., pumps, pump motors, blowers, air compressors, etc.):
 - a. Tag type:
 - 1) Type B2 Non-Metallic Signs.
 - 2) Type D Self-Adhesive Tape Tags and Signs.
 - 3) Type G Stenciling System.
 - b. Fastener:
 - 1) Self.
 - 2) Screws.
 - 3) Adhesive.
 - c. Legend:
 - 1) Letter height: 1/2 IN minimum.
 - 2) Equipment designation as indicated on the Drawings (e.g., "Rainwater Cistern Pump P-xxx").
- 6. Piping systems:
 - a. Tag type:
 - 1) Outdoor locations: Type G Stenciling System.

- 2) Indoor locations:
 - a) Type D Self-Adhesive Tape Tags and Signs.
 - b) Type G Stenciling System.
- b. Fastener: Self.
- c. Color: Per ASME A13.1.
- d. Legend:
 - 1) Letter height: Manufacturers standard for the pipe diameter.
 - 2) Mark piping in accordance with ASME A13.1.
 - 3) Use piping designation as indicated on the Drawings.
 - 4) Arrow: Single arrow.
- 7. Process tanks (over 1000 GAL) and basins, (e.g., rainwater harvesting cistern, etc):
 - a. Tag type:
 - 1) Type B2 Non-Metallic Signs.
 - 2) Type G Stenciling System.
 - b. Fastener:
 - 1) Screw.
 - 2) Self.
 - c. Location as directed by Project Representative.
 - d. Legend:
 - 1) Letter height: 4 IN minimum.
 - 2) Equipment designation as indicated on the Drawings (e.g., "CISTERN CT-xxx").
- 8. Equipment that starts automatically:
 - a. Tag type:
 - 1) Type B2 Non-Metallic Signs.
 - 2) Type D Self-Adhesive Tape Tags and Signs.
 - b. Fastener:
 - 1) Type B2 Screw or adhesive.
 - 2) Type D Self.
 - c. Size: 5 IN x 7 IN.
 - d. Legend:
 - 1) OSHA Warning Sign.
 - 2) Description of Warning: "THIS MACHINE STARTS AUTOMATICALLY".

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- B. Instrumentation Systems:
 - 1. Instrumentation Equipment (e.g., flow control valves, primary elements, etc.):
 - a. Tag type:
 - 1) Outdoor locations: Type B1 Square Non-Metallic Tags.
 - 2) Indoor non-corrosive:
 - a) Type A1 Round Metal Tags.
 - b) Type B1 Square Non-Metallic Tags.
 - 3) Indoor corrosive:
 - a) Stainless steel Type A1 Round Metal Tags.
 - b) Type B1 Square Non-Metallic Tags.
 - b. Fastener:
 - 1) Type A1: Chain of the same material.
 - 2) Type B1: Stainless steel chain.
 - c. Legend:
 - 1) Letter height: 1/4 IN minimum.
 - 2) Equipment ISA designation as indicated on the Drawings (e.g., "FIT-xxx").
 - 2. Enclosure for instrumentation and control equipment, (e.g., PLC control panels, etc.):
 - a. Tag type: Type C Phenolic Name Plates.
 - b. Fastener: Screws.
 - c. Legend:
 - 1) Letter height: 1/2 IN minimum.
 - 2) Equipment name (e.g., "PLC CONTROL PANEL PCP-xxx").
 - 3. Components inside equipment enclosure, (e.g., PLC's, control relays, contactors, and timers):
 - a. Tag type: Type D Self-Adhesive Tape Tags.
 - b. Fastener: Self.
 - c. Legend:
 - 1) Letter height: 3/16 IN minimum.
 - Description or function of component (e.g., "PLC-xxx" or "CRxxx").
 - 4. Through enclosure door mounted components (e.g., selector switches, controller digital displays, etc.):
 - a. Tag type: Type C Phenolic Name Plates.
 - b. Fastener: Screws.

- c. Legend:
 - 1) Letter height: 1/4 IN minimum.
 - Component ISA tag number as indicated on the Drawings (e.g., "HS-xxx").
- C. HVAC Systems:
 - 1. General:
 - a. Provide arrows and markers on ducts.
 - 1) At 20 FT maximum centers along continuous lines.
 - 2) At changes in direction (route) or obstructions.
 - 3) At dampers, risers, branches, machinery or equipment.
 - 4) Where ducts pass through floors, walls, ceilings, cladding assemblies and like obstructions provide markers on both sides.
 - b. Position markers on both sides of duct with arrow markers pointing in flow direction.
 - 1) If flow is in both directions use double headed arrow markers.
 - c. Apply tapes and stenciling in uniform manner parallel to ducts.
 - 2. HVAC Equipment (e.g., unit heaters, exhaust fans, air handlers, etc.):
 - a. Tag type:
 - 1) Type B2 Non-Metallic Signs.
 - 2) Type C Phenolic Name Plates.
 - b. Fastener: Screws.
 - c. Legend:
 - 1) Letter height: 1 IN minimum.
 - Equipment designation as indicated on the Drawings (e.g., "EFxxx").
 - 3. Ductwork:
 - a. Tag type:
 - 1) Type D Self-Adhesive Tape Tags and Signs.
 - 2) Type G Stenciling System.
 - b. Fastener: Self.
 - c. Legend:
 - 1) Letter height: 1 IN minimum.
 - 2) Description of ductwork, (e.g., "AIR SUPPLY").
 - 3) Arrows: Single arrow.

- 4. Enclosure for instrumentation and control equipment, (e.g., fan control panels, etc.):
 - a. Tag type: Type C Phenolic Name Plates.
 - b. Fastener: Screws.
 - c. Legend:
 - 1) Letter height: 1/2 IN minimum.
 - 2) Equipment designation as indicated on the Drawings (e.g., "FAN CONTROL PANEL FCP-xxx").
- 5. Wall mounted thermostats:
 - a. Tag type: Type D Self-Adhesive Tape Tags and Signs.
 - b. Fastener: Self.
 - c. Legend:
 - 1) Letter height: 3/16 IN minimum.
 - 2) Description of equipment controlled (e.g., "UH-xxx" or AHU-xxx").
- 6. Components inside equipment enclosure, (e.g., controller's, control relays, contactors, and timers):
 - a. Tag type: Type D Self-Adhesive Tape Tags and Signs.
 - b. Fastener: Self.
 - c. Legend:
 - 1) Letter height: 3/16 IN minimum.
 - 2) Description or function of component (e.g., "CR-xxx").
- 7. Through enclosure door mounted equipment (e.g., selector switches, controller digital displays, etc.):
 - a. Tag type: Type C Phenolic Name Plates.
 - b. Fastener: Screws.
 - c. Legend:
 - 1) Letter height: 1/4 IN minimum.
 - 2) Component tag number as indicated on the Drawings or as defined by Contractor (e.g., "HS-xxx").
- D. Electrical Systems:
 - 1. Trenches with ductbanks, direct-buried conduit, or direct-buried wire and cable.
 - a. Tag type: Type F Underground Warning Tape.
 - b. Letter height: 1-1/4 IN minimum.
 - c. Location:
 - 1) Where trench is 12 IN or more below finished grade: In trench 6 IN below finished grade.

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- 2) Where trench is less than 12 IN below finished grade: In trench 3 IN below finished grade.
- d. Electrical power (e.g., low and medium voltage):
 - 1) Color: Red with black letters.
 - 2) Legend:
 - a) First line: "CAUTION CAUTION CAUTION".
 - b) Second line: "BURIED ELECTRIC LINE BELOW".
- e. Communications (e.g., telephone, instrumentation, LAN, SCADA):
 - 1) Color: Orange with black letters.
 - 2) Legend:
 - a) First line: "CAUTION CAUTION CAUTION".
 - b) Second line: "BURIED COMMUNICATION LINE BELOW".
- 2. Switchgear, switchboards and motor control centers:
 - a. Tag type: Type C Phenolic Name Plates.
 - b. Fastener: Screws.
 - c. Main equipment legend:
 - 1) Letter height:
 - a) First line: 1 IN minimum.
 - b) Subsequent lines: 3/8 IN minimum.
 - First line: Equipment name (e.g., "MAIN SWITCHBOARD MSBxxx").
 - 3) Second line:
 - a) Source of power (e.g., "FED FROM MCCxxx LOCATED IN ROOM xxx").
 - 4) Third line: System voltage and phase (e.g., "480/277 V, 3PH").
 - d. Main and feeder device legend:
 - 1) Letter height: 3/8 IN minimum.
 - Description of load (e.g., "MAIN DISCONNECT", "PUMP Pxxx" or "PANELBOARD HPxxx").
- 3. Panelboards and transformers:
 - a. Tag type: Type C Phenolic Name Plates.
 - b. Fastener: Screws.
 - c. Legend:
 - 1) Letter height:
 - a) First line: 3/8 IN minimum.
 - b) Subsequent lines: 3/16 IN minimum.

