

BID CATEGORY 09E – FLOORING

1.01 GENERAL INCLUSIONS

- A. The following information is provided to define and describe the scope of work that will be required of the successful Bidder.
- B. The information is to be complimentary with the collective requirements of all the other Contract Documents. All the Contract Documents, including all disciplines of the specifications and drawings, are included as part of this scope of work.
- C. This Document will become a part of the successful Bidder's Final Contract and outlines the scope of work for this bid category.
- D. Reference specification section 01 12 01, "General Requirements for all Bid Categories" for general requirements that applies to all bid categories.
- E. Reference "Summary" section of 01 12 02, "Bid Category Descriptions" for general information that applies to all bid categories.
- F. Specification Sections that are the responsibility of this Bid Category:

Specification Section		Complete Scope	As Applies	Labor Only	Material Only
DIVISION 00	Procurement and Contracting Requirements	X			
DIVISION 01	General Requirements	X			
09 6500	Resilient Flooring	X			
09 6813	Tile Carpeting	X			

2.01 SCOPE SPECIFIC INCLUSIONS

- A. **MANPOWER, EQUIPMENT & MATERIALS**
 - 1. Provide all required shop drawings, submittals, product data, field measuring, warranties, attic stock and delivery of the above Specification Sections and Contract Documents.
- B. **SAFETY & HOUSEKEEPING**
 - 1. All flooring shall be vacuumed after installation. Resilient Flooring shall receive a wax finish by this flooring contractor per the manufacturer's recommendations.
- C. **DELIVERY, STORAGE & HANDLING**
 - 1. Ensure that all materials shall be delivered palletized with protective packaging, to prevent any warping or damage. Supplier is responsible for proper storage and material handling prior to delivery to the job site.
 - 2. Turnover to the Owner all partial and unused boxes of each type of floor finish and wall finish products remaining after the completion of the Work.
- D. **PLANNING, COORDINATION & QUALITY CONTROL**
 - 1. Inspect the surfaces to receive flooring systems for acceptability of the surfaces. Include all cleaning and preparation work and prepare all substrates including but not limited to prepping, spot filling, and the touch-up of minor depressions and voids, as well as removal of taping compound, caulk or other debris from floors and acid etching / washing / neutralizing of floors as preparation for flooring work is the responsibility of this Contractor. Include all prep work where new concrete floor infills are poured adjacent to existing concrete floors. Commencement of this Work in a given area shall constitute acceptance of the substrate.
- E. **CONSTRUCTION**
 - 1. Provide and install all Resilient Flooring and all accessories and floor preparation complete in accordance with the contract documents.
 - 2. Provide and install all vinyl base as shown in the Contract Documents, including casework toe kicks.
 - 3. Furnish and install all accessories required for a complete flooring system, including but not limited to trim molding, nosing, edge strips, transitions, rubber tile accessibility ramp, etc.

4. Furnish and install transition strips from epoxy to flooring, LVT to rubber, carpet to LVT.

3.01 PROJECT SPECIFIC INCLUSIONS

4.01 ALLOWANCES

- A. Refer to Specification for scope specific allowances.

5.01 ALTERNATES

- A. Refer to Specification Sections 01 2300 Alternates and 00 4113 Bid Form for a list of alternates.

BID CATEGORY 9H – FLUID APPLIED FLOORING

1.01 GENERAL INCLUSIONS

- A. The following information is provided to define and describe the scope of work that will be required of the successful Bidder.
- B. The information is to be complimentary with the collective requirements of all the other Contract Documents. All the Contract Documents, including all disciplines of the specifications and drawings, are included as part of this scope of work.
- C. This Document will become a part of the successful Bidder's Final Contract and outlines the scope of work for this bid category.
- D. Reference specification section 01 12 01, "General Requirements for all Bid Categories" for general requirements that applies to all bid categories.
- E. Reference "Summary" section of 01 12 02, "Bid Category Descriptions" for general information that applies to all bid categories.
- F. Specification Sections that are the responsibility of this Bid Category:

	Specification Section	Complete Scope	As Applies	Labor Only	Material Only
DIVISION 00	Procurement and Contracting Requirements	X			
DIVISION 01	General Requirements	X			
09 0561	Common Work Results for Flooring Preparation	X			
09 6700	Fluid-Applied Flooring	X			

2.01 SCOPE SPECIFIC INCLUSIONS

- A. **MANPOWER, EQUIPMENT & MATERIALS**
 - 1. Provide all required shop drawings, submittals, product data, field measuring, warranties, attic stock and delivery of the above Specification Sections and Contract Documents.
 - 2. This contractor is responsible for temporary power sources above standard 120V outlets.
- B. **SAFETY & HOUSEKEEPING**
 - 1. This Contractor is required to remove all debris (including scraps, shavings, sediment, slag, etc.) resulting from their scope of work on a daily basis. The Construction Manager will back-charge for any time involved in the cleanup of this Contractor's debris.
 - 2. Extension cords shall be rolled up when not in use and inspected weekly. Contractors shall not allow extension cords to obstruct walkways or working areas
 - 3. Mask, cover, drop cloth, and otherwise protect all areas adjacent to the Work, including other finished surfaces and products. This contractor is responsible for repair costs due to damage caused by this bid category.
 - 4. This contractor is responsible for air quality and means of maintaining safe air quality during installation of this scope. Provide all ventilation, fans, and equipment necessary to control dust, fumes, etc.
 - 5. Cleaning excess dust created by this scope of work due to inadequate dust control is the responsibility of this contractor.
- C. **DELIVERY, STORAGE & HANDLING**
 - 1.
- D. **PLANNING, COORDINATION & QUALITY CONTROL**
 - 1. Complete moisture testing of concrete floors prior to installation per manufacturer requirements or specifications, whichever are more stringent.
 - 2. Inspect the surfaces to receive flooring systems for acceptability of the surfaces. Include all cleaning and preparation work and prepare all substrates including but not limited to prepping, spot filling, and the touch-up of minor depressions and voids, as well as removal of taping compound, caulk or other debris from floors and acid etching / washing / neutralizing of floors as preparation for flooring work is the responsibility of this Contractor. Include all prep work where

new concrete floor infills are poured adjacent to existing concrete floors. Commencement of this Work in a given area shall constitute acceptance of the substrate.

3. Notify Terra Construction if there are issues above and beyond standard floor prep expectations that would adversely affect the coating longevity prior to product application (i.e. – structural cracks in concrete).

E. CONSTRUCTION

1.

3.01 PROJECT SPECIFIC INCLUSIONS

- A. This contractor is responsible for all sealed concrete finished (SC1, SC2, SC3, and SC4 per Sheet A701).

4.01 ALLOWANCES

- A. Refer to Specification for scope specific allowances.

5.01 ALTERNATES

- A. Refer to Specification Sections 01 2300 Alternates and 00 4113 Bid Form for a list of alternates.

END OF SECTION

BID CATEGORY 09J – PAINTING

1.01 GENERAL INCLUSIONS

- A. The following information is provided to define and describe the scope of work that will be required of the successful Bidder.
- B. The information is to be complimentary with the collective requirements of all the other Contract Documents. All the Contract Documents, including all disciplines of the specifications and drawings, are included as part of this scope of work.
- C. This Document will become a part of the successful Bidder's Final Contract and outlines the scope of work for this bid category.
- D. Reference specification section 01 12 01, "General Requirements for all Bid Categories" for general requirements that applies to all bid categories.
- E. Reference "Summary" section of 01 12 02, "Bid Category Descriptions" for general information that applies to all bid categories.
- F. Specification Sections that are the responsibility of this Bid Category:

Specification Section		Complete Scope	As Applies	Labor Only	Material Only
DIVISION 00	Procurement and Contracting Requirements	X			
DIVISION 01	General Requirements	X			
09 9123	Interior Painting	X			

2.01 SCOPE SPECIFIC INCLUSIONS

A. MANPOWER, EQUIPMENT & MATERIALS

- 1. Provide all required shop drawings, submittals, product data, field measuring, warranties, attic stock and delivery of the above Specification Sections and Contract Documents.
- 2. Provide the equipment necessary for proper ventilation of its Work areas, to avoid other contractors from being adversely affected by this contractor's operations. If application of particularly hazardous or malodorous coating systems causes disruption to the Project, painting contractor shall apply these systems on off-hours or weekends at no additional cost to Terra Construction.
- 3. Provide the equipment necessary for proper ventilation and air flow of its Work areas, to avoid a delay in the skimcoat and painting set-up and cure time.

B. SAFETY & HOUSEKEEPING

- 1. Wash out all its tools in an area designated by Terra Construction. This wash-out area is to be cleaned after each use. Under no circumstance are the restroom facilities to be used for this purpose.
- 2. Ensure that all floors within any work area of this Contractor shall be broom-cleaned at the end of each workday. All debris caused by these operations shall be removed daily from the building and discarded into onsite dumpsters.
- 3. Mask, cover, drop cloth and otherwise protect all areas adjacent to the Work, including other finished surfaces and products. This Contractor includes the removal of paint/coatings and/or correction of finished surfaces that was blemished due to deficient protection. This Contractor is responsible to control dust/tracking result from its scope of work.

C. DELIVERY, STORAGE & HANDLING

- 1. Store and acclimate the paint, solvents and other materials in accordance with the manufacturer's recommendations and the designated area(s) with adequate ventilation and safety measures in place for types and quantities of materials stored on site, meeting all the requirements of OSHA and local governing agencies.

D. PLANNING, COORDINATION & QUALITY CONTROL

- 1. Inspect all materials to be painted or receive coatings for acceptability of the surfaces. Application of coatings or paint shall constitute acceptance of the substrate.
- 2. Review and accept all walls prior to installing any product. Once walls are accepted any defects will be the responsibility of this contractor

3. Protect freshly painted areas and post "Wet Paint" signs in these areas.

E. CONSTRUCTION

1. Painting contractor to review primed walls with a high-lumen light and report defects to the gypsum contractor for corrections. Defects found after subsequent finish coats are the responsibility of this contractor.
2. Paint all hollow metal doors and door frames.
3. Paint all access panels, brackets, and exposed wood backing to match adjacent surfaces. Paint all exposed conduit and equipment, exposed steel.
4. Properly prepare all existing surfaces to receive coatings or painting as required by the Contract Documents.
5. Paint all exposed sprinkler piping in normally occupied areas, as required by the Contract Documents and local code.
6. Paint all exposed interior and exterior structural steel and miscellaneous metals, including but not limited to metal stairs, metal railings, exterior bollards, etc, as required by the contract documents.
7. Provide one pass of patching minor painting and coatings during the punch list phase. This Contractor shall provide protection of adjacent surfaces during final touch-up and cleaning of debris after such touch-up.
8. Specifically acknowledges that the room finish schedule, interior finish plans, contract specifications, and interior elevations will need to be cross-referenced in order to complete the project.

3.01 PROJECT SPECIFIC INCLUSIONS

4.01 ALLOWANCES

- A. Refer to Specification for scope specific allowances.
- B. Includes 40 hours to pre-punch list touch up of all finished areas. This Contractor understands that a normal amount of repair of finished product will be required, and all costs associated with these repairs are included in the Bid. Include an additional 40 hours of non-normal touch-up repairs. All repairs not considered non-normal must be reported to Terra Construction in writing, prior to commencing with repair work.

5.01 ALTERNATES

- A. Refer to Specification Sections 01 2300 Alternates and 00 4113 Bid Form for a list of alternates.

END OF SECTION

BID CATEGORY 10A – SPECIALTIES (MATERIAL ONLY)

1.01 GENERAL INCLUSIONS

- A. The following information is provided to define and describe the scope of work that will be required of the successful Bidder.
- B. The information is to be complimentary with the collective requirements of all the other Contract Documents. All the Contract Documents, including all disciplines of the specifications and drawings, are included as part of this scope of work.
- C. This Document will become a part of the successful Bidder's Final Contract and outlines the scope of work for this bid category.
- D. Reference specification section 01 12 01, "General Requirements for all Bid Categories" for general requirements that applies to all bid categories.
- E. Reference "Summary" section of 01 12 02, "Bid Category Descriptions" for general information that applies to all bid categories.
- F. Specification Sections that are the responsibility of this Bid Category:

Specification Section		Complete Scope	As Applies	Labor Only	Material Only
DIVISION 00	Procurement and Contracting Requirements	X			
DIVISION 01	General Requirements	X			
10 1100	Visual Display Units				X
10 2113.17	Phenolic Toilet Compartments				X
10 2600	Wall and Door Protection				X
10 2800	Toilet, Bath, and Laundry Accessories				X
10 4400	Fire Protection Specialties				X
10 5113	Metal Lockers				X

2.01 SCOPE SPECIFIC INCLUSIONS

- A. **MANPOWER, EQUIPMENT & MATERIALS**
 - 1. Provide all required shop drawings, submittals, product data, warranties, attic stock and delivery of the above Specification Sections and Contract Documents.
- B. **SAFETY & HOUSEKEEPING**
- C. **DELIVERY, STORAGE & HANDLING**
- D. **PLANNING, COORDINATION & QUALITY CONTROL**
 - 1. Field measurements are to be coordinated with BC#06C – Carpentry.
- E. **CONSTRUCTION**
 - 1. Provide and install all required brackets, clips, angles, trim and closure pieces as required for a complete installation.
 - 2. Ensure all material is delivered with protective packaging, to prevent any warping, damage or discoloration.
 - 3. Furnish templates required for use of other trades for installation.
 - 4. Furnish materials, avoiding errors, dents, scratches, etc.
 - 5. Provide touchup paint for prefinished items supplied.
 - 6. Provide all fire extinguishers with appropriate and current inspection tags prior to delivery to the Project jobsite.

3.01 PROJECT SPECIFIC INCLUSIONS

4.01 ALLOWANCES

- A. Refer to Specification for scope specific allowances.

5.01 ALTERNATES

A. Refer to Specification Sections 01 2300 Alternates and 00 4113 Bid Form for a list of alternates.

END OF SECTION

BID CATEGORY 10B – SIGNAGE

1.01 GENERAL INCLUSIONS

- A. The following information is provided to define and describe the scope of work that will be required of the successful Bidder.
- B. The information is to be complimentary with the collective requirements of all the other Contract Documents. All the Contract Documents, including all disciplines of the specifications and drawings, are included as part of this scope of work.
- C. This Document will become a part of the successful Bidder's Final Contract and outlines the scope of work for this bid category.
- D. Reference specification section 01 12 01, "General Requirements for all Bid Categories" for general requirements that applies to all bid categories.
- E. Reference "Summary" section of 01 12 02, "Bid Category Descriptions" for general information that applies to all bid categories.
- F. Specification Sections that are the responsibility of this Bid Category:

	Specification Section	Complete Scope	As Applies	Labor Only	Material Only
DIVISION 00	Procurement and Contracting Requirements	X			
DIVISION 01	General Requirements	X			
10 1419	Dimensional Letter Signage	X			
10 1423	Panel Signage	X			

2.01 SCOPE SPECIFIC INCLUSIONS

- A. **MANPOWER, EQUIPMENT & MATERIALS**
 - 1. Provide labor, material, and equipment necessary to complete all work in accordance with the above listed specifications.
 - 2. Provide all required shop drawings, submittals, product data, field measuring, warranties, attic stock, and delivery of the above Specification Sections and Contract Documents.
- B. **SAFETY & HOUSEKEEPING**
 - 1. Execute its Work in accordance with the OSHA Regulations, which includes fall protection measures at OSHA indicated elevations.
 - 2. This contractor is required to remove all debris resulting from their scope of work on a daily basis. The Construction Manager will back-charge for any time involved in the cleanup for this Contractor's Debris.
- C. **DELIVERY, STORAGE & HANDLING**
 - 1. Ensure material is stored at required temperatures.
 - 2. Ensure that all materials shall be delivered palletized with protective packaging, to prevent any warping or damage to materials. Supplier is responsible for proper storage and material handling prior to delivery to the job site.
 - 3. Furnish materials, avoiding errors, dents, scratches, etc.
 - 4. Provide touchup paint for prefinished items supplied.
- D. **PLANNING, COORDINATION & QUALITY CONTROL**
 - 1. Furnish templates required for use of other trades for installation.
- E. **CONSTRUCTION**
 - 1. Install signage on walls adjacent to the latch side of the door where applicable.
 - 2. Verify substrate is acceptable prior to installation

3.01 PROJECT SPECIFIC INCLUSIONS

4.01 ALLOWANCES

- A. Refer to Specification for scope specific allowances.