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- 2) First line: Equipment name (e.g., "PANELBOARD LPxxx" or "TRANSFORMER Txxx").
- 3) Second line (panelboards only): System voltage and phase (e.g., "208/120V, 3PH").
- 4) Third line:
 - a) Source of power (e.g., "FED FROM MCCxxx LOCATED IN ROOM xxx").
- 4. Transfer switches:
 - a. Tag type: Type C Phenolic Name Plates.
 - b. Fastener: Screws.
 - c. Legend:
 - 1) Letter height:
 - a) First line: 3/8 IN minimum.
 - b) Subsequent lines: 3/16 IN minimum.
 - 2) First line: Equipment name (e.g., "AUTOMATIC TRANSFER SWITCH ATSxxx").
 - 3) Second line: Normal source of power (e.g., "NORMAL SOURCE FED FROM MCCxxx").
 - 4) Third line: Emergency source of power (e.g., "EMERGENCY SOURCE FED FROM SGENxxx").
- 5. Safety switches, separately mounted circuit breakers and motor starters, VFD's, etc.:
 - a. Tag type: Type C Phenolic Name Plates.
 - b. Fastener: Screws.
 - c. Legend:
 - 1) Letter height: 1/4 IN minimum.
 - First line: Description of load equipment is connected to (e.g., "PUMP Pxxx").
 - 3) Second line:
 - a) Source of power (e.g., "FED FROM MCCxxx LOCATED IN ROOM xxx").
 - b) The source of power room number is only required when there are multiple electrical rooms, if the source is in another building, the building name or number shall be used.
- 6. Enclosure for instrumentation and control equipment, (e.g., lighting control panels, etc.):
 - a. Tag type: Type C Phenolic Name Plates.
 - b. Fastener: Screws.
- c. Legend:
 - 1) Letter height: 1/2 IN minimum.
 - 2) Equipment name (e.g., "LIGHTING CONTROL PANEL LCPxxx").
- 7. Components inside equipment enclosures (e.g., circuit breakers, fuses, control power transformers, control relays, contactors, timers, etc.):
 - a. Tag type: Type D Self-Adhesive Tape Tags and Signs.
 - b. Fastener: Self.
 - c. Legend:
 - 1) Letter height: 3/16 IN minimum.
 - Description or function of component (e.g., "M-xxx", "CR-xxx" or "TR-xxx").
- 8. Through enclosure door mounted equipment (e.g., selector switches, controller digital displays, etc.):
 - a. Tag type: Type C Phenolic Name Plates.
 - b. Fastener: Screws.
 - c. Legend:
 - 1) Letter height: 1/4 IN minimum.
 - 2) Component tag number as indicated on the Drawings or as defined by contractor (e.g., "HS-xxx").
- 9. Conductors in control panels and in pull or junction boxes where multiple circuits exist.
 - a. Tag type: Type D Self-Adhesive Tape Tags.
 - b. Fastener: Self.
 - c. Tag conductor at both ends.
 - d. Legend:
 - 1) Letter height: 1/8 IN minimum.
 - 2) Circuit number or wire number as scheduled on the Drawings or as furnished with the equipment.
- 10. Conductors in cable trays.
 - a. Tag type: Type D Self-Adhesive Tape Tags.
 - b. Fastener: Self.
 - c. Tag all conductors at the same location in the tray at 50FT maximum intervals.
 - d. Legend:
 - 1) Letter height: 1/8 IN minimum.
 - 2) Circuit number or wire number as scheduled on the Drawings.

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- 11. Conductors in handholes and manholes.
 - a. Tag type: Type A3 Metal Tape Tags.
 - b. Fastener: Nylon strap.
 - c. Tag conductor at both ends.
 - d. Legend:
 - 1) Letter height: 1/8 IN minimum.
 - 2) Circuit number or wire number as scheduled on the Drawings.
- 12. Grounding conductors associated with grounding electrode system in accordance with the following:
 - a. Tag type: Type D Self-Adhesive Tape Tags.
 - b. Fastener: Self.
 - c. Legend:
 - 1) Letter height: 1/8 IN minimum.
 - 2) Function of conductor (e.g., "MAIN BONDING JUMPER", "TO GROUND RING", "TO MAIN WATER PIPE").
- 13. Flash protection for switchboards, panelboards, industrial control panels and motor control centers:
 - a. Tag type: Type D Self-Adhesive Tape Signs.
 - b. Fastener: Self.
 - c. Legend: Per NFPA 70.
- 14. Poles:
 - a. Tag type: Type D Self-Adhesive Tape Tags and Signs.
 - b. Fastener:
 - 1) Metal pole: Self.
 - 2) Wood pole:
 - a) Self mount tag on aluminum utility panel.
 - b) Panel thickness: 20 mils.
 - c) Two (2) mounting holes.
 - d) Screw or nail panel to pole.
 - c. Color: Yellow with black letters.
 - d. Legend:
 - 1) Letter height: 1 IN minimum.
 - 2) Pole number as scheduled on the Drawings.
- 15. Power cable trays:
 - a. Tag type: Type D Self-Adhesive Tape Tags and Signs.

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- b. Fastener: Self.
- c. Size: 1-3/4 IN x 2-1/2 IN.
- d. Location:
 - 1) Every 50 FT maximum.
 - 2) Label each barriered section of tray.
- e. Legend:
 - 1) OSHA Danger Sign.
 - 2) Description of Danger, (e.g., "UP TO 480 VOLTS").

16. Control cable trays:

- a. Tag type: Type D Self-Adhesive Tape Tags and Signs.
- b. Fastener: Self.
- c. Size: 1-3/4 IN x 2-1/2 IN.
- d. Location: Every 50 FT maximum.
- e. Legend:
 - 1) OSHA Danger Sign.
 - Description of Danger, (e.g., "LESS THAN 50 VOLTS, CLASS 2 OR 3" or "ANALOG INSTRUMENTATION" or "DIGITAL COMMUNICATION").
- 17. Telecommunication cable trays:
 - a. Tag type: Type D Self-Adhesive Tape Tags and Signs.
 - b. Fastener: Self.
 - 1) Location: Every 20 FT maximum.
 - 2) Legend:
 - a) Letter height: 1/4 IN minimum.
 - b) Description of tray, (e.g., "TELECOMMUNICATIONS").
- 18. Entrances to electrical rooms:
 - a. Tag type: Type B2 Non-Metallic Signs.
 - b. Fastener: Screw or adhesive.
 - c. Size: 5 IN x 7 IN.
 - d. Location: Each door to room.
 - e. Legend:
 - 1) OSHA Danger Sign.
 - 2) Description of Danger: "HIGH VOLTAGE, AUTHORIZED PERSONNEL ONLY".

- 19. Entrances to Telecommunications Rooms:
 - a. Tag type: Type B2 Non-Metallic Signs.
 - b. Fastener: Screw or adhesive.
 - c. Size: 5 IN x 7 IN.
 - d. Location: Each door to room.
 - e. Legend:
 - 1) OSHA Warning Sign.
 - 2) Description of Warning: "TELECOMM ROOM, AUTHORIZED PERSONNEL ONLY".
- 20. Equipment where more than one (1) voltage source is present:
 - a. Tag type:
 - 1) Type B2 Non-Metallic Signs.
 - 2) Type D Self-Adhesive Tape Signs.
 - b. Fastener:
 - 1) Screw or adhesive.
 - 2) Self.
 - c. Size: 1-3/4 IN x 2-1/2 IN.
 - d. Location: Exterior face of enclosure or cubical.
 - e. Legend:
 - 1) OSHA Danger Sign.
 - 2) Description of Danger: "MULTIPLE VOLTAGE SOURCES".

3.03 HAZARD AND SAFETY SIGNS

- A. Provide 25 Hazard and Safety Signs:
 - 1. Type B2 or D.
 - 2. Inscription as directed by Project Representative.

SECTION 10 14 23 SIGNAGE

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes: Accessibility toilet room identification signs.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Division 00 Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 01 General Requirements.

1.02 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. Americans with Disabilities Act (ADA):
 - a. Americans with Disabilities Act Accessibility Guidelines (ADAAG).

1.03 SUBMITTALS

- A. Submittal Procedures: See Section 01 33 00 Submittal Procedures for requirements for the mechanics and administration of the submittal process.
- B. Leadership in Energy and Environmental Design (LEED[®]) Documentation: Submit the following in accordance with Section 01 81 30 – Sustainability Requirements:
 - 1. Completed LEED Materials Submittal Form.
 - 2. Completed LEED VOC Submittal Form.
- C. Approval Submittals:
 - 1. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 - c. Color charts for Project Representative's color selection.
 - 1) Color selection shall be made from manufacturer's complete color line including all premium and special colors.
 - 2. Schedule of all signs indicating text and graphics.
 - 3. Layout of accessibility toilet room signs showing finish, size, letter style, text, and installation detail.
- D. Samples:
 - 1. Sample of accessibility toilet room sign finish.

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PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. Accessibility toilet room identification signs:
 - a. Andco (www.andco.com).
 - b. ASE Architectural Signs and Engraving (*www.ase-signs.com*).
 - c. ASI Sign Systems (asisignage.com).
 - d. Best Manufacturing Co (www.bestsigns.com).
 - e. Or approved equal.
- B. Submit request for substitution in accordance with Specification Section 01 60 00 – Product Requirements.

2.02 MATERIALS

A. Accessibility Toilet Room Identification Signs:1. Interior: Melamine plastic suitable for raised lettering and Braille.

2.03 FABRICATION

- A. Accessibility Toilet Room Identification Signs:
 - 1. General:
 - a. Raised text, border and graphics.
 - 1) Minimum 1/32 IN height.
 - Provide international graphic symbol of accessibility for all toilet, locker and shower rooms or combinations thereof, and for unisex toilet rooms.
 - b. Grade 2 Braille.
 - c. Finish: Eggshell.
 - 1) Color: Dark Gray with white text.
 - d. Text: Minimum 3/4 IN high; Helvetica style.
 - e. All signs shall comply with requirements of ADA.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Accessibility Toilet Room Identification Signs:
 - 1. Install signs on walls adjacent to the latch side of doors using foam tape per room per schedule below.
 - 2. Install 1 signage on center of door per room per schedule below.

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- 3. Where no adjacent wall space is available, mount signs on nearest adjacent wall.
 - Mounting of signs shall be such that a person may approach to within 3 IN of sign without encountering any protruding objects or standing in swing of door travel.
- 4. Mount 60 IN above finish floor to centerline of sign.

3.02 SCHEDULES

- A. Accessibility Toilet Room Identification Signs:
 - 1. Unisex toilet room signage sets, 1 each to room 02-015 and room 04-103.
 - 2. Women toilet and locker room signage set to room 03-113.
 - 3. Men toilet and locker room signage set to room 03-114.

3.03 ADJUSTING AND CLEANING

- A. Remove and replace damaged or deformed signs and signs that do not comply with specified requirements. Replace signs with damaged or deteriorated finishes or components
- B. Remove temporary protective coverings and strippable films as signs are installed.
- C. On completion of installation, clean exposed surfaces of signs according to manufacturer's written instructions, and touch up minor nicks and abrasions in finish. Maintain signs in a clean condition during construction and protect from damage until acceptance by Project Representative.

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SECTION 10 21 13 TOILET PARTITIONS

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes: Plastic-laminate-faced toilet compartments configured as toilet enclosures and urinal screens.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Division 00 Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 01 General Requirements.
 - 3. Section 09 22 16 Non-Load-Bearing Wall Framing Systems.
 - 4. Section 10 28 13 Toilet and Bath Accessories.

1.02 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. Americans with Disabilities Act (ADA):
 - a. Accessibility Guidelines for Buildings and Facilities (ADAAG).
 - 2. ASTM International (ASTM):
 - a. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84, or another standard acceptable to authorities having jurisdiction, by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1.03 SUBMITTALS

- A. Submittal Procedures: See Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
- B. Leadership in Energy and Environmental Design (LEED[®]) Documentation: Submit the following in accordance with Section 01 81 30 – Sustainability Requirements:
 - Product Data for MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content; include statement indicating costs for each product having recycled content.
 - 2. Product Data for MR 5: For products required to comply with requirements for regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

- 3. Product Data for MR 7: Provide architectural woodwork produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC 1.2, "Principles and Criteria."
- 4. Product Data: For hardboard, medium-density fiberboard, particleboard, plywood, high-pressure decorative laminate, adhesive for bonding plastic laminate, thermoset decorative overlay, solid-surfacing material, fire-retardant-treated materials, cabinet hardware and accessories, handrail brackets, and finishing materials and processes.
 - a. Include data for Low VOC content.
 - b. No wood-bonding agent used shall contain urea formaldehyde.
 - c. Include evidence that mill is certified for chain-of-custody by an FSCaccredited certification body.
- 5. Product Data for IEQ 4.1: For adhesives and sealants used inside the weatherproofing system, documentation including printed statement of VOC content.
- 6. Product Data for IEQ 4.4: For all composite wood and agrifiber products, documentation provided that no urea formaldehyde was used.
- 7. LEED Materials Tracking Form: Form to be provided in an electronic format to the Contractor to record LEED materials used on the project.
- C. Approval Submittals:
 - 1. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 - c. Manufacturer's anchorage device and structural backing recommendations.
 - d. Color chart including all colors available from the manufacturer for color selection by Project Representative.
 - 2. Samples:
 - a. Provide actual metal samples of selected color for Project Representative's final approval.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. Toilet partitions:
 - a. Accurate Partitions Corp. (www.accuratepartitions.com).
 - b. American Sanitary Partition Corp. (www.am-sanitary-partition.com).
 - c. Bradley (www.bradleycorp.com).

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- d. General Partition (www.generalpartitions.com).
- e. Or approved equal.
- B. Submit request for substitution in accordance with Specification Section 01 60 00.

2.02 MATERIALS

- A. Particleboard: ANSI A208.1, Grade M-2 with 45 LB density, made with binder containing no urea formaldehyde.
- B. Toilet Partition Panels, Pilasters and Doors:
 - 1. Plastic Laminate: NEMA LD 3, general-purpose HGS grade, 0.048 IN (1.2-mm) nominal thickness.
 - 2. Adhesives: Manufacturer's standard product that complies with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.03 COMPONENTS

- A. General:
 - 1. Provide handles, pulls, latches, locks, and other opening devices in accordance with the ADAAG.
- B. Pilaster Shoes:
 - 1. Type 302/304 stainless steel, ASTM A480.
 - 2. 20 GA, 3 IN high.
- C. Stirrup Brackets:
 - 1. Manufacturer's standard design for attaching panels to walls and pilasters.
 - 2. Type 302 stainless steel, ASTM A480.
- D. Latch and Strike-Keeper:
 - 1. Stainless steel slide latch.
 - 2. Conceal in door or surface mounted.
 - 3. Wrap-around type strike-keeper designed to properly receive and hold latch.
- E. Anchorages and Fasteners:
 - 1. Exposed fasteners: Manufacturer's tamper-resistant, stainless steel finish to match hardware.
 - 2. Concealed anchors: Galvanized steel, hot-dip coated after fabrication complying with ASTM A385.

2.04 ACCESSORIES

- A. Bumper-Coat Hook: Rubber-tipped combination bumper and coat hook for each compartment.
- B. Paper Holders: As specified in Specification Section 10 28 13 Toilet and Bath Accessories.