5.01ALTERNATES

A. Refer to Specification Sections 01 2300 Alternates and 00 4113 Bid Form for a list of alternates.

END OF SECTION

BID CATEGORY 12A – WINDOW COVERINGS

1.01 GENERAL INCLUSIONS

- A. The following information is provided to define and describe the scope of work that will be required of the successful Bidder.
- B. The information is to be complimentary with the collective requirements of all the other Contract Documents. All the Contract Documents, including all disciplines of the specifications and drawings, are included as part of this scope of work.
- C. This Document will become a part of the successful Bidder's Final Contract and outlines the scope of work for this bid category.
- D. Reference specification section 01 12 01, "General Requirements for all Bid Categories" for general requirements that applies to all bid categories.
- E. Reference "Summary" section of 01 12 02, "Bid Category Descriptions" for general information that applies to all bid categories.
- F. Specification Sections that are the responsibility of this Bid Category:

Specification Section		Complete Scope	As Applies	Labor Only	Material Only
DIVISION 00	Procurement and Contracting Requirements	X			
DIVISION 01	General Requirements	X			
12 2400	Window Shades	X			

2.01 SCOPE SPECIFIC INCLUSIONS

- A. **MANPOWER, EQUIPMENT & MATERIALS**
 - 1. Provide all required shop drawings, submittals, product data, field measuring, warranties, attic stock and delivery of the above Specification Sections and Contract Documents.
 - 2. Provide labor, material, and equipment necessary to complete all work in accordance with the above listed specifications.
- B. **SAFETY & HOUSEKEEPING**
 - 1. Execute its Work in accordance with the OSHA Regulations, which includes fall protection measures at OSHA indicated elevations.
 - 2. This contractor is required to remove all debris resulting from their scope of work on a daily basis. The Construction Manager will back-charge for any time involved in the cleanup for this Contractor's Debris.
- C. **DELIVERY, STORAGE & HANDLING**
 - 1. Ensure material is stored at required temperatures.
 - 2. Ensure that all materials shall be delivered palletized with protective packaging, to prevent any warping or damage to materials. Supplier is responsible for proper storage and material handling prior to delivery to the job site.
- D. **PLANNING, COORDINATION & QUALITY CONTROL**
 - 1. Include any field measurements prior to installation.
 - 2. Coordinate electrical connection locations for motorized window shades with the electrical contractor.
- E. **CONSTRUCTION**
 - 1. Window shades shall not be installed in a room until after the painting is complete.
 - 2. Provide and install all required brackets, clips, angles, trim and closure pieces as required for a complete installation.

3.01 PROJECT SPECIFIC INCLUSIONS

4.01 ALLOWANCES

A. Refer to Specification for scope specific allowances.

5.01ALTERNATES

A. Refer to Specification Sections 01 2300 Alternates and 00 4113 Bid Form for a list of alternates.

END OF SECTION

BID CATEGORY 21A – FIRE SPRINKLER (DESIGN-BUILD)

1.01 GENERAL INCLUSIONS

- A. The following information is provided to define and describe the scope of work that will be required of the successful Bidder.
- B. The information is to be complimentary with the collective requirements of all the other Contract Documents. All the Contract Documents, including all disciplines of the specifications and drawings, are included as part of this scope of work.
- C. This Document will become a part of the successful Bidder's Final Contract and outlines the scope of work for this bid category.
- D. Reference specification section 01 12 01, "General Requirements for all Bid Categories" for general requirements that applies to all bid categories.
- E. Reference "Summary" section of 01 12 02, "Bid Category Descriptions" for general information that applies to all bid categories.
- F. Specification Sections that are the responsibility of this Bid Category:

Specification Section		Complete Scope	As Applies	Labor Only	Material Only
DIVISION 00	Procurement and Contracting Requirements	X			
DIVISION 01	General Requirements	X			
07 8400	Firestopping		X		
Division 21	Fire Suppression (Design/Build)	X			

2.01 SCOPE SPECIFIC INCLUSIONS

- A. **MANPOWER, EQUIPMENT & MATERIALS**
 - 1. Provide all required shop drawings, submittals, product data, field measuring, warranties, attic stock and delivery of the above Specification Sections and Contract Documents.
 - 2. Provide all lifts, scaffolding, ladders, etc. required for installation.
- B. **SAFETY & HOUSEKEEPING**
 - 1. Leave protective plastic on devices until after cleanup is completed. At that time, Contractor shall remove and dispose of protective covers to facilitate final testing and Commissioning.
- C. **DELIVERY, STORAGE & HANDLING**
 - 1. Ensure that all materials shall be delivered palletized with protective packaging, to prevent any warping or damage. Supplier is responsible for proper storage and material handling prior to delivery to the job site.
- D. **PLANNING, COORDINATION & QUALITY CONTROL**
 - 1. Coordinate with Terra Construction, Mechanical Contractor and Electrical Contractor to provide detailed coordination drawings. This will require separate coordination meetings with all parties and a coordination drawing submittal to Terra Construction. Locations of light fixtures take precedence over sprinkler heads and sprinkler piping. Heads installed in fixture locations or sprinkler piping interfering with fixtures and ductwork, etc shall be relocated at the fire sprinklers expense.
 - 2. Include the layout, cutting of holes, placing and securing of sleeves through slabs, walls and roofs as required for proper completion of the Work. This Contractor shall detail, submit for approval, layout, and coordinate openings not shown on the Contract Documents but required by design, so that they may be reviewed and approved prior to their incorporation into the Work. Costs of openings not shown in the Contract Documents shall be borne by this Contractor. Additional openings must be detailed in a timely manner so as not to delay the Work of others.
 - 3. Design, furnish and install all Fire Suppression Systems, complete, as described.
 - 4. Be responsible for all final design calculations and drawings for the fire suppression system and shall be reviewed and stamped by a Registered Professional Engineer for Fire Protection and gain approval of same, such that the current Project Schedule is met.
 - 5. Coordinate wiring of all fire protection related devices with the Division 26 through 28 Contractors, as well as locate dry assemblies (if any), air compressors, etc. such that they are in

- close proximity to electrical power sources. Dry assembly (if any) locations shall be coordinated to assure sufficient space is available for all trades within these areas
6. Submit sprinkler head locations for Architect's approval prior to installation.
 7. **3D Modeling Coordination: Required to deliver 3D models, acceptable to Terra Construction, for coordination of clash detection and project closeout.**
 1. Refer to section 013100 – Subcontractor BIM Execution Plan.
 2. Modeling Level of Detail (LOD), including, but not limited to:
 - a. Components of the fire protection system shall be modeled, including piping, valves, fire pump and sprinkler heads.
 - b. Any access zone requirement will be modeled.

E. CONSTRUCTION

1. Provide a full design-build supply and installation of the fire protection systems.
2. Obtain all necessary permits, with the cost for those permits included in the Bid.
3. Provide qualified personnel to participate in all interface testing of the fire alarm system.
4. Furnish and install all firesafing, caulking, or other materials as required by the Contract Documents and local codes to provide a code-compliant seal around all wall penetrations to maintain the partition's rating.
5. Furnish and install all miscellaneous devices, wall backing, pipe supports, etc. not specifically shown or specified in order to provide a complete, code-compliant, operable system.
6. Furnish and install all required identification systems for its piping, valves, equipment, etc.
7. Furnish and install all hose cabinets and fire control valve cabinets (if any).
8. Provide flow and tamper switches for wiring by the Electrical Contractor. All switches shall be compatible with the fire alarm system provide by the Electrical Contractor, to allow a U.L. rating for the fire alarm system as a whole to be achieved.
9. Provide and install fire caulking around all sprinkler through wall/floor penetrations at rated assemblies.
10. Provide and install all acoustical and/or smoke caulking around sprinkler piping through acoustical/smoke related assemblies.
11. Fire Protection Systems shall also include and meet the below requirements:
 - a) Sprinkler heads must be centered in 24x24 ceiling tile / 24x24 end of larger ceiling tile.
 - b) All heads are quick response
 - c) Fire protection designer shall route sprinkler piping to minimize drain location.
 - d) Sprinkler contractor shall perform calculations and locate heads where required. Coordinate with architectural ceiling plans for soffit elevations and ceiling elevations.
 - e) Sprinkler contractor shall develop sprinkler plans and specifications for installation of complete new sprinkler system to meet NFPA-13 and local fire marshals requirements. Sprinkler contractor is required to have signed design drawings completed by certified fire sprinkler designer. Signed copies of hydraulic calculations, plans, and shop drawings shall be submitted to State Fire Marshalls office or local authority having jurisdiction for plan review and approval. State Fire Marshals or local authority having jurisdiction approved hydraulic calculations, plans, and shop drawings shall be submitted to the construction manager, Owner, and engineer of review. If approval is not received by both the engineer and State Fire Marshals or local authority having jurisdiction before sprinkler piping is fabricated, any change to the piping fabrication is at the cost of the sprinkler contractor. System bid and installed shall meet all NFPA-13 requirements, including head quantities and locations.
 - f) All piping located in exposed bar joist areas shall be located in the joist space.
 - g) Sprinkler contractor shall perform flow test for adequate sizing. Provide flow test results with shop drawings.
 - h) Fire protection water service must have a water meter furnished and installed per the local requirements.
 - i) A fire department connection shall be installed if required by the State Fire Marshall or local authority having jurisdiction.
 - j) Wet sprinkler system shall be provided for 100 percent coverage of all building areas.
 - k) Sprinkler zones are to be established according to occupancy classifications. Refer to the architectural code plan to confirm all code related items.
 - l) Sprinklers shall be quick response types. Extended coverage types shall be used wherever possible. Extended coverage sprinklers shall be identical in appearance to standard coverage sprinklers.

- m) Sprinklers shall be located in a regular pattern, perpendicular, and parallel with building lines, and in perfect alignment with other ceiling components.
- n) Sprinklers in unfinished areas shall be chrome-plated pendant, upright or sidewall types suitable for application.
- o) Sprinklers in areas subject to freezing shall be recessed pendant or sidewall, dry-type sprinklers.
- p) Delegated design to follow Minnesota State Facility Design Standards, including but not limited to Schedule 40 rigid piping.

3.01 PROJECT SPECIFIC INCLUSIONS

- A. This contractor is responsible for furnishing and installing the solenoid valve (if required) per Detail A5/F001.

4.01 ALLOWANCES

- A. Refer to Specification for scope specific allowances.

5.01 ALTERNATES

- A. Refer to Specification Sections 01 2300 Alternates and 00 4113 Bid Form for a list of alternates.

END OF SECTION

BID CATEGORY 22B – PLUMBING PIPING & MECHANICAL

1.01 GENERAL INCLUSIONS

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- C. This Document will become a part of the successful Bidder's Final Contract and outlines the scope of work for this bid category.
- D. Reference specification section 01 12 01, "General Requirements for all Bid Categories" for general requirements that applies to all bid categories.
- E. Reference "Summary" section of 01 12 02, "Bid Category Descriptions" for general information that applies to all bid categories.
- F. Specification Sections that are the responsibility of this Bid Category:

	Specification Section	Complete Scope	As Applies	Labor Only	Material Only
DIVISION 00	Procurement and Contracting Requirements	X			
DIVISION 01	General Requirements	X			
07 8400	Firestopping		X		
Division 22	Plumbing	X			
Division 23	HVAC (excluding 230923 and 230993)	X			
31 2113	Radon Mitigation		X		

2.01 SCOPE SPECIFIC INCLUSIONS

- A. **MANPOWER, EQUIPMENT & MATERIALS**
 - 1. Provide all required shop drawings, submittals, product data, field measuring, warranties, attic stock and delivery of the above Specification Sections and Contract Documents.
 - 2. Provide all lifts, scaffolding, ladders, etc. required for installation.
- B. **SAFETY & HOUSEKEEPING**
 - 1. Perform final cleaning of all Work as it relates to this Bid Category, including but not limited to internal cleaning, tanks, fixtures and pumps cleaning; removal of temporary labels and stickers from fixtures and equipment, and the thoroughly cleaning of heating and air conditioning equipment, traps, pumps, tanks and filters/filter media.
 - 2. This contractor is responsible for protecting any finished flooring or pour concrete floors when completing overhead work.
- C. **DELIVERY, STORAGE & HANDLING**
 - 1. Ensure that all materials shall be delivered palletized with protective packaging, to prevent any warping or damage. Supplier is responsible for proper storage and material handling prior to delivery to the job site.
- D. **PLANNING, COORDINATION & QUALITY CONTROL**
 - 1. Coordinate with Terra Construction, Electrical Contractor, **temperature controls contractor**, and the Fire Suppression Contractor to provide detailed coordination drawings. This will require separate coordination meetings with all parties. Terra Construction will lead the coordination.
 - 2. Include the layout, cutting of holes, cutting & patching, placing and securing of sleeves through slabs, walls and roofs as required for proper completion of the Work. This Contractor shall detail, submit for approval, layout, and coordinate openings not shown on the Contract Documents but required by design, so that they may be reviewed and approved prior to their incorporation into the Work. Costs of openings not shown in the Contract Documents shall be borne by this Contractor. Additional openings must be detailed in a timely manner so as not to delay the Work of others.
 - 3. At the time of framing activities, this contractor is to layout any and all through wall penetration at the bottom track of framed walls prior to metal studs being installed.

4. Provide all roof deck penetrations required for scope of work. Coordinate with Terra Construction & Roofing Contractor on penetration locations. The timing of all roof penetrations shall occur at the same time to avoid multiple trips by the Roofing Subcontractor. Coordinate with Terra Construction.
5. Provide coordination and layout for ceiling-mounted diffusers in all ceilings.
6. Provide coordination of the duct and piping installations, so that no duct or piping is run over the top of electrical panels, through stairwells, or other as required by local codes.
7. Provide any/all necessary support steel not clearly noted as provided by others to support any/all equipment provided under this Bid Category.
8. Provide coordination of the AHUs and other equipment with the Trade Contractor(s) responsible for enclosing the area containing the equipment. Requests to delay the construction of walls for access purposes shall be communicated to Terra Construction and directly coordinated with all applicable Trade Contractors. This Contractor shall expedite such equipment to avoid delays and re-mobilization to the Work of others. Order any and all AHU's (standard or custom) broken down into small enough sections to ensure they are able to be delivered and installed into their permanent location without demolishing walls, ceilings, etc. beyond the extent that is shown on the demolition drawings.
9. **3D Modeling Coordination: Required to deliver 3D models, acceptable to Terra Construction, for coordination of clash detection and project closeout.**
 1. Refer to section 013100 Subcontractor BIM Execution Plan
 2. Modeling Level of Detail (LOD), including, but not limited to:
 - a. Plumbing:
 - i. Plumbing and gas piping, including specialty gas, access zones, and equipment.
 - ii. Pipes shall be modeled to the outside diameter of either the pipe or pipe insulation, whichever is greater.
 - iii. Pipe slope will be incorporated in the model
 - iv. Plumbing equipment (height, width, and depth)
 - v. Valves and clean outs will be modeled along with all access to valves/cleanouts
 - b. HVAC:
 - i. Ducts and air handling equipment, to the outside face dimensions of the flanges. Hangers will be modeled.
 - ii. HVAC Equipment (overall height, width and depth), indicate equipment access zones as solids.
 - iii. Piping associated with mechanical equipment, using the outside diameter of the pipe insulation thickness.
 - iv. The intent of this model is to show HVAC ductwork and piping as accurately as possible to the actual condition at completion of construction.

E. CONSTRUCTION

1. Furnish and install flashing, counter flashing and/or sealant at all penetrations through the roof, exterior wall system, or waterproofed areas.
2. Furnish and install all miscellaneous devices, wall backing, pipe supports, etc. not specifically shown or specified in order to provide a complete, code-compliant, operable system.
3. Furnish and install all roof curbs and jacks/boots for equipment as required.
4. Furnish and install all required identification systems for its piping, valves, equipment, etc.
5. Leave protective plastic on devices until after cleanup is completed. At that time, this Contractor shall remove and dispose of protective covers to facilitate final testing and Commissioning.
6. Provide all plumbing systems as indicated by the above-listed Specification Sections, as required by the Contract Documents, and as described herein.
7. Provide any and all steel, hangers, supports, embeds and scaffolding to access and complete the Work described herein and within the Bid Documents.

8. Locate all wall penetrations necessary for this work. Scope includes all coordination for layout of openings, blocking for railing, and steel lintels in accordance with Contract Documents. If openings are not explicitly shown on the Contract Documents and are required for installation of work provided by this Bid Category, this Bid Category shall provide cutting and patching of these openings.
9. Provide mechanical sleeves for all plumbing Work shown extending through cast-in-place, masonry or existing walls. All embedded sleeves in the concrete shall have support tabs which will not be visible after form removal. Furnish and install rubber gaskets and collars are required to produce a watertight seal (reference any details that may apply).
10. Provide embed and sleeve coordination shop drawings for all items required to be embedded in cast-in-place concrete, precast concrete or masonry to the applicable Trade Contractor. Shop drawings shall be in an electronic format acceptable to such Trade Contractors.
11. Furnish and install of all backing or blocking as required for this Work.
12. Furnish and install all OSHA-compliant excavations required for the Work of this agreement, including but not limited to shoring, pipe bedding including material, and backfill and other as required for complete and operable systems.
13. Furnish and install the Work of this Bid Category to a minimum of five (5) feet outside of the building foundation lines (unless shown otherwise in the Contract Documents) and connect to the Work of others.
14. Provide the layout of all concrete housekeeping pads and concrete bases for mechanical equipment. Concrete will be by a different Bid Category. Upon award of the contract, provide a detailed plan to Terra Construction of all required locations and sizes of required concrete bases/pads.
15. Furnish and install permanent or temporary roof drain piping as required to provide a functioning roof draining system within 10 workdays after placement of roofing materials in a given area. Provide roof drains with bird screen as temporary protection from construction debris. Remove and dispose of all temporary systems upon installation of permanent systems.
16. Provide coordination of mechanical identification required with the Contractor providing for the painting of exposed mechanical work per the Contract Documents.
17. Provide the coordination of the plumbing installations, so that no piping is run over the top of electrical panels, through stairwells, or other as required by local codes.
18. Make connections to the permanent source of water in the building as soon as possible, to allow its use for construction water by all Contractors. Water systems cannot be used as potable water until all testing and disinfection efforts have been completed.
19. Note that exposed concrete surfaces shall remain free from markings. Layout and other markings for installation of work on exposed concrete surfaces will not be permitted. If markings appear, this Contractor shall be responsible for removal of such markings as directed by the Construction Manager. Exposed concrete surfaces include, but are not limited to, columns, ceilings, core/shaft walls, and sealed concrete floors. Any stains that result from this Contractor's Work will need to be removed and surfaces restored to original condition.
20. Protect open ends of all piping and ductwork with temp caps throughout construction.
21. Provide above-ceiling supports system, as necessary, to support its Work, in accordance with the Contract Documents.
22. Provide all roof drains, deck clamps, deck clamping rings and extensions, strainers, as required to complete the work per the Contract Documents. Coordinate installation of roof drain components with decking and roofing Contractors.
23. Provide all HVAC systems as indicated by the above-listed Specification Sections, as required by the Contract Documents, and as described herein.
24. Furnish and install all roof curbs and other systems required for the support of its equipment shall be provided by this Contractor. This Contractor shall provide temporary plywood panels or covers required for its roof or floor openings or penetrations. Covers shall be labeled "Caution-Do Not Remove".
25. Carefully remove and dispose of decking for installation of their Work, immediately installing the permanent curbs or equipment at the opening. Openings not protected with permanent curbs and equipment must be covered, as noted above.
26. Note that use of equipment for temporary means shall require temporary filters to be furnished, installed and maintained, regular adjustment and maintenance of equipment, and, if warranted, replacement of consumable items such as belts. Prior to final turnover to the Owner, any system that has been used must be properly cleaned and/or refurbished as required to maintain equipment manufacturer's warranties and to meet specified project requirements. All such actions shall be included in the Bid.

27. Furnish and install sealant or other at all joints between sheet metal and masonry, sheet metal casings, housings, filter frames, and at all other locations where required to eliminate air leakage or noise infiltration and to provide a complete and acceptable operating system.
28. Review and coordinate all HVAC ductwork with the roof joist installation to assure sufficient space is available for the duct sizes specified. Any adjustment in routing, duct size or configuration required due to coordination with the joists shall be performed at no additional cost.
29. Be responsible for the start-up and testing of all systems provided in this scope of Work and lead the verification that all systems are complete, operational (within its systems as well as in conjunction with systems provided by other Contractors), and in accordance with the Contract Documents. This work to be coordinated with the construction activities and will be performed during "off" hours or on weekends if required, at no additional cost.
30. Furnish and install motor starters for all packaged equipment provided by this Contractor, as well as other miscellaneous devices required the Work of this Bid Category, in order to provide a complete working system as specified or required by the manufacturer. Where equipment provided deviates from the Specifications, requiring additional devices or wiring not previously shown or required, it shall be furnished and installed by this Contractor at no additional cost.
31. Provide fire/smoke and/or smoke dampers with integrally-mounted duct smoke detectors, as specified in the Contract Documents. This Contractor shall assure its selection of dampers and detectors are compatible with the fire alarm system provided by the Electrical Contractor, in order to achieve a U.L. rating for the fire alarm system as a whole.

3.01 PROJECT SPECIFIC INCLUSIONS

1. Provide and install all required fire caulking for mechanical penetrations at rated assemblies. Review fire stopping details with Bid Category 9A Contractor to ensure gap is accurately cut around penetrations.
2. Provide and install all required acoustical/smoke caulking for penetrations at rated assemblies or called out by specific wall types.
3. This contractor is responsible for completing the commissioning for the HVAC system per Spec Section 019113.
4. This contractor is responsible for a ~~design-build~~ radon mitigation as directed in the construction documents. This contractor is responsible for all components of the radon mitigation system (fans, piping, associated excavating, ~~rock~~, etc) **as directed by Spec Section 312113, other than the gas-permeable aggregate, which will be furnished and installed by BC#31C.**
5. This contractor is responsible for furnishing and installing the snow melt systems at the exterior entrances per the construction documents
6. This contractor is responsible for furnishing and installing a tee for irrigation contractor to stem off from. Irrigation contractor is to provide the associated RPZ.

4.01 ALLOWANCES

- A. Refer to Specification for scope specific allowances.

5.01 ALTERNATES

- A. Refer to Specification Sections 01 2300 Alternates and 00 4113 Bid Form for a list of alternates.

END OF SECTION

BID CATEGORY 25A – TEMPERATURE CONTROLS

1.01 GENERAL INCLUSIONS

- A. The following information is provided to define and describe the scope of work that will be required of the successful Bidder.
- B. The information is to be complimentary with the collective requirements of all the other Contract Documents. All the Contract Documents, including all disciplines of the specifications and drawings, are included as part of this scope of work.
- C. This Document will become a part of the successful Bidder's Final Contract and outlines the scope of work for this bid category.
- D. Reference specification section 01 12 01, "General Requirements for all Bid Categories" for general requirements that applies to all bid categories.
- E. Reference "Summary" section of 01 12 02, "Bid Category Descriptions" for general information that applies to all bid categories.
- F. Specification Sections that are the responsibility of this Bid Category:

	Specification Section	Complete Scope	As Applies	Labor Only	Material Only
DIVISION 00	Procurement and Contracting Requirements	X			
DIVISION 01	General Requirements	X			
07 8400	Firestopping		X		
23 0923	Controls for HVAC	X			
23 0993	Sequence of Operations for HVAC Controls	X			

2.01 SCOPE SPECIFIC INCLUSIONS

- A. **MANPOWER, EQUIPMENT & MATERIALS**
 - 1. Provide all required shop drawings, submittals, product data, field measuring, warranties, attic stock and delivery of the above Specification Sections and Contract Documents.
 - 2. Provide all lifts, scaffolding, ladders, etc. required for installation.
- B. **SAFETY & HOUSEKEEPING**
 - 1. Perform final cleaning of all Work as it relates to this Bid Category.
 - 2. This contractor is responsible for protecting any finished flooring or pour concrete floors when completing overhead work.
- C. **DELIVERY, STORAGE & HANDLING**
 - 1. Ensure that all materials shall be delivered palletized with protective packaging, to prevent any warping or damage. Supplier is responsible for proper storage and material handling prior to delivery to the job site.
- D. **PLANNING, COORDINATION & QUALITY CONTROL**
 - 1. Coordinate with Terra Construction, Electrical Contractor, **mechanical/plumbing contractor**, and the Fire Suppression Contractor to provide detailed coordination drawings. This will require separate coordination meetings with all parties. Terra Construction will lead the coordination.
 - 2. Include the layout, cutting of holes, cutting & patching, placing and securing of sleeves through slabs, walls and roofs as required for proper completion of the Work. This Contractor shall detail, submit for approval, layout, and coordinate openings not shown on the Contract Documents but required by design, so that they may be reviewed and approved prior to their incorporation into the Work. Costs of openings not shown in the Contract Documents shall be borne by this Contractor. Additional openings must be detailed in a timely manner so as not to delay the Work of others.
 - 3. At the time of framing activities, this contractor is to layout any and all through wall penetration at the bottom track of framed walls prior to metal studs being installed.
 - 4. All temperature controls design and installation shall follow the above referenced specification sections.
 - 5. This contractor shall provide a code compliant design and installation of the temperature control system

6. Provide and install all required fire caulking for penetrations at rated assemblies. Review fire stopping detail with Bid Category 9A Gypsum Board contractor to ensure penetrations are accurately cut around.
7. Provide and install all required acoustical and/or smoke caulking penetrations at rated assemblies or called out by the specific wall types.

E. CONSTRUCTION

1. Furnish and install all miscellaneous devices, wall backing, pipe supports, etc. not specifically shown or specified in order to provide a complete, code-compliant, operable system.
2. Locate all wall penetrations necessary for this work. Scope includes all coordination for layout of openings, blocking for railing, and steel lintels in accordance with Contract Documents. If openings are not explicitly shown on the Contract Documents and are required for installation of work provided by this Bid Category, this Bid Category shall provide cutting and patching of these openings.
3. Provide embed and sleeve coordination shop drawings for all items required to be embedded in cast-in-place concrete, precast concrete or masonry to the applicable Trade Contractor. Shop drawings shall be in an electronic format acceptable to such Trade Contractors.
4. Furnish and install of all backing or blocking as required for this Work.
5. Furnish and install all OSHA-compliant excavations required for the Work of this agreement, including but not limited to shoring, pipe bedding including material, and backfill and other as required for complete and operable systems.
6. Provide coordination of mechanical identification required with the Contractor providing for the painting of exposed mechanical work per the Contract Documents.
7. Provide above-ceiling supports system, as necessary, to support its Work, in accordance with the Contract Documents.

3.01 PROJECT SPECIFIC INCLUSIONS

1. Provide and install all required fire caulking for mechanical penetrations at rated assemblies. Review fire stopping details with Bid Category 9A Contractor to ensure gap is accurately cut around penetrations.
2. Provide and install all required acoustical/smoke caulking for penetrations at rated assemblies or called out by specific wall types.

4.01 ALLOWANCES

- A. Refer to Specification for scope specific allowances.

5.01 ALTERNATES

- A. Refer to Specification Sections 01 2300 Alternates and 00 4113 Bid Form for a list of alternates.

END OF SECTION

BID CATEGORY 26A – ELECTRICAL

1.01 GENERAL INCLUSIONS

- A. The following information is provided to define and describe the scope of work that will be required of the successful Bidder.
- B. The information is to be complimentary with the collective requirements of all the other Contract Documents. All the Contract Documents, including all disciplines of the specifications and drawings, are included as part of this scope of work.
- C. This Document will become a part of the successful Bidder's Final Contract and outlines the scope of work for this bid category.
- D. Reference specification section 01 12 01, "General Requirements for all Bid Categories" for general requirements that applies to all bid categories.
- E. Reference "Summary" section of 01 12 02, "Bid Category Descriptions" for general information that applies to all bid categories.
- F. Specification Sections that are the responsibility of this Bid Category:

Specification Section		Complete Scope	As Applies	Labor Only	Material Only
DIVISION 00	Procurement and Contracting Requirements	X			
DIVISION 01	General Requirements	X			
07 8400	Firestopping		X		
Division 26	Electrical	X			
Division 27	Communications	X			
Division 28	Electronic Safety and Security	X			

2.01 SCOPE SPECIFIC INCLUSIONS

- A. **MANPOWER, EQUIPMENT & MATERIALS**
 - 1. Provide all required shop drawings, submittals, product data, field measuring, warranties, attic stock and delivery of the above Specification Sections and Contract Documents.
 - 2. Furnish all equipment and accessories in full accordance with the Contract Documents.
 - 3. Expedite submittal of shop drawings and coordination of materials with other Contractors.
 - 4. Furnish all miscellaneous hardware required for the Work.
 - 5. Provide all required extra materials, in accordance with the Specifications shall be turned over to the Owner at Substantial Completion.
- B. **SAFETY & HOUSEKEEPING**
 - 1. Furnish final cleaning of all work as it relates to the work of this agreement including internal equipment cleaning, and removal of temporary labels, stickers, and touch-up paint as required.
- C. **DELIVERY, STORAGE & HANDLING**
 - 1. Ensure that all materials shall be delivered palletized with protective packaging, to prevent any warping or damage. Supplier is responsible for proper storage and material handling prior to delivery to the job site.
- D. **PLANNING, COORDINATION & QUALITY CONTROL**
 - 1. Obtain all necessary permits, with the cost for those permits included in the Bid.
 - 2. Coordinate with Terra Construction, Mechanical Contractor and the Fire Suppression Contractor to provide detailed coordination drawings. This will require separate coordination meetings with all parties and a coordination drawing submittal to the Construction Manager.
 - 3. Provide a temporary power system throughout the buildings footprint. Design and build a temporary power system, as described below, as a minimum. The temporary system provides power for construction use and access and egress lighting only. Individual task lighting is the responsibility of each Subcontractor. Temporary Power will need to be coordinated with Terra Construction. Specific to this scope of work are the following:
 - a) Pay utility fees and costs for temporary and permanent service connections. Owner will pay for the cost of the electricity only.

- b) Extend temporary power to the Construction Manager's trailer and each of the building floors.
 - c) Furnish and install all turtle cords and riser cords.
 - d) Power is to be distributed on floors via power turtles (spider boxes) at a maximum of 75 feet apart. The intent is to place the turtles in such a manner that all floor space can be reached using an extension cord. GCFI protection is required.
 - e) Temporary construction lighting complies with OSHA guidelines for access and egress lighting. All stairwells are to be provided with their own lighting circuit.
 - f) A means to shut off lighting on a per floor basis during non-working hours shall be provided.
 - g) Provide a dedicated crew and material for the installation, maintenance, and service of the temporary power and lighting system.
 - h) Temporary power connections to the Construction Managers trailer will be included in this Contract.
 - i) Provide wire for temporary panels (2 panels) from transformer (provided and installed by Utility Company) to temporary electrical panels.
4. Note that use of the permanent building systems prior to their final turnover and acceptance by the Owner does not relieve this Contractor of any warranties on equipment or systems, nor does such use initiate the warranty period.
 5. Provide coordination with the Fire Suppression Contractor for the wiring and tie in of the fire suppression system with the fire alarm system.
 6. Provide coordination the installation of electrical gear and other large equipment with the Trade Contractor(s) responsible for enclosing the area containing equipment. Requests to delay the construction of walls for access purposes shall be communicated to the Construction Manager and directly coordinated with all applicable Trade Contractors. This Contractor shall expedite such equipment to avoid delays and re-mobilizations to the Work of others.
 7. Provide the layout of all concrete housekeeping pads and concrete bases for electrical equipment. Concrete will be by a different Bid Category (Concrete Contractor). Upon award of the contract, provide a detailed plan to the Construction Manager of all required locations and sizes of required concrete bases/pads.
 8. This contractor is to coordinate with local power company for permanent power.
 9. **3D Modeling Coordination: Required to deliver 3D models, acceptable to Terra Construction, for coordination of clash detection and project closeout.**
 1. Refer to Section 01 3100 – Subcontractor BIM Execution Plan
 2. Modeling Level of Detail (LOD) including, but not limited to:
 - a. Conduits 1" or greater (or smaller conduits if in ganged runs).
 - b. Cable tray, access zones, and equipment.
 - c. Light fixture locations and space requirements.
 - d. Power feeds to equipment and all switch gear.
 10. This contractor will be responsible for ensuring that electrical rough-ins at the exterior precast wall panels is completed at Molin Concrete Products (BC#03D Precast Concrete) in Ramsey, MN per Detail 3/E100. Upon distribution and execution of contracts, a preliminary coordination meeting between this contractor and Molin Concrete Products will be scheduled to discuss process, fabrication schedule, etc. Molin Concrete Products address and Plant Supervisor information is as follows. Additional information on this process can be found after this bid category description.

Molin Concrete Products
Tom Sumner – Plant Supervisor
Ph: 320-362-4182
Em: tom.sumner@molin.com
6820 143rd Ave NW
Ramsey, MN 55303

E. CONSTRUCTION

1. Provide any and all steel, hangers, supports, embeds and scaffolding to access and complete the Work described herein and within the Bid Documents.
2. Provide all testing and adjusting of the systems in accordance with the Contract Documents and local codes.
3. Provide conduit sleeves or blockouts for all Work shown extending through cast-in-place or masonry walls. All embedded sleeves in the concrete shall have support tabs which will not be visible after form removal.