2.05 FABRICATION

- A. Toilet Partitions:
 - 1. Provide formed Plastic Laminate type, floor-supported overhead-braced, complete with all accessories.
- B. General:
 - 1. Preassemble units in shop to greatest extent possible to minimize field cutting and assembly of units.
 - 2. Provide concealed reinforcement for installation of hardware, fittings, brackets, and required accessories.
 - 3. Finishing:
 - a. After fabrication, prepare and clean surfaces.
 - b. Plastic Laminate Color: Wilson Art Slate Gray.
- C. Toilet Partition Panels, Pilasters and Doors:
 - 1. Plastic Laminate
 - 2. Fabricate using the following minimum thicknesses:
 - a. Handicapped Stalls:
 - 1) Swing-out doors minimum 34 IN wide for front approach.
 - 2) Pull handle inside and out.
 - 3) Stall size and configuration as shown on the Drawings.
 - b. Doors:
 - 1) 3/4 IN thick.
 - 2) For 32 IN or wider stalls (except handicapped): 26 IN wide, minimum.
 - 3) For stalls less than 32 IN wide: 24 IN wide, minimum.
 - c. Floor-Braced Pilasters:
 - 1) Minimum 3/4 IN thick.
 - 2) Galvanized steel anchorage devices.
 - 3) Complete with threaded rods, lock washers, leveling adjustment nuts and shoes.
 - d. Wall-Hung Screens:
 - 1) Minimum 1/2 IN thick.

- 2) Size: 18 x 42 IN.
- 3) Same construction and finish as toilet compartments.
- 3. Provide extra heavy stirrups for securing to walls.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install in a rigid, straight, plumb, and level and secure manner with layout as indicated on Drawings.
- C. Install products in accordance with the ADAAG.
 - 1. Provide sizes, heights and clearances required for accessibility compliance.
- D. Clearances:
 - 1. Between pilasters and panels: 1/2 IN maximum.
 - 2. Between panels and walls: 1 IN maximum.
 - 3. Between doors and pilasters: 3/16 IN maximum.
 - 4. Between floor and bottom of panels: 12 IN.
- E. Secure to walls with stirrup brackets near top and bottom of panel.
 - 1. Locate brackets so holes occur in masonry or tile joints.
 - 2. Use manufacturer's recommended anchoring devices.
- F. Floor-mounted / Overhead-braced partitions:
 - 1. Secure pilasters to floor.
 - 2. Level, plumb, and tighten.
 - 3. Secure overhead brace with minimum of two fasteners per pilaster.
 - 4. Set tops of closed doors parallel with overhead brace.
- G. Wall-Mounted Screens:
 - 1. Attach with heavy duty concealed anchoring devices.
 - 2. Verify that adequate structural backing has been provided in wall as recommended by manufacturer to suit wall construction.
 - a. See Specification Section 09 22 16 Non-Load Bearing Wall Framing Systems.
 - 3. Mount screens with top of screen at 60 IN above floor.

3.02 ADJUSTMENT

- A. Adjust and lubricate hardware for proper operation after installation.
 - 1. Set hinges on in-swing doors to hold unlatched doors open approximately 30 degrees.

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- 2. Set hinges on out-swing doors to return to fully closed position.
- B. Repair all scratches in finish with material provided by and using application methods recommended by partition manufacturers.

SECTION 10 26 00 CORNER GUARDS

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes: Surface-mounted corner guards.
- B. Related Sections include but are not necessarily limited to:
 - 1. Division 01 General Requirements.

1.02 QUALITY ASSURANCE

A. Corner Guards - Performance Requirements: Pull out capacity complying with ANSI A117.1 requirements.

1.03 SUBMITTALS

- A. Submittal Procedures: See Section 01 33 00 Submittal Procedures for requirements for the mechanics and administration of the submittal process.
- B. Leadership in Energy and Environmental Design (LEED[®]) Documentation: Submit the following in accordance with Section 01 81 30 – Sustainability Requirements:
 - 1. Product Data for MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content; include statement indicating costs for each product having recycled content.
 - 2. Product Data for MR 5: For products required to comply with requirements for regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.
- C. Approval Submittals:
 - 1. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 - c. Manufacturer's anchorage device and structural backing recommendations.
 - d. Color chart including all colors available from the manufacturer for color selection by Project Representative.
 - 2. Samples:
 - a. Verification Samples: 12 IN long assemblies, including one end cap, in color specified.

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PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. Corner Guards:
 - a. Pawling Corporation, Architectural Products Division, (www.pawling.com).
 - b. C/S Group, (<u>www.c-sgroup.com</u>).
 - c. Corner Protector MX (diamondlifegear.com).
 - d. Or approved equal.
- B. Submit requests for "or equal" substitutions in accordance with Section 01 60 00 – Product Requirements.

2.02 MATERIALS

- A. Aluminum for Corner Guard Retainers: Alloy 6063-T5, in accordance with ASTM B221 or FS QQ-A-200; anodized finish complying with AAMA 611, Class II minimum.
- B. Surface Mounted Corner Guards: CG-401, 2 IN wide, mill finish aluminum alloy, 90 degree corner, for adhesive application.

2.03 ACCESSORIES

A. Provide appropriate fasteners and accessories as required to properly complete corner guard installation.

PART 3 – EXECUTION

3.01 APPLICATION

- A. Examination:
 - 1. Verify that walls are in proper condition to receive installation of corner guards.
 - 2. Flush mounted corner guards must be coordinated with installation of gypsum wallboard.
 - 3. Surface mounted corner guards must be installed after wall finishes have been completed.
- B. Installation:
 - 1. Install corner guards in full compliance with manufacturer's installation instructions.

- C. Surface mounted Corner Guards:
 - 1. Fasten directly to finished wall surfaces using fasteners or adhesive as recommended by manufacturer.
- D. Adjusting and Cleaning:
 - 1. Verify that corner guards are plumb and rigidly secured to substrate; make any adjustments required.
 - 2. Clean corner guards and immediate areas of installation, using materials and methods recommended by manufacturer.
 - 3. Remove from project site packaging and debris caused by installation.

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SECTION 10 28 13 TOILET AND BATH ACCESSORIES

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Toilet and bath accessories.
 - 2. Utility Shelf with Mop Holders, Drying Rod and Rag Hooks.
- B. Related Sections include but are not necessarily limited to:
 - 1. Division 00 Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 01 General Requirements.
 - 3. Section 10 21 13 Metal Toilet Partitions.

1.02 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. Americans with Disabilities Act (ADA):
 - a. Americans with Disability Act Accessibility Guidelines (ADAAG).
 - 2. ASTM International (ASTM):
 - a. A269, Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
 - b. A480, Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip.

1.03 SUBMITTALS

- A. Submittal Procedures: See Section 01 33 00 Submittal Procedures for requirements for the mechanics and administration of the submittal process.
- B. Leadership in Energy and Environmental Design (LEED[®]) Documentation: Submit the following in accordance with Section 01 81 30 – Sustainability Requirements:
 - 1. Completed LEED Materials Submittal Form.
 - 2. Product Data for MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content; include statement indicating costs for each product having recycled content.
 - 3. LEED Materials Tracking Form: Form to be provided in an electronic format to the Contractor to record LEED materials used on the project.

- C. Approval Submittals:
 - 1. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 - c. Manufacturer's recommendation on fasteners.
 - 2. Schedule of items being provided for each room. Reference rooms using room number designated on Drawings.
 - 3. Catalog cut sheet of each item proposed.
- D. Closeout Submittals:
 - Operation & Maintenance (O&M) Manual Content: Provide O&M manual documentation as required by Section 01 73 00 – Operation and Maintenance Manuals.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Product numbers scheduled are manufactured by Bobrick unless noted otherwise.
- B. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. American Specialties, Inc. (www.americanspecialties.com).
 - 2. Bobrick (www.bobrick.com).
 - 3. Bradley Corp. (www.bradleycorp.com).
 - 4. Kimberly Clark (<u>www.kcprofessional.com</u>).
 - 5. IPS® Corporation (www.ipscorb.com).
 - 6. Or approved equal.
- C. Submit request for substitution in accordance with Specification Section 01 60 00 Product Requirements.

2.02 MATERIALS

- A. Toilet Accessories:
 - 1. General: ASTM A480, stainless steel.
 - 2. Grab bars: ASTM A269, stainless steel.
- B. Anchoring Devices: Manufacturer's standard.

2.03 FABRICATION

- A. Toilet Accessories:
 - 1. General:
 - a. Satin finish.
 - b. Items shall meet design requirements of ADA.
 - 2. Grab bars:
 - a. Concealed mounting.
 - b. 3 IN DIA flange.
 - c. 1-1/2 IN OD.
 - 3. Utility Shelf with Mop Holders, Drying Rod and Rag Hooks.
 - a. Material: Stainless steel.
 - b. Size: Maximum thirty-six (36) IN.
 - c. Mop holder brackets shall be plated steel and shall be ribbed for rigidity.
 - d. Each mop holder shall have a pivoting spring loaded serrated rubber can that shall hold round handles of 7/8 to 1 1/4 IN DIA against ribbed clamp plate.
 - e. Stainless steel drying rod shall be provided to run between mounting bracket gussets.
 - f. Finish: Satin.
- B. Anchoring Devices:
 - 1. Designed to withstand minimum concentrated load of 250 LB applied at any point on grab bar.

PART 3 – EXECUTION

3.01 PREPARATION

- A. Verify adequate backing has been provided in wall or toilet partition.
- B. See Section 10 21 13 Toilet Partitions.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instruction and in accordance with ADA and authorities having jurisdiction.
- B. Mount all items with manufacturer's standard anchorage devices.
- C. Install in locations indicated on Drawings.

3.03 SCHEDULE

- A. See Drawings for locations. Restroom accessories listed are Bobrick Products unless noted otherwise.
 - 1. TA-1: Toilet Tissue Dispenser (double non-controlled) B-2740.
 - 2. TA-2: Toilet Seat Cover Dispenser B-221.
 - 3. TA-3 : Feminine Napkin-Tampon Dispenser B-282.
 - 4. TA-4 : Feminine Napkin Disposal B-270.
 - 5. TA-5: Liquid Soap Dispenser 92145 Wall Mounted -Kimberly-Clark.
 - 6. TA-6: Mirror B-290 1836.
 - 7. TA-7: Grab Bar B-6806 x 18 Vertical Bar.
 - 8. TA-8: Grab Bar B-6806 x 36 Horizontal Bar; B-6806 x 42 Horizontal Bar.
 - 9. TA-9: Grab Bar B-6860 x 24 Horizontal Bar; B-6806 x 42 Horizontal Bar.
 - 10. TA-10: Towel Bar B-530 x 24 IN With 252-30 Mounting Kit.
 - 11. TA-11: Shower Curtain Rod B-6047 length required.
 - 12. TA-12: Shower Curtain 204-3 with 204-1 hooks as required.
 - 13. TA-13: Shower Seat Special unit, B-5191 x full depth of stall.
 - 14. TA-14: Soap Dish B-4380.
 - 15. TA-15: Robe Hook B-672.
 - 16. TA-16: Mop and Broom Rack B-223 x 36 IN.
 - 17. TA-17: Metal Shelf B-295 x 24 IN.
 - 18. TA-18: Clothes Hook Strip B985 Vandal-Resistant.
 - 19. TA-19: Paper Towel Dispenser 09990 -Kimberly Clark.
 - 20. TA-20: Waste Receptacle B-3644 Recessed.
 - 21. TA-21: Under Sink Protector TRUBRO Soft Guard Plus[™]- White Pipe Sleeve IPS® Corporation.

SECTION 10 29 00 BIRD CONTROL DEVICE

PART 1 – GENERAL

1.01 SYSTEM DESCRIPTION

- A. Bird Control: Physical control system constructed of stainless steel strip and wire to prevent pest birds and climbing animals from landing, roosting, nesting or climbing on architectural surfaces.
- B. Mounting Hardware: Mounting clips and fasteners designed to securely fasten bird control to architectural surfaces. Hardware is made of stainless steel or non-corrosive materials.

1.02 QUALITY ASSURANCE

- A. Installer obtain, review, and understand manufacturer's planning guides, estimating worksheets and installation instructions.
- B. Installer be completely familiar with proper installation procedures for product specified.
- C. Installer be completely familiar with specified mounting hardware and mounting hardware installation procedures.

1.03 STORAGE & HANDLING

- A. Provide storage to keep shipping boxes dry, clean and undamaged. Do not stack or place other packaging on shipping boxes.
- B. Keep bird control strips and mounting hardware in original packaging until needed for installation.

1.04 SUBMITTALS

- A. Submittal Procedures: See Section 01 33 00 Submittal Procedures for requirements for the mechanics and administration of the submittal process.
- B. Leadership in Energy and Environmental Design (LEED[®]) Documentation: Submit the following in accordance with Section 01 81 30 – Sustainability Requirements:
 - 1. Completed LEED Materials Submittal Form.
 - 1. Product Data for MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content; include statement indicating costs for each product having recycled content.
 - 2. Product Data for MR 5: For products and materials required to comply with requirements for regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

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3. LEED Materials Tracking Form: Form to be provided in an electronic format to the Contractor to record LEED materials used on the project.

PART 2 – PRODUCTS

2.01 BIRD BARRIER STRIPS

- A. Manufacturers:
 - 1. Bird-B-Gone, Inc. (<u>www.birdbgone.com</u>).
 - 2. Nixalite of America, Inc (www.nixalite.com).
 - 3. Bird-X (<u>www.bird-x.com</u>).
 - 4. Or approved equal.
- B. Barriers: Stainless steel wire and strip barriers.
 - 1. Wires: High grade stainless steel, 0.041 IN DIA, full-hard spring temper, 250,000 LBS/IN tensile strength.
 - 2. Base Strip: High grade stainless steel, 0.25 IN wide x 0.02 IN thick, full anneal for flexibility, easy strip cutting and surface shape memory.
- C. Strip Lengths: 48 IN strip lengths.
- D. 5-1/2 IN high, 3 IN wide, NO LESS THAN 120 wires per foot, 180-degree wire coverage. Wall mount model for vertical surfaces only. Use above surfaces less than 2 IN depth.
- E. Finish: Natural stainless steel finish.

2.02 STRIP MOUNTING HARDWARE

- A. To be made of stainless steel materials. Hardware to allow for strip removal and reinstallation without causing damage to installation surface, the strips or mounting system.
- B. Mounting hardware that best suits the installation surface. All hardware listed is made of stainless steel.

INSTALLATION SURFACE	MOUNTING HARDWARE UNIT
Sheet metal, plastic, PVC	Mounting clip, sheet metal screw, washer
Steel, cast iron, brass, bronze	Mounting clip, drive screw, washer
Pipes, cables, conduit, grates	Wire tie, wire tying tool, adhesive

- C. Optional Fastening:
 - 1. Custom Forms: Use custom made stainless steel form, bracket or strap to fasten bird control strips to difficult surface with limited or zero surface penetration requirements.
 - 2. Glue Clips & Adhesive: If surface conditions do not allow for the use of the mounting hardware, use the glue clip and adhesive installation method.

2.03 MAINTENANCE MATERIALS

- A. Extra Materials:
 - 1. Provide 10 percent additional extra material to Project Representative.

PART 3 – EXECUTION

3.01 INSPECTION

- A. Visually inspect installation surfaces. Make sure surfaces are clean, dry and free from debris or other conditions that could impede workflow of this section.
- B. Notify Project Representative of detrimental conditions. Do not proceed until these conditions have been corrected.

3.02 PREPARATION

- A. Field Measurements: Verify dimensions of each installation surface.
- B. Make sure all installation surface finishing requirements have been accomplished before installing bird control. DO NOT apply any surface coating or treatment (paint, sealer, etc.) over the installed bird control or mounting hardware.
- C. Remove or relocate all plants or foliage that overhangs the installation surfaces.

3.03 SURFACE CLEANING

- A. Surfaces to be clean, dry and free of obstructions before bird control is installed.
- B. IF BIRD WASTE IS PRESENT: Treat, neutralize and safely remove all bird waste from installation surfaces. Installer must follow all City, State and Federal regulations regarding the proper removal and disposal of bird droppings.
- C. Use surface cleaning products to neutralize any bird droppings, nests and related waste materials that may be present. Allow all surfaces to air dry completely, and then reapply to sanitize and deodorize the surface before proceeding. Strictly follow treatment instructions provided with surface cleaning products.
- D. Use anti-bacterial personal protection products to help prevent disease transmittal when working around surfaces contaminated with bird droppings.

3.04 INSTALLATION

- A. Strip:
 - 1. Install strip in strict accordance with manufacturer's strip spacing and installation guidelines. Protect all surfaces.
 - 2. Protect the entire surface, not just the outside edges. NO GAPS allowed in the bird barrier strip coverage. Cut strips where necessary to fit the surface properly.