4. Provide embed and sleeve coordination shop drawings for all items required to be embedded in cast-in-place concrete or masonry to the applicable Contractor. Shop drawings shall be in electronic format acceptable to such Contractors.
5. Furnish and installation of all backing or blocking as required for its Work shall be the responsibility of this Contractor.
6. Provide all coordination required, with the Work of structural, architectural, mechanical and other Contractors.
7. Furnish and install all power and distribution as specified in the Contract Documents.
8. Furnish and install all equipment, conduit, cable tray, and any cabling as specified in Division 27 & 28. This shall include all electrical rough-in and connections for door hardware including but not limited to hold opens and card readers. Install electric strikes furnished by Division 08.
9. Provide coordination for rough-in requirements with the appropriate Trade Contractors
9. Furnish and install electrical rough-in and connection of door hardware including but not limited to hold opens, card readers and electric strikes. Provide coordination for rough-in requirements with the appropriate Trade Contractors.
10. Provide final connections for equipment provided by others that requires electrical connections.
11. Furnish and install lighting fixtures and controls as specified in the Contract Documents. This Contractor shall fully coordinate its rough-in and circuitry to provide sufficient service to these fixtures for a fully operational system.
12. Furnish and install any and all site lighting/power, including any survey or layout necessary to meet the requirements of the Documents (based on site benchmarks and primary grid points established by others), trenching, excavation, backfilling, forming and placement of concrete, furnish and installation of reinforcing steel, furnish and installation of embedded anchors and concrete finishing.
13. Furnish and install all excavation required for its Work, including but not limited to shoring (as required to protect existing utilities, structures and sitework), ductbank (if any) and fill concrete, and backfill and other as required for complete and operable systems. This Contractor to be responsible for dewatering of its excavation and shall perform whatever work required to achieve compaction required per the Contract Documents. Remove excess spoils.
14. Be responsible for performing start-up and testing of all electrical, low voltage and other systems provided in this scope of work and lead the coordination at start-up and verification of operation of complete systems, as well as verification on demonstration of operation with other building systems. This Work to be coordinated with construction activities and will be performed during "off" hours or on weekends if required by governing authorities or by the Project Schedule, at no increase to the Contract Amount.
15. Perform all required testing in the presence of Terra Construction, Architect, 3rd Party Commissioning Agent, and other authorities having jurisdiction. It is understood that some testing will require coordination with other trades and will be performed in concert with same.
16. Furnish and install all Fire Alarm interfaces with the fire-rated doors, as applicable.
17. Furnish and install the specified identification systems as required by the Contract Documents and local codes, for its Work.
18. Furnish and install all backing or other blocking in or on walls required to ensure a proper installation of the Work per the plans and Specifications and local code requirements. Plywood wall panels in electrical and telecommunication rooms, either painted or unpainted, shall be furnished and installed by this Contractor.
19. Furnish and install duct smoke detectors as described in all Contract Documents and local code.
20. Ensure that its selection of a fire alarm system is compatible with dampers, duct detectors, flow & tamper switches, etc. provided by the mechanical subcontractor, in order to achieve a U.L. rating for the fire alarm system as a whole.
21. Furnish and install all wiring of flow and temper switches (switches provided by Fire Suppression Contractor) for the fire suppression system.
22. Provide and install all required fire caulking / stopping for electrical penetrations at rated assemblies.
23. Review fire stopping detail with Bid Category 9A Drywall Contractor to ensure penetrations are accurately cut around.
24. Provide and install all required acoustical/smoke caulking penetrations at rated assemblies or called out by the specific wall types.
25. Provide electrical infrastructure and rough-in for future solar.

3.01 PROJECT SPECIFIC INCLUSIONS

1. This contractor shall coordinate the disconnection of the existing fiber optic lines with Terra Construction and the fiber optic provider.

4.01 ALLOWANCES

- A. Refer to Specification for scope specific allowances.

5.01 ALTERNATES

- A. Refer to Specification Sections 01 2300 Alternates and 00 4113 Bid Form for a list of alternates.

END OF SECTION

Molin Concrete Products - Ramsey Plant Electricians Guide

I. Ramsey Plant Contacts:

Kevin Franz
Plant Manager
Cell Phone: (651) 332-3020
Email: kevin.franz@molin.com

Tom Sumner
Plant Supervisor
Cell Phone: (320) 362-4182
Email: tom.sumner@molin.com

II. Location:

6820 143rd Avenue NW, Ramsey MN 55303

III. Plant Standard Hours:

5AM – Finished (Typically between 1-2 PM)

IV. Parking:

While working on the job with us you can park in front of the large overhead door on the north side of the building. This way you have access to your equipment and tools. See picture to right. Park at green arrow.

V. Weckenmann Circulation Plant:

We typically like to have a plant tour/walk-through to discuss how this process works in our style of plant. Molin's Ramsey plant is one of a few circulation plants operating in the country, having process advantages and limitations. It is best for the electrician to see the operation in person, but there is a general video of the process on YouTube. [Ramsey Plant YouTube](#) The plant adheres to a strict 30-minute takt time, which means the installation of electrical needs to be completed within that 30-minute time window. For this reason, electrical contractors will need to supply the necessary labor to meet this timing. From the video you'll notice that all the production processes are linked, slowing down any individual station impacts the timing and therefore the output and ultimately profitability.

VI. Subcontractors:

If you are looking to subcontract work to a local company who has performed the work in this plant before contact.



TIM WHITE

Project Manager

Gephart Electric

Mobile 612-770-6660

TIM.WHITE@GEPHARTELECTRIC.COM

3550 Labore Road, St. Paul, MN 55110

VII. Safety Requirements:

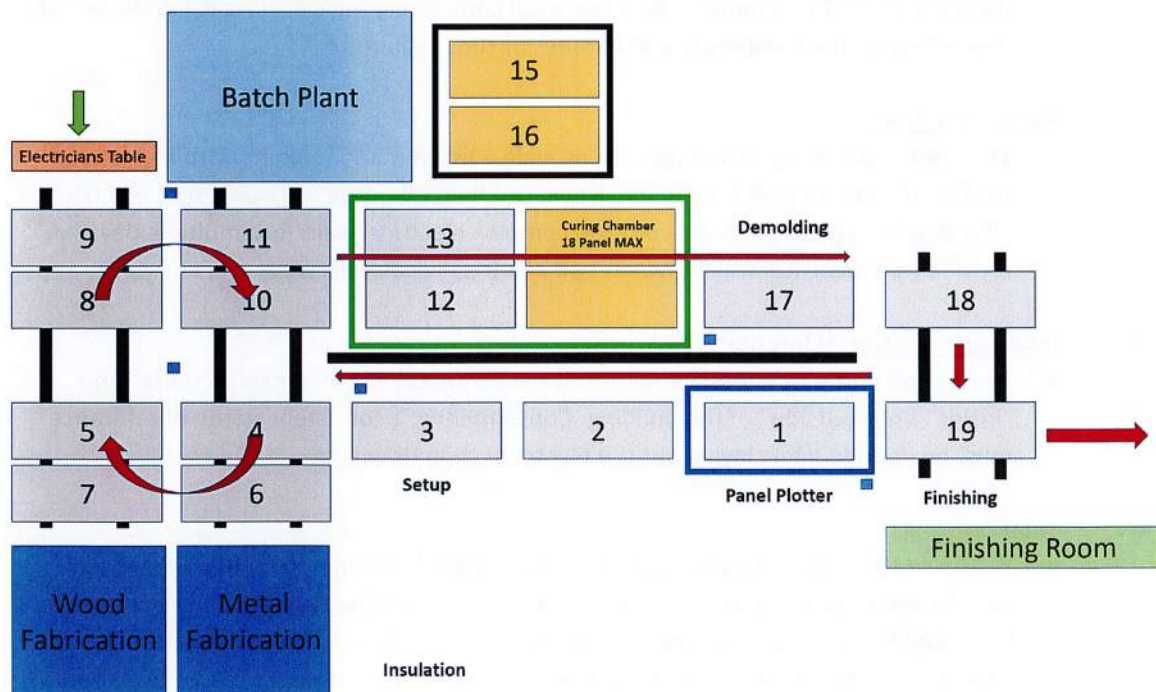
- a. We are serious about safety. Molin requires the following PPE: hard hat, safety glasses, and steel toe shoes/boots. These are to be worn while inside the building and are not optional. Plant management will discuss this once and upon further violation you will be asked to leave for non-compliance.
- b. We have a 15-mph speed limit on the premises due to the high volume of traffic.

VIII. Molin Provided Parts & Equipment:

- Foam
- Ties and Tie Guns
- Scrap Wood
- Bar Bolster and Chairs
- Rebar

IX. Workspace / Equipment Required:

- a. A work area with a 4' x 8' table and ample storage area for parts is available. See green arrow in layout below. *** It is highly recommended that your electrical assemblies are built prior to them being required the following day. Past electricians have brought carts of prefabricated assemblies into the plant. It will be exceedingly difficult to keep up with the pace of production if assemblies are fabricated while installing.
- b. A propane weed burner is allowed in the facility for you to build pvc assemblies.
- c. Our plant is locked nightly and outfitted with security cameras (Inside and Outside) if you wish to leave material and equipment located inside.
- d. Production will provide a "station" to do your down in form work either station #7 or station #7 or station #9.



X. Nomenclature:

- a. *Pallet* – Refers to the movable casting beds. These pallets are numbered 1-24 in our system and referenced on our control board by these numbers.
- b. *Shutter* – Refers to the side forms that are magnetically held into place on the pallet.
- c. *Screed* – Refers to the vibrating bar that consolidates the up in form concrete. See picture below.
- d. *Up in Form* – Refers to the side of the form that is exposed to air after concrete is placed.
- e. *Down in Form* – Refers to the side of the form that is against our pallets.
- f. *Lifter* – Refers to a steel part and double U-bars that we use to lift and set panels with.
- g. *Wythe* – Most insulated panels have an outside (Architectural) and inside (Structural) wythe that is separated by foam insulation. See picture below.



- h. *ICON Wythe Connector* – Refers to the plastic part that runs between the inside and outside wythes of the walls. These connectors hold the inside and outside wythes together to create an insulated wall panel.

XI. Workforce Requirements:

- a. While panels are circulating through the plant it is often necessary to place electrical runs for the outside of the building (Down in Form) and inside of building (Up in Form) at the same time. To accomplish this, electrical contractors have allocated 2-6 electricians depending on the complexity and number of runs required.

XII. Panel Complexity:

- a. The electrical contractor will need to provide a list of mark numbers with # electrical runs as an aid for panel scheduling. Molin can help minimize the number of electricians allocated to a job by spreading out the complex electrical walls into multiple days or provide non-electrical wall between two electrically complex walls.

XIII. Inside and Outside of Interior Walls:

- a. There is no frame of reference for interior walls containing electrical as there is no "inside" and "outside" of the building. Consequently, a consistent frame of reference must be defined while laying out the electrical shop drawings.

XIV. Shop Drawings:

- a. You will need to provide your own shop drawings. Measuring down from the top of panel is recommended as the 100ft elevation is the only consistent point of reference. Slab heights are not always dependable and vary in different areas of the job. See next page for example of previous subcontractor shop drawings.

Daily Pour Ticket

Panel # **W37**

Dimensions are to center of box. (unless otherwise noted)

SF boxes should be + or - 0" up/down due to cosmetic look of wall. FF boxes should be + or - 0" up/down unless matching up with a brick joint or wall design. All boxes may move left/right + or - 1" to 2" as needed due to strand placement and other misc items.

PRODUCTION TOLERANCES ONLY

VIEW FROM INSIDE OF MULTI-PURPOSE ROOM

All measurements come from the top of Panel / SF = Screen Face (Inside) / FF = Form Face (Outside)

Key:

	= 1 Gang Form Face Box (FF)		= 1 Gang Form Face Box w/ Stub SF
	= 2 Gang Form Face Box (FF)		= Stub out at Screed Face (SF)
	= 1 Gang Screed Face Box (SF)		= Stub out at Form Face (FF)
	= 2 Gang Screed Face Box (SF)		= 3/4" PVC
	= Back to Back Boxes (FF, SF)		

Please Note: Other special items will be called out as per item

Form Face is outside & Screed Face is inside

Job name:

St. Katharine Drexel

Job Number:

MN240xx

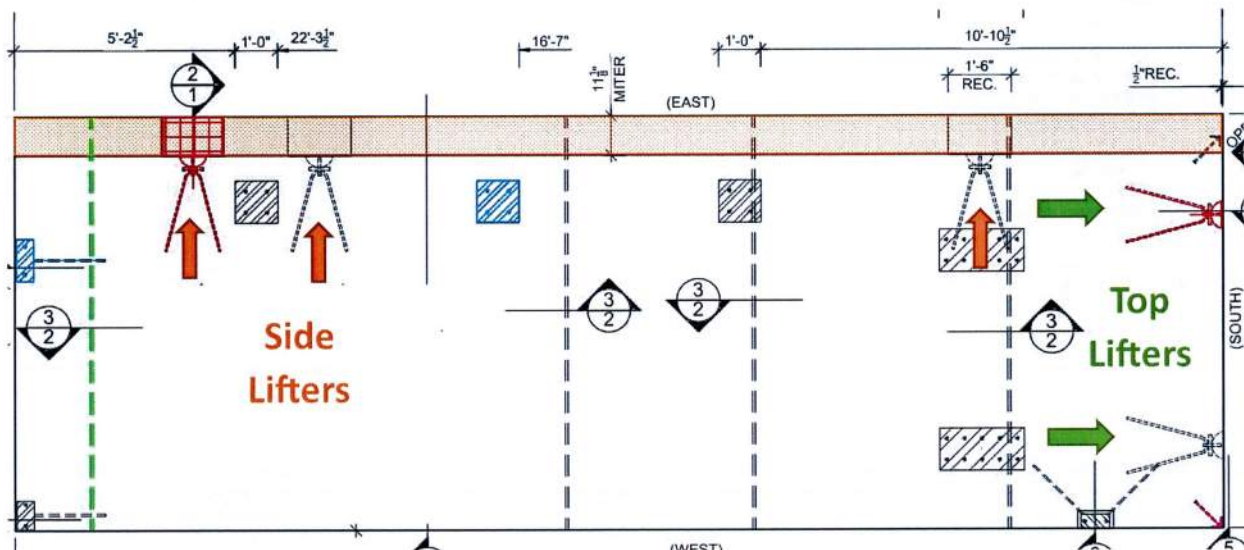
Molin Concrete Solutions
Lino Lakes, MN

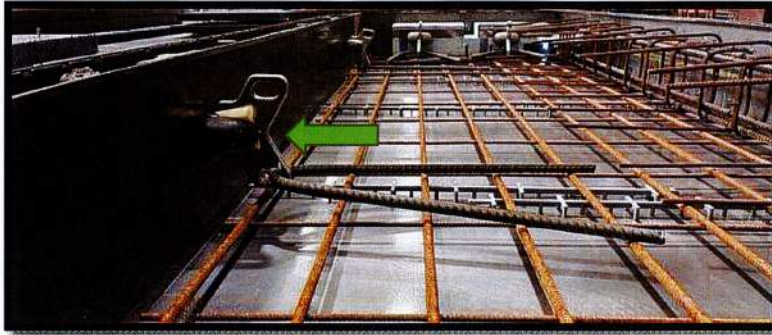
XV. Prints – Multiple Mark Numbers:

- a. While reviewing layout drawings in preparation for creating your shop drawings, if you notice two identical panels with electrical in them, please contact your assigned Molin project manager. Molin will need to change the mark numbers for the impacted walls to guarantee the right wall is installed in the right place on the job. The unique electrical makes that a unique wall.

XVI. Panel Orientation:

- a. Down in form (against the casting bed) is 99% of the time the outside of the building. Lights, card readers, and security runs are typical here.
- b. Up in form (open to the air) is likewise 99% of the time the inside of the building. Electrical outlets, exit signs, lights are typical here.
- c. There will be Molin provided build prints located on every pallet. You will need to orient yourself to every bed before beginning installing electrical. The top of the panel is not always on the same side of the bed. You will need to look for the lifters on our panel drawings to orient yourself. Be aware the plant uses both top and side lifters. Side lifters are used to get the panel out of our production facility as well as off the truck when erecting. Top lifters are in sets of two while side lifters have more than two. See the drawings below. Green Arrow shows the lifters.





XVII. Screed Height Requirement:

- a. When installing electrical runs into the wall panels, parts need to stay below the height of the shutters. Our process consolidates & levels concrete by running a vibrating screed across the top of the shutters. Anything sticking above the side forms will be knocked out of place. To help with this determination Molin will provide a 15ft aluminum bar that can be placed across the shutters as a guide. See picture of screed and aluminum bar below.



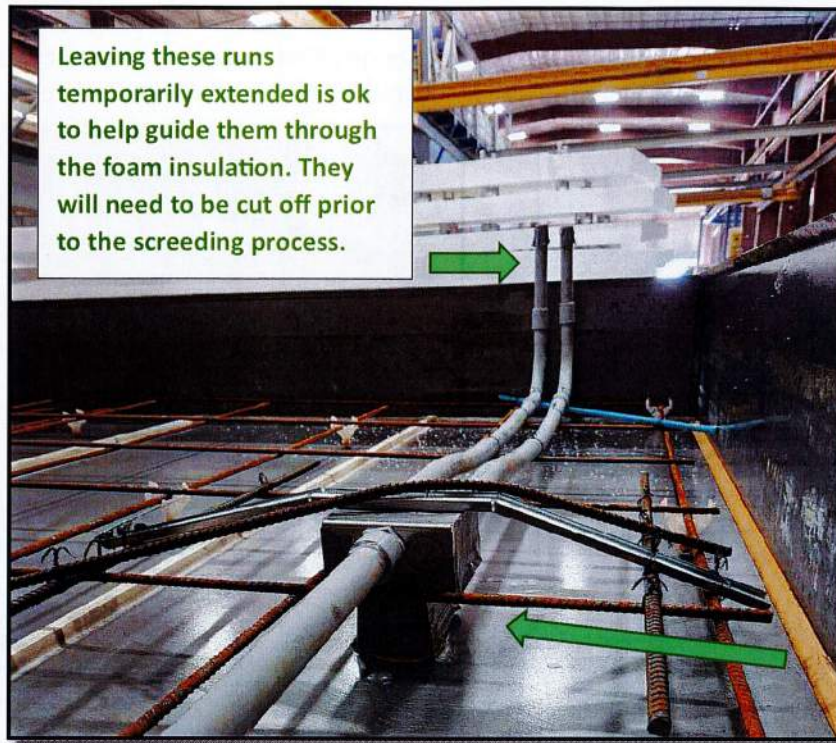
Vibrating
Screed



Aluminum
Bar

XVIII. Electrical Box Construction:

- a. It is counter intuitive to think this, but parts will float in concrete. Therefore, boxes and runs must be tied down to the steel mesh.
- b. It is recommended to use a 1½" – 2" mud ring for your electrical boxes. See example pictures below.