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- 3. Wires of to extend over outside edge of surface by at least 1/4 IN. Base strips to extend over any open end of surface by at least 1/2 IN.
- 4. Fasten to the surface with the mounting hardware recommended by the manufacturer. Follow hardware spacing guidelines and installation procedures supplied by manufacturer.
- 5. Bird control is designed for vertical surfaces only. Do not install horizontally (down flat). Use over surfaces less than 2 IN in depth or as recommended by manufacturer.
- 6. Protect the entire surface, not just the outside edge of a surface. Follow all the spacing guidelines provided by manufacturer.

3.05 ADJUSTMENTS / CLEANING

- A. Remove debris and waste materials from project site.
- B. Inspect finished installation. Make any adjustments to conform to spacing and installation guidelines.
- C. Visually inspect finished installation. Make any adjustments needed to conform to manufacturer's spacing and installation guidelines.

SECTION 10 44 33 FIRE EXTINGUISHER AND CABINETS

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes: Fire extinguishers, and cabinets.
- B. Related Sections include but are not necessarily limited to:
 - 1. Division 00 Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 01 General Requirements.
 - 3. Division 09 Finishes.
 - 4. Section 21 13 00 Fire-Suppression Sprinkler Systems.

1.02 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. Americans with Disabilities Act (ADA):
 - a. Americans with Disabilities Act Accessibility Guidelines (ADAAG).
 - 2. FM Global (FM):
 - a. Approval Guide Latest Edition.
 - 3. National Fire Protection Association (NFPA):
 - a. 10, Standard for Portable Fire Extinguishers.
 - 4. Underwriters Laboratories, Inc. (UL):
 - a. Building Materials Directory.
 - 5. Warnock Hersey (WH).
 - 6. 2009 International Fire Code, Section 906 Portable Fire Extinguishers as adopted and amended by the City of Bellevue.
- B. All cabinets must meet projection limitations per ADA.

1.03 SUBMITTALS

- A. Submittal Procedures: See Section 01 33 00 Submittal Procedures for requirements for the mechanics and administration of the submittal process.
- B. Leadership in Energy and Environmental Design (LEED[®]) Documentation: Submit the following in accordance with Section 01 81 30 – Sustainability Requirements:
 - 1. Completed LEED Materials Submittal Form.

- C. Approval Submittals:
 - 1. Product Data for MR 4: For products having recycled content, documentation indicating percentages by weight of post consumer and preconsumer recycled content; include statement indicating costs for each product having recycled content.
 - 2. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
- D. Closeout Submittals:
 - Operation & Maintenance (O&M) Manual Content: Provide O&M manual documentation as required by Section 01 73 00 – Operation and Maintenance Manuals.
 - Extended Warranty: Provide two executed copies of the Extended Warranty required by this Section in accordance with the provisions of Section 01 78 00 – Closeout Procedures.

1.04 EXTENDED WARRANTY

- A. In accordance with the provisions of Section 01 78 00 Closeout Procedures, provide an Extended Warranty for the Work of this Section:
 - 1. Warranty period for Work of this Section is five (5) years commencing on the date of Substantial Completion.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver cabinets in time to allow installation.
- B. Deliver and install filled and charged extinguishers just prior to building occupancy.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. Fire Protection Specialties:
 - a. Amerex Corporation (www.amerex-fire.com).
 - b. Ansul Fire Protection (www.ansul.com).
 - c. Walter Kidde (www.kidde.com).
 - d. Potter Roemer Inc (www.potterrooemer.com).
 - e. JL Industries (www.activarcpg.com/jl-industries).
 - f. Or Approved Equal.

- 2. Fire extinguisher signs:
 - a. Seton (<u>www.seton.com</u>).
 - b. Uline (<u>www.uline.com</u>).
 - c. Compliance Signs (<u>www.compliancesigns.com</u>).
 - d. Or Approved Equal.
- B. Submit request for substitution in accordance with Specification Section 01 60 00 Product Requirements.

2.02 MANUFACTURED UNITS

- A. Fire Extinguisher Cabinet (FEC-1):
 - 1. Description: Semi-recessed steel tub with 1-1/4 IN steel trim and door.
 - a. Fire-rated Cabinets: Provide fire-rated cabinets where FEC-1 is indicated to be installed in fire-rated walls.
 - 2. Cabinet Construction:
 - a. Non-fire rated Units: Single-wall, 0.026 IN (26 GA) cold-rolled steel.
 - b. Fire Rated Units: Double-wall construction fabricated from 0.043 IN (18 GA) cold-rolled steel lined with minimum 5/8 IN thick, fire-barrier material.
 - 3. Finish: Clear finish, Anodized.
 - 4. Tub Size: Inside clear (WxTxD): 10-1/2 IN x 24 IN x 6 IN.
 - 5. Door Style: Full Glazing; Clear acrylic.
 - 6. Lock: Cam lock with emergency break-away release mechanism.
- B. Fire Extinguisher Cabinet (FEC-2):
 - 1. Description: Steel cabinet box fully recessed with exposed flat trim.
 - 2. Material: 0.026 IN (26 GA) cold-rolled steel.
 - 3. Finish: Clear finish, Anodized.
 - 4. Tub Size, inside clear (WxTxD): 13-11/16 IN x 27-3/16 IN x 6-1/2 IN.
 - 5. Door Style: Full Glazing; Clear acrylic.
 - 6. Lock: Cam lock with emergency break-away release mechanism.
 - C. Wall Mounted Brackets (FEC-3):
 - 1. Bracket type to fit specified extinguisher, with correct mounting accessories to fit substrate.
 - 2. Furnish bracket for each extinguisher not in cabinet.
 - 3. Bracket to be finished in black enamel.
- D. Fire Extinguisher Cabinet (FEC-4):
 - 1. Description: Steel cabinet box fully exposed and mounted directly on wall with no trim.
 - 2. Material: 0.026 IN (26 GA) cold-rolled steel.
 - 3. Finish: Clear finish, Anodized.
 - 4. Tub Size, inside clear (WxTxD): 13-11/16 IN x 27-3/16 IN x 6-1/2 IN.
 - 5. Door Style: Full Glazing; Clear acrylic.
 - 6. Lock: Cam lock with emergency break-away release mechanism.

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- E. Fire Extinguisher (FE):
 - 1. General:
 - a. Determine proper type of extinguisher is required for room in which they are indicated.
 - b. Coordinate cabinet and extinguisher sizes. Bring discrepancies to attention of Project Representative prior to or during submittal phase.
 - c. Include wall brackets where extinguishers are indicated without cabinets.
 - d. Provide FIRE EXTINGUISHER decal for each extinguisher.
 - 2. General-purpose Fire Extinguishers (typical item except where more specialized types are required):
 - a. Extinguishing Agent: Multipurpose chemical powder suitable for classes A, B & C fires.
 - b. Construction:
 - 1) Heavy-duty steel cylinder with metal valve and siphon tube with replaceable molded valve stem seal, visual pressure gauge, pull pin and upright squeeze grip.
 - 2) Corrosion and impact-resistant.
 - 3) Powder coat finish.
 - 4) Color: Red, in accordance with OSHA requirements.
 - 3. Capacity: 10 LBS.
 - a. UL-rating: 4A-60BC.
 - 4. Clean-Agent Type:
 - a. EPA approved "Clean Agent" for class A, B and C fires.
 - b. Construction:
 - 1) Heavy-duty steel cylinder with metal valve and siphon tube with replaceable molded valve stem seal, visual pressure gage, pull pin and upright squeeze grip.
 - 2) Corrosion and impact-resistant.
 - 3) Powder coat finish.
 - 4) Color: Red, in accordance with OSHA requirements.
 - c. Capacity: 10 LBS.
 - d. UL-Listed.
- 5. Locations: Furnish one FE for each:
 - a. Fire Extinguisher Cabinet (FEC).
 - b. Fire Extinguisher (FE) location.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. General:
 - 1. Install items included in this Section in locations and at mounting heights indicated, or if not indicated, at heights to comply with applicable regulations of governing authorities.
 - 2. Prepare recesses in walls for cabinets as required by type and size of cabinet and style of trim and to comply with manufacturers instructions.
 - 3. Maintain rated wall assemblies integrity in accordance with Manufacturer's instructions and the requirements of the approved assembly.
 - 4. Securely fasten mounting brackets and cabinets to structure, square and plumb, to comply with manufacturer's instructions.
 - 5. Install in accordance with NFPA-10 and manufacturer's instructions.
 - 6. Provide required closures.
- B. Installation Heights:
 - 1. General:
 - a. Install extinguishers and cabinets with in limitations of NFPA-10 and ADA.
 - 2. Fire Extinguisher Cabinets (FEC):
 - a. Locate with centerline of cabinet door handle not more than 48 IN above finished floor (AFF).
 - b. Exception: Extinguishers with at gross weight > 40 LBS: Locate with centerline of cabinet door handle not higher than 24 IN AFF.
 - 3. Fire Extinguishers (FE) not contained in a cabinet:
 - a. Locate wall brackets such that top of extinguisher will not be higher 48 IN AFF.
 - b. Exception: Extinguishers with at gross weight greater than 40 LBS: Install with extinguisher top not more than 36 IN above floor.
 - C. Fire extinguisher locations shown on Drawings are approximate locations. Verify all extinguisher mounting locations with local Fire Marshal in coordination with the Project Representative.
 - D. Mount "FIRE EXTINGUISHER" sign above or adjacent to each extinguisher as directed by the Project Representative.

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SECTION 10 51 13 METAL LOCKERS AND LOCKER BENCHES

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes: Metal lockers and locker benches.
- B. Related Sections include but are not necessarily limited to:
 - 1. Division 00 Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 01 General Requirements.
 - 3. Section 07 92 00 Joint Sealants.

1.02 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. ASTM International (ASTM):
 - a. A540, Standard Specification for Alloy-Steel Bolting Materials for Special Applications.
 - b. A1008, Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Baked Hardenable.
 - c. B108, Standard Specification for Aluminum-Alloy Permanent Mold Castings.
 - 2. American Wood Protection Association (AWPA):
 - a. Book of Standards.
 - b. Use Category System.
 - 3. Forestry Certification: Provide architectural woodwork produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC 1.2, "Principles and Criteria".
 - 4. Accessibility Requirements: For lockers indicated to be accessible, comply with applicable provisions in the 2010 Standards for Accessible Design (2010 Standards).

1.03 SUBMITTALS

A. Submittal Procedures: See Section 01 33 00 – Submittal Procedures for requirements for the mechanics and administration of the submittal process.

- B. Leadership in Energy and Environmental Design (LEED[®]) Documentation: Submit the following in accordance with Section 01 81 30 – Sustainability Requirements.
 - 1. Product Data for MR 7: Provide architectural woodwork produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC 1.2, "Principles and Criteria".
 - 2. Product Data for Credit IEQ 4.1: For sealants and sealant primers used inside the weatherproofing system, documentation including printed statement of VOC content.
 - 3. Product Data for Credit IEQ 4.2: For paints and coatings, including printed statement of VOC content.
 - 4. LEED Materials Tracking Form: Form to be provided in an electronic format to the Contractor to record LEED materials used on the project.
- C. Approval Submittals:
 - 1. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 - c. Color chart showing manufacturer's full line of available colors for preliminary color selection by Project Representative.
 - 2. Shop Drawings:
 - a. Drawings showing location, numbering sequence, anchoring method and locking.
- D. Closeout Submittals:
 - Operation & Maintenance (O&M) Manual content: Provide O&M manual documentation as required by Section 01 73 00 – Operations and Maintenance Manuals.
 - Extended Warranty: Provide two executed copies of the Extended Warranty required by this Section in accordance with the provisions of Section 01 78 00 – Closeout Procedures.

1.04 EXTENDED WARRANTY

- A. In accordance with the provisions of Section 01 78 00 Closeout Procedures, provide an Extended Warranty for the Work of this Section:
 - 1. Warranty period for Work of this Section is two (2) years commencing on the date of Substantial Completion.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. Lockers and locker benches:
 - a. Art Metal Products (www.artmetalproducts.com).
 - b. DeBourgh Manufacturing (www.debourgh.com).
 - c. Lyon Metal Products (www.lyonworkspace.com).
 - d. Penco Products (www.pencoproducts.com).
 - e. Or Approved Equal.
- B. Submit request for substitution in accordance with Specification Section 01 60 00 Product Requirements.

2.02 MATERIALS

- A. Steel: ASTM A1008.
- B. Fasteners: Cadmium-plated steel ASTM A540.
- C. Hooks and Hanger Rods: Cadmium-plated steel ASTM A540 or cast aluminum ASTM B108.
- D. Wood based materials: FSC chain of custody certificates.

2.03 ACCESSORIES

- A. Hooks:
 - 1. Provide one double-prong ceiling hook and three single-prong wall hooks for single-tier and double-tier lockers.
 - 2. One wall hook and one ceiling hook for multi-tier lockers 12 IN and less in width.
- B. Provide hat shelf in single-tier lockers.
- C. Provide hanger rod minimum 5/8 IN DIA, in lieu of ceiling hook, in single tier lockers 18 IN deep or deeper.
- D. Number Plates:
 - 1. Manufacturer's standard etched, embossed, or stamped, non-ferrous metal number plates.
 - 2. Three-digit numerals not less than 3/8 IN high.
 - 3. Sequence numbers as directed by Project Representative.
 - 4. Attach plates centered, near top of each locker door, with two fasteners of same finish as number plate.
 - 5. Provide on each locker door.

- E. Benches: Laminated selected hardwood, 1-1/4 IN full finished thickness, corners rounded and sanded, surfaces finished with two coats of clear lacquer.
 - 1. Width: 12 IN. (24 IN for Accessibility Bench).
 - 2. Lengths: 72 IN. (48 IN for Accessibility Bench).
- F. Heavy-Duty Bench Pedestals: Steel tubing with 10 gage steel flanges welded to each end, 16-1/4 IN high, finish to be chosen by Project Representative.

2.04 FABRICATION

- A. General:
 - 1. Fabricate lockers square, rigid, and without warp, with metal faces flat and free of dents or distortion.
 - 2. Ease all exposed metal edges.
 - 3. Weld frames together.
 - 4. Weld, bolt, or rivet other connections per manufacturer's standard.
 - 5. Grind exposed welds flush.
 - 6. Chemically pretreat metal with degreasing and phosphatizing process.
 - 7. Apply baked-on enamel finish to all surfaces, exposed and concealed, except plated and non-ferrous metal.
 - 8. Color: Charcoal.
 - 9. Finished film thickness of not less than 0.75 mil for all exterior surfaces and not less than 0.5 mil for all interior surfaces.
- B. Lockers:
 - 1. Frames:
 - a. Minimum 16 GA channels or 12 GA angles, with corners electrically welded to form solid one-piece structure.
 - b. Provide door stops at door openings.
 - c. Provide minimum 16 GA horizontal members between doors of other than single-tier lockers.
 - 2. Backs and sides:
 - a. Minimum 24 GA.
 - b. Flange backs on vertical edges and sides where they intermember with backs, making double-flanged rear corners.
 - 3. Exposed ends of non-recessed lockers: Minimum 16 GA.
 - 4. Tops, bottoms and shelves: Minimum 24 GA, flanged on all sides.
 - 5. Filler Panels: Full height minimum 20 GA.
 - 6. Sloped tops: Continuous, minimum 20 GA.

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- 7. Doors:
 - a. One-piece, minimum 16 GA, flanged at all edges, with corners.
 - b. Extra bracing or reinforcing on inside of doors over 15 IN wide.
 - c. Construct to prevent springing when opening or closing.
 - d. Door swing of 180 degrees.
 - e. Stamped louvered vents in door faces.
 - 1) Single-tier lockers: Not less than six, 6 IN louver openings in top and bottom of each door.
 - 2) Double-tier lockers: Not less than three, 6 IN louver openings in top and bottom of each door.
- 8. Door hinges:
 - a. Full-loop, five-knuckle, tight pin.
 - b. Not less than 0.050 IN thick steel, 2 IN high.
 - c. Continuous weld hinges to inside of frame and secure to door with not less than two (2) factory-installed fasteners, completely concealed and tamperproof when door is closed.
 - d. Minimum three (3) hinges for each door 42 IN high and over.
 - e. Minimum two (2) hinges for each door less than 42 IN high.
- 9. Latching:
 - a. Positive, automatic, prelocking, pry-resistant latch and pull.
 - b. Rubber silencers.
 - c. Chromium-plated, vandal-proof or kick-proof lift-up handle, containing strike and hole for padlock.
 - d. Enclose latch on four sides in a boxed receptacle in lock bar channel, and engaging latch hooks on frame opposite hinges.
 - e. Three-point latching for single-tier lockers.
 - f. Two-point latching for double-tier lockers.
 - g. One-point gravity or spring latch with padlock lugs for box lockers.
- 10. Provision for padlock: Latch pull with hole to accept padlock.
- 11. Accessible Lockers: Fabricate as follows:
 - a. Locate bottom shelf no lower than 15 IN above the floor.
 - b. Where hooks, coat rods, or additional shelves are provided, locate no higher than 48 IN above the floor.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install plumb, level, rigid and flush.
- C. Space fasteners not over 48 IN OC:
 - 1. Install through suitable reinforcing plates where necessary to prevent metal distortion.
 - 2. Conceal all fasteners wherever possible.
- D. Provide and install filler and closure pieces as required.