XIX. Molin Employees:

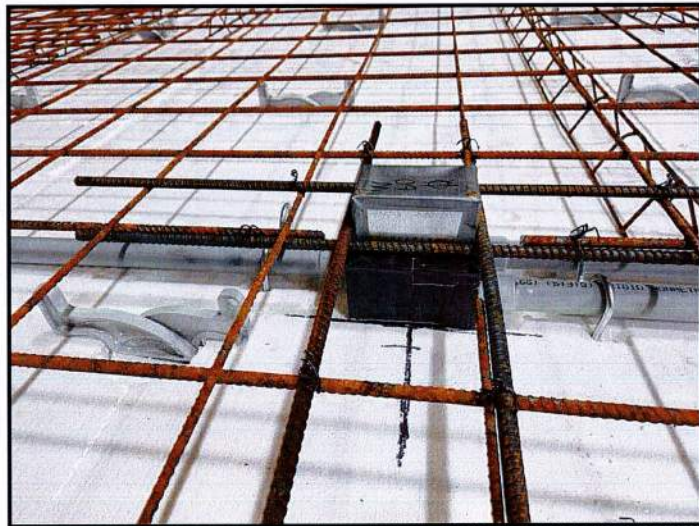
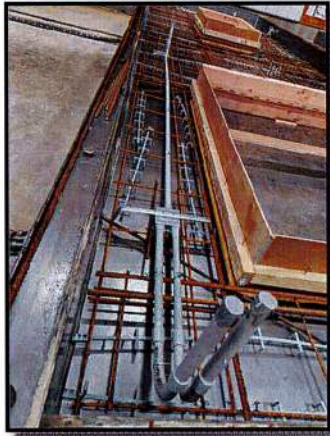
- a. Feel free to ask questions of the Molin employees. They have seen 20+ electrical contractors and can provide tips and tricks to make the job go smoothly.
- b. If you need help ask for it, and we may be able to provide some help. However, the subcontractor is responsible for the work being done. Molin employees are not trained electricians.

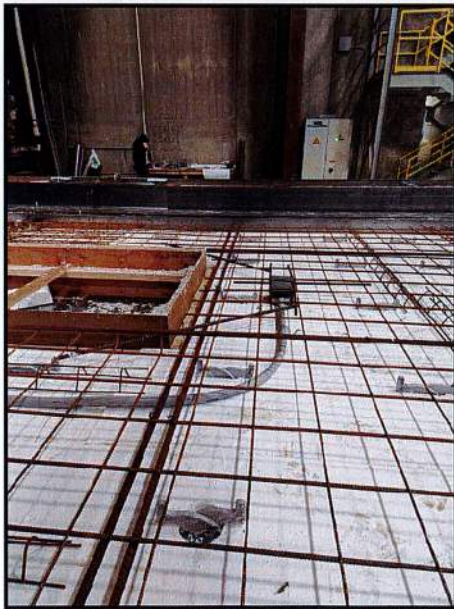
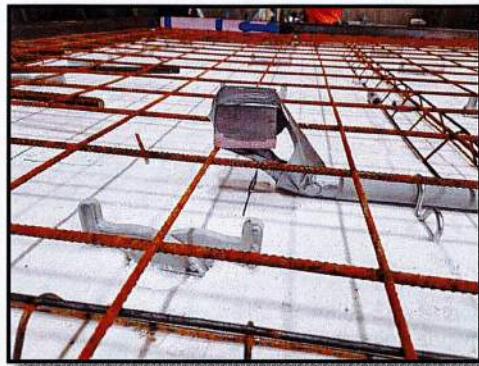
XX. Facilities Use:

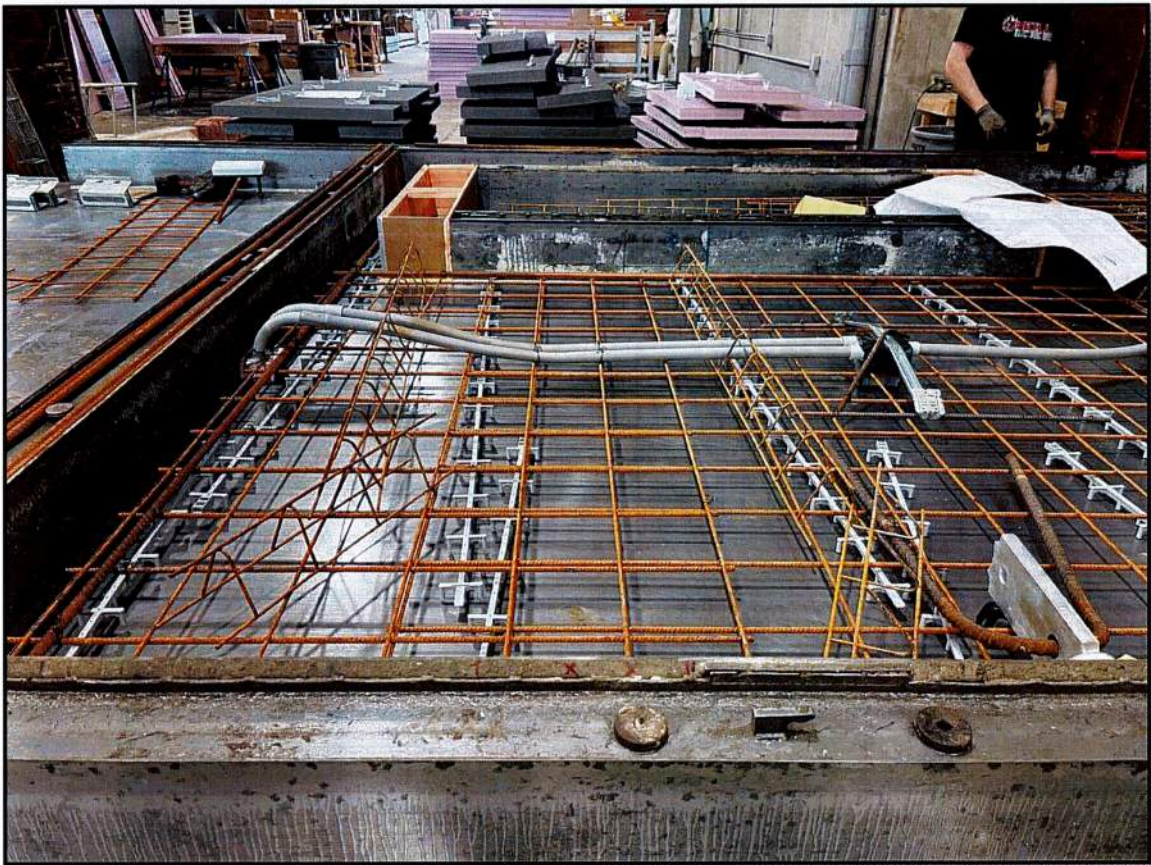
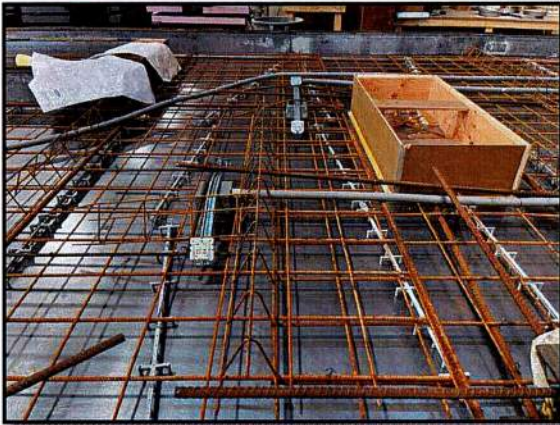
- a. Feel free to use the bathrooms and air-conditioned lunchroom with the Molin employees. There are microwaves as well as an ice-machine and coffee maker.
- b. There are a couple vending machines in the lunchroom where snacks and beverages may be purchased. These machines are owned and operated by a 3rd party.

XXI. Example Pictures:

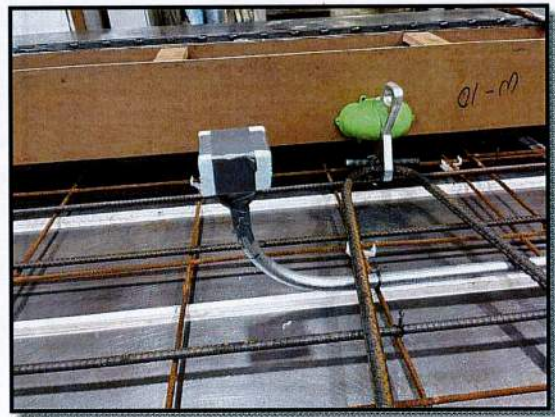
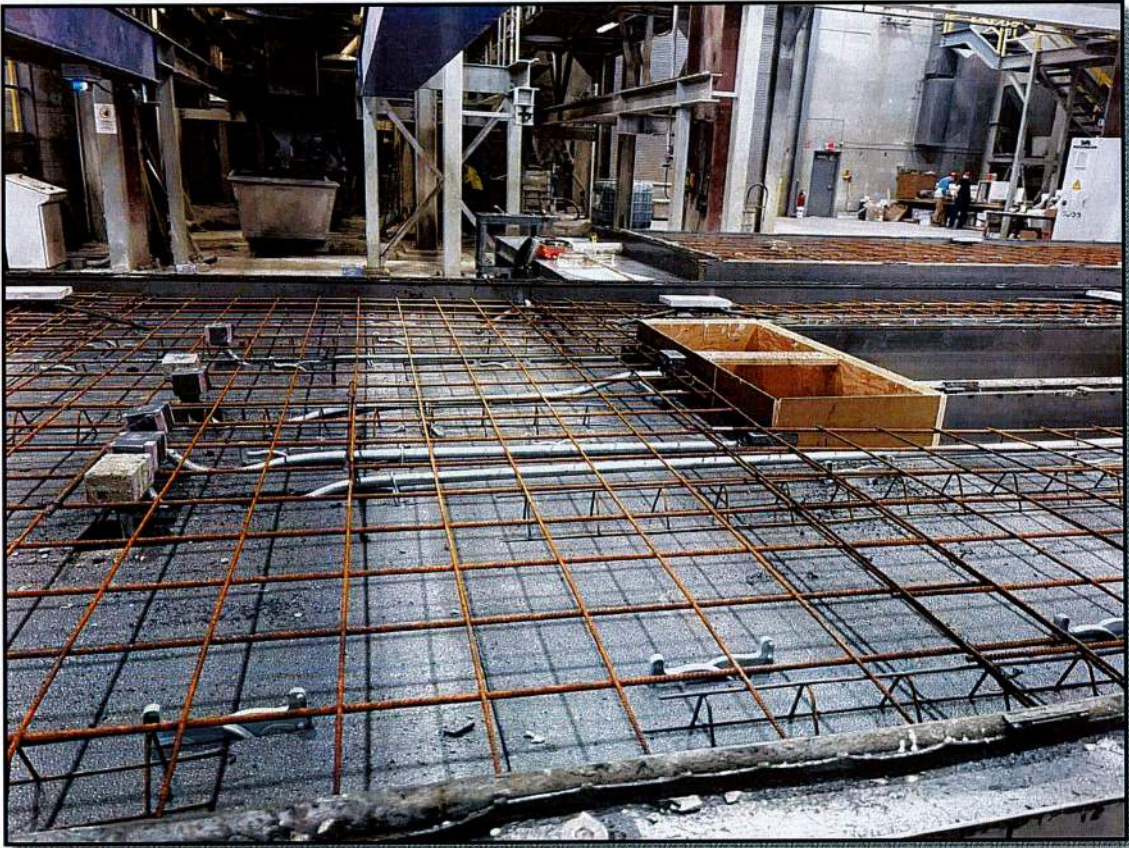
- a. As Molin is not the contracted electrician nor qualified to determine correct means and methods for installing electrical, the below pictures are for reference purposes only.











BID CATEGORY 31C – EARTHWORK & UTILITIES

1.01 GENERAL INCLUSIONS

- A. The following information is provided to define and describe the scope of work that will be required of the successful Bidder.
- B. The information is to be complimentary with the collective requirements of all the other Contract Documents. All the Contract Documents, including all disciplines of the specifications and drawings, are included as part of this scope of work.
- C. This Document will become a part of the successful Bidder's Final Contract and outlines the scope of work for this bid category.
- D. Reference specification section 011201, "General Requirements for all Bid Categories" for general requirements that applies to all bid categories.
- E. Reference "Summary" section of 011202, "Bid Category Descriptions" for general information that applies to all bid categories.
- F. Specification Sections that are the responsibility of this Bid Category:

	Specification Section	Complete Scope	As Applies	Labor Only	Material Only
DIVISION 00	Procurement and Contracting Requirements	X			
DIVISION 01	General Requirements	X			
31 1000	Site Clearing		X		
31 2113	Radon Mitigation		X		
31 2200	Grading	X			
31 2316	Excavation	X			
31 2316.13	Trenching	X			
31 2323	Fill	X			
33 0561	Concrete Manholes	X			
33 1416	Site Water Utility Distribution Piping	X			
33 3113	Site Sanitary Sewerage Gravity Piping	X			
33 4100	Subdrainage	X			
33 4211	Stormwater Gravity Piping	X			

2.01 SCOPE SPECIFIC INCLUSIONS

- A. **MANPOWER, EQUIPMENT & MATERIALS**
 - 1. Provide a trained, full time onsite "Competent Person" within the Trade Contractor's onsite personnel to ensure that all work is performed within OSHA guidelines.
- B. **SAFETY & HOUSEKEEPING**
 - 1. Provide all temporary utilities necessary, or otherwise required, to complete the work.
 - 2. All utility locates (private or public) associated with the work outlined within this bid category shall be the responsibility of this Trade Contractor.
 - 3. Provide protective shoring adjacent to existing or new structures, property lines, construction boundaries, etc. where this scope may compromise those items. Maintain shoring until those structures are no longer compromised. All costs related to the engineering of shoring required shall be paid for by this bid package contractor.
 - 4. Provide dust control due to this Trade Contractor's activities including but not limited to all OSHA and any City requirements. This Trade Contractor shall not assume temporary water will be readily available directly adjacent to the work area. Assume water will need to be transported from a hydrant source to the construction area. Any costs or fees associated with water consumption shall be paid for by this bid package contractor. Submit to Terra Construction a dust control plan immediately after contract notification award.
 - 5. Protect and support existing utilities left in place adjacent to its Work.
 - 6. Always provide OSHA compliant slopes during construction. Where OSHA compliant slopes cannot be achieved due to construction limits, provide shoring to complete excavation activities.
- C. **DELIVERY, STORAGE & HANDLING**

1. For existing items to be left in place, and if shoring is not necessary, remove & reinstall and/or protect & support those items as necessary to complete the work

D. PLANNING, COORDINATION & QUALITY CONTROL

1. Utilize proper Disruption Avoidance practices, including cooperation with Terra Construction, Owner, Owners Testing Agency, regulatory agencies, and other Contractors.
2. For any disturbances and/or utility disruptions, submit to Terra Construction a disturbance avoidance plan 2-weeks prior to work occurring.
3. Stockpiling of soil produced by excavation work is prohibited on-site, unless agreed to in writing by Terra Construction. The soil needs to be exported during excavation and imported for backfilling/grading.
4. After backfilling of foundation is complete, no spoil piles will be allowed on site.
5. **The BC#32B Site Concrete contractor will be responsible for furnishing and installing the 2" high density insulation shown on Detail 8/C502.**