3.02 FIELD QUALITY CONTROL

- A. Touch-up any damaged finishes or replace as directed by Project Representative.
 - 1. Use only materials and finishes as recommended or furnished by locker manufacturer.

3.03 ADJUSTMENT

A. Adjust doors and latches to operate easily without bind.1. Verify satisfactory operation of integral locking devices.

3.04 SCHEDULES

- A. Locker Types and Sizes:
 - 1. Type A: Single tier 12 IN x 18 IN x 72 IN.
 - 2. Type B: Double tier 12 IN x 18 IN x 36 IN.

END OF SECTION

SECTION 10 75 00 FLAGPOLES

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Flagpole.
 - 2. Flag.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Division 00 Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 01 General Requirements.
 - 3. Division 03 Concrete.
 - 4. Division 26 Electrical.

1.02 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. Aluminum Association (AA):
 - a. DAF 45, Designation System for Aluminum Finishes.
 - 2. ASTM International (ASTM):
 - a. A53, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
 - b. B241, Standard Specification for Aluminum and Aluminum-Alloy Seamless Pipe and Seamless Extruded Tube.
 - 3. National Association of Architectural Metal Manufactures (NAAMM):
 - a. FP 1001, Guide Specifications for Design of Metal Flagpoles.

1.03 SUBMITTALS

- A. Submittal Procedures: See Section 01 33 00 Submittal Procedures for requirements for the mechanics and administration of the submittal process.
- B. Approval Submittals:
 - 1. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 - c. Manufacturer's complete line of finishes for Project Representative's selection.

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- C. Closeout Submittals:
 - Operation & Maintenance (O&M) Manual Content: Provide O&M manual documentation as required by Section 01 73 00 – Operation and Maintenance Manuals.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. Flagpoles:
 - a. American Flagpole (www.americanflagpole.com).
 - b. Concord Industries, Inc. (www.concordindustries.com).
 - c. H.A. Peterson & Sons, Inc Flags (www.hapsons.com).
 - d. U.S. Flag and Flag Pole Supply (www.united-states-flag.com).
 - e. Or approved equal.
- B. Submit request for substitution in accordance with Specification Section 01 60 00 Product Requirements.

2.02 MATERIALS

- A. Pole: Aluminum.
- B. Ball: Aluminum.
- C. Truck: Aluminum.
- D. Halyard: Braided nylon with steel core, minimum 5/16 IN.
- E. Cleats and Collar: Aluminum.
- F. Foundation Sleeve: Steel.
- G. Anchors: Steel.
- H. Miscellaneous Fasteners: Aluminum or stainless steel.

2.03 ACCESSORIES

- A. Flag:
 - 1. American flag: 5 FT x 8 FT nylon.

2.04 FABRICATION

- A. General:
 - 1. Seamless extruded tubing.
 - a. ASTM B241, 6063-T6 alloy.
 - 2. Minimum wall thickness 0.188 IN.

- 3. Single length construction when possible.
 - a. If single length construction is not possible, provide precision jointery with self-aligning internal splicing sleeve.
- B. Pole:
 - 1. Exposed height:
 - a. American flag: 25 FT.
 - 2. Setting depth: Manufacturer's suggested depth for height of pole specified.
 - 3. Designed to withstand a wind velocity in accordance with NAAMM FP-1001.
- C. Ball:
 - 1. 14 GA.
 - 2. Size: Diameter to match size of pole at top of pole.
 - 3. Flush seam.
 - 4. Finish to match pole.
- D. Truck:
 - 1. Double metal sheave cast aluminum.
 - 2. Stainless steel roller bearings.
- E. Halyard:
 - 1. 5/16 IN minimum thickness.
 - 2. Braided.
 - 3. Two (2) chrome plated bronze swivel snap hooks for each.
- F. Cleats:
 - 1. Two (2) each, 9 IN cast aluminum.
 - 2. Stainless steel screws: 5/16 IN minimum.
 - 3. Finish to match pole.
- G. Collar: Spun aluminum with finish to match pole.
- H. Foundation Sleeve:
 - 1. 14 GA galvanized per ASTM A53, G-90.
 - 2. Corrugated.
 - 3. Minimum 3/16 IN galvanized steel baseplate and support plate.
 - a. G-90 coating.
 - 4. 3/4 IN steel lightning arrester to extend minimum of 12 IN below footing.
- I. Finish:
 - 1. Anodized: AAM12C22A42/44 Black.

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PART 3 – EXECUTION

3.01 APPLICATION

- A. Install products in accordance with manufacturer's instructions.
- B. Paint all portions of flagpole below grade with heavy coat of bituminous paint.
- C. Provide positive lightning ground for flagpole installation.
- D. See Division 3 for concrete for foundation.

END OF SECTION

SECTION 10 80 00 MISCELLANEOUS SPECIALTIES

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Boot Warmers.
 - 2. Bumper post sleeve.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Division 00 Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 01 General Requirements.

1.02 SUBMITTALS

- A. Submittal Procedures: See Section 01 33 00 Submittal Procedures for requirements for the mechanics and administration of the submittal process.
- B. Approval Submittals:
 - 1. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 - c. Manufacturer's complete line of finishes for Project Representative's selection.
- C. Closeout Submittals:
 - Operation & Maintenance (O&M) Manual Content: Provide O&M manual documentation as required by Section 01 73 00 – Operation and Maintenance Manuals.
 - Extended Warranty: Provide two executed copies of the Extended Warranty required by this Section in accordance with the provisions of Section 01 78 00 – Closeout Procedures.

1.03 EXTENDED WARRANTY

- A. In accordance with the provisions of Section 01 78 00 Closeout Procedures, provide an Extended Warranty for the Work of this Section:
 - 1. Warranty period for Work of this Section is two (2) years commencing on the date of Substantial Completion.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. Boot Warmers:
 - a. Cozy Winters www.cozywinters.com.
 - b. <u>Peet</u> Dryer www.peetshoedryer.com.
 - c. Williams www.bootdryer.com.
 - d. Or Approved Equal.
 - 2. Bumper Post Sleeve:
 - a. IDEAL Shield (www.idealshield.com).
 - b. Reliance Foundry (www.reliance-foundry.com).
 - c. Specialized Storage Systems (<u>www.specializedstorage.com</u>).
 - d. Or Approved Equal.
- B. Submit request for substitution in accordance with Specification Section 01 60 00 Product Requirements.

2.02 MATERIALS

- A. Boot Warmer Characteristics:
 - 1. Type: Heated with germicidal UV lamp and programmable clock.
 - 2. Size: Provide a unit with eight (8) or more boot stations in Men's Locker Room.
 - 3. Size: Provide a unit with four (4) or more stations in Women's Locker Room.
- B. Bumper Post Sleeves:
 - 1. Dome top low-density polyethylene thermoplastic nominal thickness 0.250 IN.
 - 2. Sleeve to shield pipe diameter: 10 IN per detail 1/00A506.
 - 3. Sleeve height: 48 IN.
 - 4. Sleeve Color: OSHA yellow.
 - 5. Surface of sleeve to be smooth with round top, no ribbed or two piece systems accepted.
 - 6. Secure with manufacturer's neoprene adhesive tape, no screws, glue or clamping will be acceptable.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Protect surrounding areas and surfaces from damage prior to beginning work of this Section.
- B. Install products in accordance with manufacturer's instructions.
- C. Protect Work of this Section from damage and deterioration until Substantial Completion.
 - 1. Maintain protective covers on accessories until installation is complete.
- D. Install Bumper post sleeve with manufacturer's neoprene adhesive tape per manufacturer's guidelines.

END OF SECTION

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