E. CONSTRUCTION

a. EARTHWORK

1. This Contractor shall be responsible for the Stormwater Pollution Prevention Plan (SWPPP). Establish and maintain the erosion and sediment control, soil treatment and soil stabilization requirements. Provide labor, materials and equipment to install, maintain, monitor, and remove upon completion all elements and processes required to administer the storm water compliance requirements for this Project as outlined within the documents and required by the State. This shall specifically include, but not be limited to the Construction Entrances and exit areas, perimeter control around the construction site, erosion control procedures, sediment control procedures and dewater and drain basin procedures.
2. This Contractor shall provide and maintain all temporary erosion control devices and efforts necessary to prevent undermining of structures and improvements, soil runoff to adjacent streets or properties, and soil runoff into sanitary and storm systems. Provide such devices and efforts in accordance with the Contract Documents, local and state regulations and as required by the local Authorities Having Jurisdiction. Provide maintenance as required and detailed in weekly SWPPP inspection reports provided by the Construction Manager. Any issues noted within the weekly post event inspections shall be completed within 48 hours of notification.
3. This Contractor shall endeavor to minimize dirt and mud tracked into private or city streets and shall provide and maintain gravel aprons at the project site gates ("knock off areas"), throughout the duration of the entire project regardless of if this contractor is actively working on-site or not. Provide street cleaning / sweeping as required while performing on-site operations. Coordinate location of haul roads, excavation access ramps and paths with the Construction Manager.
4. Refer to the geotechnical report and include all required soil corrections. If the report allows for corrections to be made by moisture conditioning, mining, etc. Those corrections must not create an issue with the schedule. Waiting for favorable weather conditions to re-use onsite soils is not allowed.
5. Coordinate and perform all site work demolition and removals shown in the Contract Documents including but not limited to removal of trees, curb/gutter, concrete, bituminous, fencing, boulders, bollards, etc. NOTE: Existing buildings and immediate adjacent trees/sidewalks will be demolished by others. Salvage of existing pavers by others.
6. Coordinate and perform all site demolition and salvage work as defined in the Contract Documents. All items that are required to be salvaged shall be delivered to the Owner in the location that the Owner desires. Coordinate with Terra Construction.
7. Protect existing trees and shrubs scheduled to remain in place.
8. Provide all earthwork necessary to achieve the elevations, slope, contours as noted on the plans. This Contractor is responsible for developing the site to grades necessary to construct site improvements.
9. Provide all structural excavations and backfills required for all footings and foundations as noted in the Contract Documents. Provide compaction at all subgrades as required by the Contract Documents.
10. Furnish and place sand cushion for concrete.
11. Includes dewatering due to rain. Provide and install temporary grading, sump pit, sump pump, and discharge hose required to continuously remove any standing water within excavations. These dewatering efforts shall be maintained from the point of excavation through the placement of the concrete in that area, unless otherwise approved in writing by Terra Construction.

b. UTILITIES

1. Furnish and install all site utilities, including but not limited to the layout, excavation, pipe bedding, thrust blocks, testing, inspection coordination, backfill and compaction. Return excavated trenches to the elevations provided to them and compacted to specified densities.
2. Include all testing, disinfection, flushing and cleaning of piping systems as specified and required by local codes. This Contractor shall properly coordinate the testing and inspection to minimize periods where trenches remain open.
3. Site will be graded to subgrade prior to installation of utilities. Remove all excess material generated from the excavation from the site and upon completion return site to subgrade at the same subgrade elevation provided to the utility contractor prior to the start of their work.
4. Upon completion of the work, this Contractor shall submit as-built documentation of all utility work including manhole locations, inlet and outlet elevations, and coordinates of connections to existing utilities.
5. Provide and install all water, storm and sanitary sewer, drain tile and subdrainage as shown and specified in the contract documents.
6. Provide and install all storm sewer utilities including catch basins, sewer pipe, outlet control structures, riprap.
7. This contractor shall install sanitary and storm sewer to 5-feet from the building footprint. and install fire and domestic water service in the building footprint to a flange 12" above finished floor. Coordinate with Terra Construction and the Mechanical Contractor for connections.
8. This contractor is to bring domestic water service into the building as indicated in the construction documents.

3.01 PROJECT SPECIFIC INCLUSIONS

A. EARTHWORK

- ~~1. Furnish, install and remove when no longer needed a 6" deep 15-foot wide temporary aggregate (Class V or similar type of temporary aggregate material used for construction traffic) travel path around the new building. This shall be installed after the foundations have been backfilled and removed when directed by Terra Construction. In addition, furnish & install one (1) 35-foot x 35-foot aggregate crane pad for use by other trades. Coordinate location with Terra Construction and remove during final grading.~~
2. Furnish and install all subdrainage and drain tile. Drain tile inside the building footprint will be by the mechanical contractor. All drain tile outside the building footprint shall be by this contractor.
3. Furnish and place all subgrade below hardscape areas within specified tolerance, no greater than +/- .10ft.
4. Furnish and place all topsoil required for all turf, grasses, etc. Note that there will not be any area for spoils storage for topsoil to be reused for final grading. Export as required and import any topsoil's that will be re-used for grading.
5. ~~This contractor is responsible for the gas-permeable aggregate associated with the radon mitigation system (system by others). Please reference Spec Section 312113. All other aspects of the radon mitigation systems are to be furnish and installed by BC#22B.~~

B. UTILITIES

1. This contractor is responsible for installing and maintaining rock site entrance roads as indicated on Terra's Disturbance Avoidance Plan and per Detail 1/C501.
2. This contractor is responsible for suitable subbase at locations of concrete sidewalks, concrete curb/gutters, and asphalt paving. Class V required at these locations will be the responsibility of other contractors.
3. This contractor is responsible for protecting all new and existing structures.

4.01 ALLOWANCES

- A. Refer to Specification for scope specific allowances

5.01 ALTERNATES

- A. Refer to Specification Sections 01 2300 Alternates and 00 4113 Bid Form for a list of alternates.

END OF SECTION

BID CATEGORY 31D – STRUCTURE DEMOLITION
For Reference Only – Bid Category was Previously Awarded in Bid Package #01

1.01 GENERAL INCLUSIONS

- A. The following information is provided to define and describe the scope of work that will be required of the successful Bidder.
- B. The information is to be complimentary with the collective requirements of all the other Contract Documents. All the Contract Documents, including all disciplines of the specifications and drawings, are included as part of this scope of work.
- C. This Document will become a part of the successful Bidder's Final Contract and outlines the scope of work for this bid category.
- D. Reference specification section 011201, "General Requirements for all Bid Categories" for general requirements that applies to all bid categories.
- E. Reference "Summary" section of 011202, "Bid Category Descriptions" for general information that applies to all bid categories.
- F. Specification Sections that are the responsibility of this Bid Category:

Specification Section		Complete Scope	As Applies	Labor Only	Material Only
DIVISION 00	Procurement and Contracting Requirements	X			
DIVISION 01	General Requirements	X			
02 4100	Demolition	X			
31 1000	Site Clearing		X		
31 2200	Grading		X		
31 2316	Excavation		X		
31 2316.13	Trenching		X		
31 2323	Fill		X		

2.01 SCOPE SPECIFIC INCLUSIONS

- A. **MANPOWER, EQUIPMENT & MATERIALS**
 - 1. Provide a trained, full time onsite "Competent Person" within the Trade Contractor's onsite personnel to ensure that all work is performed within OSHA guidelines.
 - 2. Provide all temporary utilities necessary, or otherwise required, to complete the work.
- B. **SAFETY & HOUSEKEEPING**
 - 1. All utility locates (private or public) associated with the work outlined within this bid category shall be the responsibility of this Trade Contractor.
 - 2. Provide protective shoring adjacent to existing or new structures, property lines, construction boundaries, etc. where this scope may compromise those items. Maintain shoring until those structures are no longer compromised. All costs related to the engineering of shoring required shall be paid for by this bid package contractor.
 - 3. Provide dust control due to this Trade Contractor's activities including but not limited to all OSHA and any City requirements. This Trade Contractor shall not assume temporary water will be readily available directly adjacent to the work area. Assume water will need to be transported from a hydrant source to the construction area. Any costs or fees associated with water consumption shall be paid for by this bid package contractor. Submit to Terra Construction a dust control plan immediately after contract notification award.
 - 4. Protect and support existing utilities left in place adjacent to its Work.
 - 5. Always provide OSHA compliant slopes during construction. Where OSHA compliant slopes cannot be achieved due to construction limits, provide shoring to complete excavation activities.

C. DELIVERY, STORAGE & HANDLING

1. For existing items to be left in place, and if shoring is not necessary, remove & reinstall and/or protect & support those items as necessary to complete the work

D. PLANNING, COORDINATION & QUALITY CONTROL

1. Utilize proper Disruption Avoidance practices, including cooperation with Terra Construction, Owner, Owners Testing Agency, regulatory agencies, and other Contractors.
2. For any disturbances and/or utility disruptions, submit to Terra Construction a disturbance avoidance plan 2-weeks prior to work occurring.
3. Verify that all existing utilities, power, etc are disconnected before building demolition.
4. No demolition debris shall be stored on site or stockpiled. Debris must be hauled away or in dumpsters during construction.

E. CONSTRUCTION

1. Coordinate and perform all site work demolition and removals shown in the Contract Documents including but not limited to removal of Existing buildings
2. Coordinate and perform all site demolition and salvage work as defined in the Contract Documents. All items that are required to be salvaged shall be delivered to the Owner in the location that the Owner desires. Coordinate with Terra Construction.
3. Protect existing trees and shrubs scheduled to remain in place.

3.01 PROJECT SPECIFIC INCLUSIONS

4.01 ALLOWANCES

- A. Refer to Specification for scope specific allowances.

5.01 ALTERNATES

- A. Refer to Specification Sections 01 2300 Alternates and 00 4113 Bid Form for a list of alternates.

END OF SECTION

BID CATEGORY 32A – BITUMINOUS

1.01 GENERAL INCLUSIONS

- A. The following information is provided to define and describe the scope of work that will be required of the successful Bidder.
- B. The information is to be complimentary with the collective requirements of all the other Contract Documents. All the Contract Documents, including all disciplines of the specifications and drawings, are included as part of this scope of work.
- C. This Document will become a part of the successful Bidder's Final Contract and outlines the scope of work for this bid category.
- D. Reference specification section 011201, "General Requirements for all Bid Categories" for general requirements that applies to all bid categories.
- E. Reference "Summary" section of 011202, "Bid Category Descriptions" for general information that applies to all bid categories.
- F. Specification Sections that are the responsibility of this Bid Category:

	Specification Section	Complete Scope	As Applies	Labor Only	Material Only
DIVISION 00	Procurement and Contracting Requirements	X			
DIVISION 01	General Requirements	X			
32 1123	Aggregate Base Courses		X		
32 1216	Asphalt Paving	X			
32 1723	Pavement Markings	X			

2.01 SCOPE SPECIFIC INCLUSIONS

- A. **MANPOWER, EQUIPMENT & MATERIALS**
 - 1. Provide a trained, full time onsite "Competent Person" within the Trade Contractor's onsite personnel to ensure that all work is performed within OSHA guidelines.
 - 2. Furnish and install all asphalt pavement, bases, and pavement markings in accordance with the contract documents.
- B. **SAFETY & HOUSEKEEPING**
- C. **DELIVERY, STORAGE & HANDLING**
- D. **PLANNING, COORDINATION & QUALITY CONTROL**
 - 1. Utilize proper Disruption Avoidance practices, including cooperation with Terra Construction, Owner, Owners Testing Agency, regulatory agencies, and other Contractors.
 - 2. Coordinate subbase requirements with BC#31C – Earthwork and Utilities.
- E. **CONSTRUCTION**
 - 1. This contractor is responsible for furnishing and installing the required Class V at all asphalt paving locations.

3.01 PROJECT SPECIFIC INCLUSIONS

4.01 ALLOWANCES

- A. Refer to Specification for scope specific allowances.

5.01 ALTERNATES

- A. Refer to Specification Sections 01 2300 Alternates and 00 4113 Bid Form for a list of alternates.

END OF SECTION

BID CATEGORY 32B – SITE CONCRETE

1.01 GENERAL INCLUSIONS

- A. The following information is provided to define and describe the scope of work that will be required of the successful Bidder.
- B. The information is to be complimentary with the collective requirements of all the other Contract Documents. All the Contract Documents, including all disciplines of the specifications and drawings, are included as part of this scope of work.
- C. This Document will become a part of the successful Bidder's Final Contract and outlines the scope of work for this bid category.
- D. Reference specification section 011201, "General Requirements for all Bid Categories" for general requirements that applies to all bid categories.
- E. Reference "Summary" section of 011202, "Bid Category Descriptions" for general information that applies to all bid categories.
- F. Specification Sections that are the responsibility of this Bid Category:

Specification Section		Complete Scope	As Applies	Labor Only	Material Only
DIVISION 00	Procurement and Contracting Requirements	X			
DIVISION 01	General Requirements	X			
31 2323	Fill		X		
32 1123	Aggregate Base Courses		X		
32 1313	Concrete Paving	X			

2.01 SCOPE SPECIFIC INCLUSIONS

A. MANPOWER, EQUIPMENT & MATERIALS

- 1. Provide labor, material, and equipment necessary to provide all work in accordance with the above listed specification sections, including but not limited to: install all cast-in-place concrete curbs and gutter, concrete sidewalks, and truncated domes.
- 2. Provide a trained, full time onsite "Competent Person" within the Trade Contractor's onsite personnel to ensure that all work is performed within OSHA guidelines.
- 3. Provide all necessary concrete placing and pumping equipment telescopic boom lifts, forklifts, scissor lifts, scaffolding, etc. to perform its Work.
- 4. Provide and install all concrete reinforcement in accordance with the Contract Documents.
- 5. Provide all accessory materials required for complete installation, including, plastic-tipped chairs, Dobies for SOG Work, double mat supports, etc. Use of dowel bar substitute shall be pre-approved through the submittal process.
- 6. Provide enough formwork to meet the requirements of the Project Schedule.
- 7. Provide a reinforcement placing workforce sufficient to support the Project Schedule.

B. SAFETY & HOUSEKEEPING

- 1. Complete its work in compliance with OSHA Silica Standards.
- 2. Provide vertical and horizontal rebar protection in accordance with OSHA guidelines, maintaining this system through the completion of all concrete Work.
- 3. Execute its Work in accordance with the OSHA Regulations, which includes fall protection measures at OSHA indicated elevations.
- 4. This Contractor shall remove all debris (including scraps, shavings, sediment, slag, etc.) resulting from their scope of work daily. The Construction Manager will back-charge for any time involved in the cleanup of this Contractor's debris.
- 5. Roll up extension cords when not in use and inspected weekly. Contractors shall not allow extension cords to obstruct walkways or working areas.
- 6. The Construction Manager will not provide an on-site concrete washout, this contractor is responsible for controlling concrete washout activities. Concrete trucks and pumps shall have self-contained washouts. Coordinate approved washout locations with Terra Construction.
- 7. Pouring Concrete on the ground outside of formwork is not permitted.
- 8. Complete its Work in compliance with the Minnesota Pollution Control Agency (MPCA) and SWPPP requirements.

C. DELIVERY, STORAGE & HANDLING

1. Stage / store all rebar on dunnage in a manner that ensures that rebar is not in contact with mud or standing water and is off the ground.
2. Provide all hoisting necessary to offload, store, move and place reinforcing steel to execute the Work.

D. PLANNING, COORDINATION & QUALITY CONTROL

1. Utilize proper Disruption Avoidance practices, including cooperation with Terra Construction, Owner, Owners Testing Agency, regulatory agencies, and other Contractors.
2. Prior to pouring any concrete, participate in a preinstallation meeting with Terra Construction, Owner, Architect, Engineer, and Testing Agency to review quality control measures such as compaction requirements, reinforcing layout, concrete placement, curing methods, control joint layout, depth, and execution.
3. Design, certify, batch, and deliver ready-mixed concrete materials in strict compliance with Specifications. Mix design modifications required to meet the Specifications shall be furnished and incorporated at no additional costs. All mix designs, product information, certification, test reports, and other written information required by Specification shall be provided by Trade Contractor in a timely manner to support the Project Schedule.
4. If an incorrect mix design is used, this trade contractor is responsible for corrections.
5. Perform quality control on its Work to assure, as a minimum, the following aspects of the Work are following the Contract Documents:
6. Construction is based on the most current Contract Documents.
7. Formwork meets criteria for tolerances & deflections, form tie types and locations, tight fitting joints, quality formwork materials.
8. Inclusion of block outs, sleeves, embeds, conduits, piping, etc.
9. Type, size and quantity of reinforcing; proper use of accessories.
10. Fully executed sign-off form by inspectors and Trade Contractors.
11. Redi-mix concrete quality, proper consolidation procedures, finishing tolerances, curing procedures.
12. Shall schedule the concrete Work and its subsequent curing period to facilitate the application of the waterproofing and any finish systems in accordance with the Project Schedule.

E. CONSTRUCTION

1. Furnish and install compressive filler between its slab-on-grade and CMU walls, per the Contract Documents.
2. Be a party to the inspections and immediately correct any items noted by the inspector.
3. Proactively cooperate with the Owner's testing agency in the onsite gathering, storing and transporting of concrete cylinders as well as the testing and reporting of results.
4. Reject all expired concrete and do not place the concrete regardless of the situation. Notify the Construction Manager of the rejected concrete.
5. Provide competent personnel to perform pour-watch beneath the formwork.
6. Recognize that it could be possible some concrete placements may continue beyond an 8-hour workday. Overtime costs to place and finish concrete shall be considered incidental to the Work, with such costs included in the bid.
7. Provide a jointing plan for approval prior to placing concrete.
8. Furnish and install all joints in the concrete, utilizing locations and methods approved by the engineer.
9. Cure concrete utilizing appropriate measures based on climatic conditions (ACI hot and cold weather concreting methods, minimum), finishing of formed and unformed surfaces, sandblast finishes (if required).
10. Bear the costs of and be responsible for any remedial work (e.g. grinding, patching, floor leveling, etc.) on its flatwork until the requirements of the Contract Documents are met.
11. Post pour, include all remedial patching, filling, and our skimming to provide acceptable substrates for subsequent trades per industry standards, manufacture standards, or specifications, whichever is most stringent. Coordinate with subsequent trades (i.e. waterproofing, air barrier, epoxy, paint, etc.)

3.01 PROJECT SPECIFIC INCLUSIONS

1. This contractor shall include in its Bid necessary costs to fully comply with all aspects of Hot/Cold Weather Concrete Placing and curing methods. The construction of the sidewalks, curbs, gutters, and truncated domes will occur during the spring and summer months.

2. This contractor is responsible for furnishing and installing the required Class V at all concrete sidewalks, curbs, gutters, and truncated domes.
3. This contractor is responsible for furnishing and installing the 2" high density insulation noted in Detail 8/C502. Specifications for the 2" high density insulation can be found in Spec Section 312323.

4.01 ALLOWANCES

- A. Refer to Specification for scope specific allowances.
- B. Include an allowance of \$10,000.00 for Terra Construction directed changes.
 - Use of this allowance to be pre-authorized by Terra.
 - Profit and Overhead mark-up cannot be applied to allowances.
 - Unused balance is to be credited back to Terra Construction.
 - Terra has the right to reallocate allowance money as needed.

5.01 ALTERNATES

- A. Refer to Specification Sections 01 2300 Alternates and 00 4113 Bid Form for a list of alternates.

BID CATEGORY 32F – LANDSCAPING

1.01 GENERAL INCLUSIONS

- A. The following information is provided to define and describe the scope of work that will be required of the successful Bidder.
- B. The information is to be complimentary with the collective requirements of all the other Contract Documents. All the Contract Documents, including all disciplines of the specifications and drawings, are included as part of this scope of work.
- C. This Document will become a part of the successful Bidder's Final Contract and outlines the scope of work for this bid category.
- D. Reference specification section 011201, "General Requirements for all Bid Categories" for general requirements that applies to all bid categories.
- E. Reference "Summary" section of 011202, "Bid Category Descriptions" for general information that applies to all bid categories.
- F. Specification Sections that are the responsibility of this Bid Category:

Specification Section		Complete Scope	As Applies	Labor Only	Material Only
DIVISION 00	Procurement and Contracting Requirements	X			
DIVISION 01	General Requirements	X			
32 1543	Stabilized Aggregate Surfacing	X			
32 3300	Site Furnishings	X			
32 3313	Site Bicycle Racks				X
32 8000	Design-Build Irrigation	X			
32 9219	Seeding	X			
32 9223	Sodding	X			
32 9300	Plants	X			

2.01 SCOPE SPECIFIC INCLUSIONS

- A. **MANPOWER, EQUIPMENT & MATERIALS**
 - 1. Provide labor, material, and equipment necessary to complete all work in accordance with the above listed specifications.
- B. **SAFETY & HOUSEKEEPING**
 - 1.
- C. **DELIVERY, STORAGE & HANDLING**
 - 1.
- D. **PLANNING, COORDINATION & QUALITY CONTROL**
 - 1. Stockpiling of soil produced by excavation work is prohibited on-site, unless agreed to in writing by Terra Construction. The soil needs to be exported during excavation and imported for backfilling/grading.
 - 2.
- E. **CONSTRUCTION**
 - 1. Provide and install an irrigation system as called for in the contract documents for all painting, seeding, and sod areas. At areas without irrigation called for, provide watering maintenance until the plantings have been established.
 - 2. Furnish and install the irrigation RPZ (if required).

3.01 PROJECT SPECIFIC INCLUSIONS

- 1. Provide and install all fencing as outlined in the above listed specification sections.
- 2. Provide Temporary Irrigation as necessary until seed is properly established. Water from city utilities will be metered and paid for by Terra Construction.
- 3. Costs shall include mobilization, site visits, maintenance, and monitoring for temporary irrigation. All temporary facilities shall be removed once seed is established.
- 4. Topsoil and soils required for all turf, grasses, and planting bed areas to be provided by others.

5. Tree protection is by others.

4.01 ALLOWANCES

- A. Refer to Specification for scope specific allowances.

5.01 ALTERNATES

- A. Refer to Specification Sections 01 2300 Alternates and 00 4113 Bid Form for a list of alternates.

END OF SECTION

SECTION 01 12 16

WORK SEQUENCE AND MILESTONE SCHEDULE

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. The Subcontractor shall coordinate with the Construction Manager all construction phases and sequences necessary to complete the Work of the Project.
- B. The Subcontractors shall adhere to the Construction Phases and time frames as further described in this Section as a condition of their Contract. Work descriptions for the Construction Phases are not intended to be all inclusive. The Subcontractor shall refer to the Phasing Plans, Drawings and Specifications for specific details of all work.
- C. The Construction Manager, by separate contract, shall bid the remainder of the work as shown on the Drawings and indicated in the Technical Specification (for reference only).
- D. Subcontractor must actively participate in Last Planner System® pull planning sessions to support schedule reliability and workflow coordination.
- E. Subcontractor is expected to participate in weekly work planning meetings, providing updates on manpower, look-ahead schedules, and constraints.
- F. Attendance and engagement in weekly subcontractor coordination meetings are mandatory to ensure field alignment and proactive issue resolution.
- G. Subcontractor must have personnel with the appropriate experience and communication skills to participate effectively in collaborative planning processes.

1.02 SEQUENCE PLAN AND SEQUENCE REQUIREMENTS ACCEPTANCE:

- A. The Subcontractors shall coordinate all steps of the Work in advance with the Construction Manager to ensure building areas are secure and safe for adjacent occupancy and use at all times. The Subcontractors shall prepare a detailed, written description of their Sequence Plan as it relates to the Primary Construction Managers Schedule.
- B. This Project practices the Last Planner® System. For each schedule milestone, Construction Manager will conduct a collaborative, phase pull plan session to build the plan to reach that schedule milestone. All field foremen/supervisors and Project managers for Trade Contractors, Subcontractors and Suppliers must attend every such session where that Trade Contractor, Subcontractor or Supplier's Work is implicated. See Specification section 007300 for more information.

1.03 MILESTONE SCHEDULE NARRATIVE:

- A. The following Milestone Schedule dates are provided herein as part of the Contract Documents. Each Subcontractor shall prepare a detailed Construction Schedule that meets the schedule provided by the Construction Manager and the Milestones identified below. It is intended the Milestone Schedule dates described herein shall remain in effect and all Subcontractors shall be required to accept the dates as a condition of their Contract.
- B. If a Subcontractor delays progress for any reason, other than those allowed by the General Conditions, the Construction Manager will take all necessary steps to expedite their Contract Work to maintain Milestone Schedule Dates and shall be responsible for damages resulting

from their delay.

- C. If, in the opinion of the Construction Manager, the Subcontractor is behind schedule and is so notified by the Construction Manager in writing, the Subcontractor and/or all Sub-subcontractors shall employ such means as overtime work, multiple work shifts, additional equipment, or any other selected means and methods accepted by the Construction Manager, all without additional compensation and shall continue to do so until the progress of the Work is, in the opinion of the Construction Manager, in conformance with the Construction and Milestone Schedules.
- D. The Subcontractors agree that whether or not any delay shall be the basis for an extension of time, they shall have no claim against the Construction Manager, Owner or Architect for a payment or allowance of any kind for damage, loss, or expense resulting from delays.

1.04 MILESTONE SCHEDULE

Bid Opening – BP#02: March 24, 2026

Project Start Date: April 6, 2026

Substantial Completion: August 3, 2027

Work Sequence: See attached project schedule.

Please review additional information for material procurement as noted in specification section 01 12 01 General Requirements for all Bid Categories.

1.05 FAILURE TO COMPLETE THE WORK ON TIME

- A. Time being essential element of the Contract, it is hereby agreed that the Owner will be entitled to damages for failure on the part of the Subcontractor, or any Sub-subcontractor, to complete the Work described with the Milestone Dates. In view of the difficulty in making a precise determination of actual damages incurred, the Subcontractor will be assessed a fixed, agreed, daily charge in the amount stipulated, not as a penalty, but as liquidated damages to compensate for the direct and indirect costs incurred.
- B. In any suit involving assessment or recovery of liquidated damages, the reasonableness of daily charges shall be presumed and the amount assessed will be in addition to every other remedy now or hereinafter enforceable at law, in equity, by statute, or under the Contract.

PART 2 - PRODUCTS

2.01 NOT USED

PART 3 - EXECUTION

3.01 NOT USED

END OF SECTION

SECTION 01 20 00

PRICE AND PAYMENT PROCEDURES

PART 1 - GENERAL

1.01 SUMMARY

- A. Administrative and procedural requirements governing the Construction Manager's Applications for Payment.

1.02 SCHEDULE OF VALUES

- A. Each Subcontractor shall coordinate preparation of its Schedule of Values for its part of the Work with the preparation of the Construction Schedule and submit to the Construction Manager their Schedule of Values.
- B. Correlate line items in the Schedule of Values with other required administrative schedules and forms, including:
 - 1. Construction Schedule.
 - 2. Application for Payment form.
 - 3. List of sub-subcontractors.
 - 4. List of principal suppliers and fabricators.
 - 5. Labor and Material breakdown in sufficient detail for evaluation Applications for Payment and acceptable to the Construction Manager.
- C. Submit the Schedule of Values to the Construction Manager at the earliest feasible date, but in no case later than 7 days before the date scheduled for submittal of the initial Application for Payment.
- D. Format and Content: Use the Project Manual Table of Contents as a guide to establish the format for the Schedule of Values.
- E. Identification: Include the following Project identification on the Schedule of Values:
 - 1. Project name and location.
 - 2. Name of the Construction Manager.
 - 3. Project number.
 - 4. Subcontractor's name and address.
 - 5. Date of submittal.
- F. Provide a breakdown of the Contract Sum in sufficient detail to facilitate continued evaluation of Applications for Payment and progress reports. Break principal subcontract amounts down into several line items.
- G. Breakdown of Labor and Materials shall be indicated.
- I. For each part of the Work where an Application for Payment may include materials or equipment, purchased or fabricated and stored, but not yet installed, provide separate line items on the Schedule of Values for initial cost of the materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
- J. Margins of Cost: Show line items for indirect costs, and margins on actual costs, only to the extent that such items will be listed individually in Applications for Payment. Each item in the Schedule of Values and Applications for Payment shall be complete including its total cost and proportionate share of general overhead and profit margin.
- K. At the Construction Manager's option, temporary facilities and other major cost items that are not direct cost of actual work-in- place may be shown as separate line items in the Schedule of Values or distributed as general overhead expense.

- L. Schedule Updating: Update and resubmit the Schedule of Values when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.03 APPLICATIONS FOR PAYMENT

- A. Payment Application Forms: AIA G703 and continuation sheet.
- B. Each Application for Payment shall be consistent with previous applications and payments as certified by the Construction Manager and paid for by the Construction Manager.
- C. The initial Application for Payment, the Application for Payment at time of Substantial Completion, and the final Application for Payment involve additional requirements.
- D. Payment Application Times: Submit applications for payment to the Construction Manager no later than the 25th day of each month. The Construction Manager will process the application and forward it to the Owner on the Construction Managers Payment Application which will include Subcontractors amounts within 7 days.
- E. Application Preparation: Complete every entry on the form, including notarization and execution by person authorized to sign legal documents on behalf of the Owner. Incomplete applications will be returned without action.
- F. Entries shall match data on the Schedule of Values and Construction Manager's Construction Schedule. Use updated schedules if revisions have been made.
- G. Include amounts of Change Orders issued prior to the last day of the construction period covered by the application.
- H. Transmittal: Submit one (1) executed copy of each Application for Payment to the Construction Manager. The Application for Payment shall be complete, including waivers of lien and similar attachments, when required.
- I. Waivers of Mechanics Lien: With each Application for Payment, submit waivers of mechanics lien from every entity who may lawfully be entitled to file a mechanics lien arising out of the Contract, and related to the Work covered by the payment.
- J. Submit final Application for Payment with or proceeded by final waivers from every entity involved with performance of Work covered by the application who could lawfully be entitled to a lien.
- K. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of the first Application for Payment include the following:
 - 1. List of Sub-subcontractors. AIA G705 with Sub-contract Material and Labor values.
 - 2. List of principal suppliers and fabricators with Sub-contract Material values.
 - 3. Schedule of Values. Filled in on AIA G703.
 - 5. Schedule of principal products.
 - 6. List of Subcontractor's staff assignments.
 - 7. Certificates of insurance and insurance policies.
 - 8. Performance and payment bonds
 - 9. Safety documents, including but not limited to SDS, site specific silica plan, etc.
- L. Application for Payment at Substantial Completion: Following issuance of the Certificate of Substantial Completion, submit an Application for Payment; this application shall reflect any Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
 - 1. Administrative actions and submittals that shall proceed or coincide with this application include:
 - a. Occupancy permits and similar approvals.
 - b. Warranties (guarantees) and maintenance agreements.
 - c. Test/adjust/balance records.
 - d. Maintenance instructions.
 - e. Start-up performance reports.
 - f. Change-over information related to Owner's occupancy, use, operation and

- g. maintenance.
 - h. Final cleaning.
 - i. Application for reduction of retainage, and consent of surety.
 - j. List of incomplete Work, recognized as exceptions to Architect's Certificate of Substantial Completion.
- M. Final Payment Application: Administrative actions and submittals which must precede or coincide with submittal of the final payment Application for Payment include the following:
 - 1. The Construction Manager shall verify that the Subcontractor has submitted all required certified IC-134 forms, "Withholding Affidavit for Contractors" with the final Application for Payment.
 - 2. Completion of Project closeout requirements.
 - a. Completion of items specified for completion after Substantial Completion.
 - b. Assurance that unsettled claims will be settled.
 - c. Assurance that Work not complete and accepted will be completed without undue delay.
 - d. Transmittal of required Project construction records to Owner.
 - e. Proof taxes, fees and similar obligations have been paid.
 - f. Removal of temporary facilities and services.
 - g. Removal of surplus materials, rubbish and similar elements.
- N. Procurement
 - 1. Please see the instructions regarding specific procurement needs in specification section 01 12 01 General Requirements for all Bid Categories.

PRODUCTS

2.01 NOT USED

EXECUTION

3.01 NOT USED

END OF SECTION

**SECTION 01 2100
ALLOWANCES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Cash allowances.
- B. Payment and modification procedures relating to allowances.

1.02 CASH ALLOWANCES

- A. Costs Included in Cash Allowances: Cost of product to Contractor or Subcontractors, less applicable trade discounts .
- B. Costs Not Included in Cash Allowances: Product handling at the site, including unloading, uncrating, and storage; protection of products from elements and from damage; and labor for installation and finishing.
- C. Differences in costs will be adjusted by Change Order.

1.03 ALLOWANCES SCHEDULE

- A. Allowance No. 01 - Section 26 0944 - Digital Lighting Control Equipment: Include the stipulated sum of \$\$34,620.55 for purchase and delivery of digital lighting control equipment.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

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**SECTION 01 2200
UNIT PRICES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. List of unit prices, for use in preparing Bids.
- B. Measurement and payment criteria applicable to Work performed under a unit price payment method.
- C. Defect assessment and non-payment for rejected work.

1.02 COSTS INCLUDED

- A. Unit Prices included on the Bid Form shall include full compensation for all required labor, products, tools, equipment, plant, transportation, services and incidentals; erection, application or installation of an item of the Work; overhead and profit.

1.03 UNIT QUANTITIES SPECIFIED

- A. Quantities indicated in the Bid Form are for bidding and contract purposes only. Quantities and measurements of actual Work will determine the payment amount.

1.04 MEASUREMENT OF QUANTITIES

- A. Measurement methods delineated in the individual specification sections complement the criteria of this section. In the event of conflict, the requirements of the individual specification section govern.
- B. Assist by providing necessary equipment, workers, and survey personnel as required.
- C. Measurement Devices:
 - 1. Weigh Scales: Inspected, tested and certified by the applicable state Weights and Measures department within the past year.
 - 2. Platform Scales: Of sufficient size and capacity to accommodate the conveying vehicle.
 - 3. Metering Devices: Inspected, tested and certified by the applicable state department within the past year.
- D. Measurement by Weight: Concrete reinforcing steel, rolled or formed steel or other metal shapes will be measured by handbook weights. Welded assemblies will be measured by handbook or scale weight.
- E. Measurement by Volume: Measured by cubic dimension using mean length, width and height or thickness.
- F. Measurement by Area: Measured by square dimension using mean length and width or radius.
- G. Linear Measurement: Measured by linear dimension, at the item centerline or mean chord.
- H. Stipulated Price Measurement: Items measured by weight, volume, area, or linear means or combination, as appropriate, as a completed item or unit of the Work.
- I. Perform surveys required to determine quantities, including control surveys to establish measurement reference lines. Notify Architect prior to starting work.

1.05 PAYMENT

- A. Payment for Work governed by unit prices will be made on the basis of the actual measurements and quantities of Work that is incorporated in or made necessary by the Work and accepted by the Architect, multiplied by the unit price.
- B. Payment will not be made for any of the following:
 - 1. Products wasted or disposed of in a manner that is not acceptable.
 - 2. Products determined as unacceptable before or after placement.
 - 3. Products not completely unloaded from the transporting vehicle.
 - 4. Products placed beyond the lines and levels of the required Work.

5. Products remaining on hand after completion of the Work.
6. Loading, hauling, and disposing of rejected Products.

1.06 DEFECT ASSESSMENT

- A. Replace Work, or portions of the Work, not complying with specified requirements.
- B. If, in the opinion of Architect, it is not practical to remove and replace the Work, Architect will direct one of the following remedies:
 1. The defective Work may remain, but the unit price will be adjusted to a new unit price at the discretion of Architect.
 2. The defective Work will be partially repaired to the instructions of the Architect, and the unit price will be adjusted to a new unit price at the discretion of Architect.
- C. If, in the opinion of Owner, it is not practical to remove and replace the Work, Owner will direct one of the following remedies:
 1. The defective Work may remain, but the unit price will be adjusted to a new unit price at the discretion of Owner.
 2. The defective Work will be partially repaired to the instructions of the Owner, and the unit price will be adjusted to a new unit price at the discretion of Owner.
- D. The individual specification sections may modify these options or may identify a specific formula or percentage price reduction.
- E. The authority of Architect to assess the defect and identify payment adjustment is final.

1.07 SCHEDULE OF UNIT PRICES

- A. Unit Price No. 01: Removal of Unsuitable Soils; Section 31 2316 Excavation.
 1. Includes: Refer to Section 31 2316 for unit price requirements.
 2. Measurement: per By the cubic yard, in place volume.
- B. Unit Price No. 02: Engineered Fill (off-site source); Section 31 2323 Fill.
 1. Includes: Refer to Section 31 2323 for unit price requirements.
 2. Measurement: per By the cubic yard, in place volume.
- C. Unit Price No. 03: Short Prairie Native Seeding; Section 32 9219 Seeding.
 1. Includes: Soil preparation, supplying short prairie native seed mix , supplying perennial plug plantings for short prairie seeded areas, seeding operations, installing plug plantings, installing associated erosion control, watering and maintenance through warranty period.
 2. Measurement: per Square Foot.
- D. Unit Price No. 04: Sodding; Section 32 9223.
 1. Includes: Soil preparation, supplying salt tolerant boulevard sod, sod installation, watering and maintenance through warranty period. .
 2. Measurement: per Square Yard.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 2300 ALTERNATES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Description of Alternates.
- B. Procedures for pricing Alternates.
- C. Documentation of changes to Contract Sum and Contract Time.

1.02 ACCEPTANCE OF ALTERNATES

- A. Alternates quoted on Bid Forms will be reviewed and accepted or rejected at Owner's option. Accepted Alternates will be identified in the Owner-Contractor Agreement.
- B. Coordinate related work and modify surrounding work to integrate the Work of each Alternate.

1.03 SCHEDULE OF ALTERNATES

- A. Alternate No. 1 - Paint Precast Walls in Primary Labs:
 - 1. Base Bid Item: Do not prime or paint precast walls in three primary labs, rooms 814, 815 and 823. Paint only concrete masonry or gypsum board walls within these spaces, as indicated on drawings.
 - 2. Alternate: Prime and paint precast walls in three primary labs, room 814, 815, and 823, as indicated on drawings.
- B. Alternate No. 2 - Lab Floor Finish:
 - 1. Base Bid Item: Provide SC1 concrete sealer and hardener in rooms 821 and 824 as indicated on sheet A80b.
 - 2. Alternate: Provide fluid-applied flooring FAF1 in lieu of SC1 to rooms 821 and 824. Refer to specification sections 09 0651 and 09 6700, and sheets A701 and A801b.
 - a. Prepare concrete slab as specified in Section 09 0651.
 - b. Test concrete per Section 09 0651 for moisture content and relative humidity. Apply primer for mitigation as recommended by the flooring manufacturer.
 - c. Install fluid-applied flooring per manufacturer's instructions.
- C. Alternate No. 3 - 3D Modeling / BIM Coordination:
 - 1. Base Bid Item: No BIM Coordination
 - 2. Alternate: Generate 3D model and participate in all BIM Coordination efforts. See specification section 01 3100.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

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**SECTION 01 2500
SUBSTITUTION PROCEDURES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Procedural requirements for proposed substitutions.

1.02 DEFINITIONS

- A. Substitutions: See General Conditions for definition.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS

- A. A request for substitution constitutes a representation that the submitter:
1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product, equipment, assembly, or system.
 2. Agrees to provide the same warranty for the substitution as for the specified product.
 3. Agrees to coordinate installation and make changes to other work that may be required for the work to be complete, with no additional cost to Owner.
 4. Waives claims for additional costs or time extension that may subsequently become apparent.
 5. Agrees to reimburse Owner and Architect for review or redesign services associated with re-approval by authorities or due to a change to other conditions as a result of the substitution.
- B. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents. Burden of proof is on proposer.
- C. Content: Include information necessary for tracking the status of each Substitution Request, and information necessary to provide an actionable response.
1. Forms included in the Project Manual are adequate for this purpose, and must be used.
- D. Limit each request to a single proposed substitution item.

3.02 SUBSTITUTION PROCEDURES DURING PROCUREMENT

- A. Submittal Form (before award of contract):
1. **Complete LHB Substitution Request Form:** Submit substitution requests by completing the form attached to this section whenever a substitution is requested. See this form for additional information and instructions. Use only this form; other forms of submission are unacceptable. All questions on the form must be answered. Requests with incomplete forms will not be processed.
 2. Submit Substitution Request to Architect for consideration on the LHB form attached to this section, not less than 5 business days from specified bid date. Limit each request to one proposed substitution.
 3. **All products to be used must have the Architect's approval prior to bidding.**
 4. Requests for substitution not submitted in accordance with the procedures described in this section will not be reviewed or considered by the Architect.

3.03 SUBSTITUTION PROCEDURES DURING CONSTRUCTION

- A. Submittal Form (after award of contract):
1. Submit substitution requests by completing the form attached to this section. See this section for additional information and instructions. Use only this form; other forms of submission are unacceptable.
- B. Requests for Substitution received after Bid Opening will not be considered except in such cases it is necessary due to strikes, lockouts, bankruptcy, discontinuance of a product and sim

- C. Submit request for Substitution for Cause within 14 days of discovery of need for substitution, but not later than 14 days prior to time required for review and approval by Architect, in order to stay on approved project schedule.
- D. Substitutions will not be considered under one or more of the following circumstances:
 - 1. When they are indicated or implied on shop drawing or product data submittals, without having received prior approval.

3.04 RESOLUTION

- A. Architect may request additional information and documentation prior to rendering a decision. Provide this data in an expeditious manner.
- B. Architect will notify Contractor in writing of decision to accept or reject request. If written notification is not provided, Contractor shall assume the request was rejected.

3.05 ACCEPTANCE

- A. Accepted substitutions change the work of the Project. They will be documented and incorporated into work of the project by Addendum, Change Order, Construction Change Directive, Architectural Supplementary Instructions, or similar instruments provided for in the Conditions of the Contract.

3.06 ATTACHMENTS

- A. Substitution Request Form.

END OF SECTION

Contractor's Certification

The undersigned states, proposing this Substitution, certifies the following as true and correct and accepts all conditions relating to this request:

- This Substitution has been fully investigated and determined to be equal or superior in all respects.
- The same warranty will be furnished.
- The same maintenance service and source of replacement parts, as applicable, is available.
- The change to the Construction Progress Schedule is unchanged.
- The cost data as stated above is complete. All claims for any additional costs related to this Substitution does not affect dimensions or functional clearances.
- The Substitution does not affect dimensions or functional clearances.
- All Architectural/Engineering design fees associated with the review, evaluation, and or design and detailing changes as a result of this Substitution Request are the responsibility of the Contractor. The amount of these fees will be deducted from the Contract Sum due to the Contractor.
- Coordination, installation, and changes to the Work as necessary for an accepted Substitution will be complete in all respects.

Submitted By: _____

Signature: _____

Firm: _____

Address: _____

Telephone: _____

For Use By Architect / Engineer

- ☐ Substitution Recommended: Make submittals in accordance with Specifications.
- ☐ Substitution Recommended as Noted: Make submittals in accordance with Specifications.
- ☐ Substitution Rejection Recommended: Use specified products. Architect shall not be held responsible for the performance of any substitution accepted or approved by Owner over the recommendation of the Architect (Release and Indemnification Agreement between Owner and Architect required).
- ☐ Substitution Request received after deadline: Use specified products.
- ☐ Substitution Request returned: Incomplete submittal, use specified products.

Comments:

Signature: _____ Date: _____

NOTE: If approved, LHB will include product approval in Addendum

**SECTION 01 3000
ADMINISTRATIVE REQUIREMENTS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. General administrative requirements.
- B. Electronic document submittal service.
- C. Preconstruction meeting.
- D. Progress meetings.
- E. Construction progress schedule.
- F. Progress photographs.
- G. Coordination drawings.
- H. Submittals for review, information, and project closeout.
- I. Number of copies of submittals.
- J. Requests for Interpretation (RFI) procedures.
- K. Submittal procedures.

1.02 GENERAL ADMINISTRATIVE REQUIREMENTS

- A. Comply with requirements of Section 01 7000 - Execution and Closeout Requirements for coordination of execution of administrative tasks with timing of construction activities.
- B. Make the following types of submittals to Architect:
 - 1. Requests for Interpretation (RFI).
 - 2. Requests for substitution.
 - 3. Shop drawings, product data, and samples.
 - 4. Test and inspection reports.
 - 5. Design data.
 - 6. Manufacturer's instructions and field reports.
 - 7. Applications for payment and change order requests.
 - 8. Progress schedules.
 - 9. Coordination drawings.
 - 10. Correction Punch List and Final Correction Punch List for Substantial Completion.
 - 11. Closeout submittals.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 ELECTRONIC DOCUMENT SUBMITTAL SERVICE

- A. All documents transmitted for purposes of administration of the contract are to be in electronic (PDF) format, as appropriate to the document, and transmitted via an Internet-based submittal service that receives, logs and stores documents, provides electronic stamping and signatures, and notifies addressees via email.
 - 1. Besides submittals for review, information, and closeout, this procedure applies to Requests for Interpretation (RFIs), progress documentation, contract modification documents (e.g. supplementary instructions, change proposals, change orders), applications for payment, field reports and meeting minutes, Contractor's correction punchlist, and any other document any participant wishes to make part of the project record.
 - 2. Contractor, Owner and Architect are required to use this service.
 - 3. It is Contractor's responsibility to submit documents in allowable format.

4. Subcontractors, suppliers, and Architect's consultants will be permitted to use the service at no extra charge.
 5. Users of the service need an email address, internet access, and PDF review software that includes ability to mark up and apply electronic stamps (such as Adobe Acrobat, www.adobe.com, or Bluebeam PDF Revu, www.bluebeam.com), unless such software capability is provided by the service provider.
 6. Paper document transmittals will not be reviewed; emailed electronic documents will not be reviewed.
 7. All other specified submittal and document transmission procedures apply. Actual physical samples and color selection charts shall be submitted to the Architect in addition to the PDF format.
- B. Submittal Service:
1. The Contractor shall use e-Builder (Trimble Unity Construct), the Minnesota State Internet-Based Enterprise Project Management System (EPMS) in the administration of this project.
 2. Minnesota State shall provide access and training resources to support the Contractor's use of e-Builder.
 3. Additional information may be found at <https://www.minnstate.edu/system/finance/facilities/design-construction/index.html>
 4. All Proposal Requests (PR), Construction Change Directives (CCD), Change Orders (CO), and Applications for Payment shall be submitted as processes in the (EPMS).
 5. Submittals, Prevailing Wage Documentation, and Close-out Documents are to be
- C. Training: One, one-hour, web-based training session will be arranged for all participants, with representatives of Architect and Contractor participating; further training is the responsibility of the user of the service.
- D. Training: Minnesota State offers periodic online vendor training and reference guides. Refer to the e-Builder heading found at <https://www.minnstate.edu/system/finance/facilities/design-construction/index.html>

3.02 PRECONSTRUCTION MEETING

- A. Construction Manager will schedule a meeting after Notice of Award.
- B. Attendance Required:
1. Owner.
 2. Architect.
 3. Contractor.
 - a. Contractor's Project Manager.
 - b. Contractor's Field Superintendent.
 4. All Major Subcontractors.
 5. Owner's Representative.
- C. Agenda:
1. Execution of Owner-Contractor Agreement.
 2. Submission of executed bonds and insurance certificates.
 3. Distribution of Contract Documents.
 4. Submission of list of subcontractors, list of products, schedule of values, and progress schedule.
 5. Submission of initial Submittal schedule.
 6. Designation of personnel representing the parties to Contract, Owner, Contractor, Subcontractors and Architect.
 7. Procedures and processing of field decisions, requests for information, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.

8. Reviewing communication procedures.
 9. Scheduling, including establishing day, time, and frequency of Construction Progress Meetings.
 10. Site mobilization, administrative requirements, Owner requirements.
 11. Safety and security requirements and procedures.
 12. Review requirements for indoor air quality management plan and construction waste management disposal.
 13. Quality assurance requirements, including those for testing, inspections, field observations, and pre-installation meetings.
- D. Construction Manager to record minutes and distribute copies to participants, with copies to Contractor, Owner, participants, and those affected by decisions made.

3.03 QUALITY CONTROL MEETING

- A. Construction Manager will schedule a meeting after Notice of Award.
- B. Attendance Required:
1. Owner.
 2. Architect.
 3. Contractor.
 - a. Contractor's Project Manager.
 - b. Contractor's Field Superintendent.
 4. All Major Subcontractors.
 5. Owner's Representative.
- C. Agenda:
1. Quality assurance requirements, including those for testing, inspections, field observations, and pre-installation meetings.
 2. Testing and inspections.
 3. Field Observations.
 4. Pre-installation meetings.
- D. Construction Manager to record minutes and distribute copies to participants, with copies to Contractor, Owner, participants, and those affected by decisions made.

3.04 PROGRESS MEETINGS

- A. Schedule and administer meetings throughout progress of the work at maximum bi-monthly intervals.
- B. Make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.
- C. Attendance Required:
1. Contractor.
 2. Owner.
 3. Architect.
 4. Contractor's superintendent.
 5. Major Subcontractors.
 6. Owner's Representative.
- D. Agenda:
1. Review minutes of previous meetings.
 2. Review of work progress.
 3. Review of Contractor's two-week look ahead schedule.
 4. Field observations, problems, and decisions.
 5. Identification of problems that impede, or will impede, planned progress.
 6. Review of submittals schedule and status of submittals.

7. Review of RFIs log and status of responses.
 8. Maintenance of progress schedule.
 9. Corrective measures to regain projected schedules.
 10. Planned progress during succeeding work period.
 11. Coordination of projected progress.
 12. Maintenance of quality and work standards.
 13. Effect of proposed changes on progress schedule and coordination.
 14. Other business relating to work.
- E. Construction Manager to record minutes and distribute copies to participants, with copies to Contractor, Owner, participants, and those affected by decisions made.

3.05 CONSTRUCTION PROGRESS SCHEDULE

- A. If preliminary schedule requires revision after review, submit revised schedule within 10 days.
- B. Within five (5) days after review of preliminary schedule, submit draft of proposed complete schedule for review.
 1. Include written certification that major contractors have reviewed and accepted proposed schedule.
- C. Within 10 days after joint review, submit complete schedule.
- D. Submit updated schedule with each Application for Payment.
- E. Provide a two-week look ahead schedule (minimum duration) at Construction Progress Meetings.

3.06 PROGRESS PHOTOGRAPHS

- A. Submit new photographs at least once a month, within 3 days after being taken.
- B. Photography Type: Digital; electronic files.
- C. Provide photographs of site and construction throughout progress of work produced by an experienced photographer, acceptable to Architect.
- D. Views:
 1. Provide non-aerial photographs from four cardinal views at each specified time, until date of Substantial Completion.
 2. Consult with Architect for instructions on views required.
 3. Provide factual presentation.
 4. Provide correct exposure and focus, high resolution and sharpness, maximum depth of field, and minimum distortion.
- E. Digital Photographs: 24 bit color, minimum resolution of 1024 by 768, in JPG format; provide files unaltered by photo editing software.
 1. Delivery Medium: via Submittal Service.
 2. File Naming: Include project identification, date and time of view, and view identification.
 3. PDF File: Assemble all photos into printable pages in PDF format, with 2 to 3 photos per page, each photo labeled with file name; one PDF file per submittal.

3.07 COORDINATION DRAWINGS

- A. Review, stamp, approve and sign drawings prior to submission to Architect.

3.08 REQUESTS FOR INTERPRETATION (RFI)

- A. Preparation: Prepare an RFI immediately upon discovery of a need for interpretation of Contract Documents. Failure to submit a RFI in a timely manner is not a legitimate cause for claiming additional costs or delays in execution of the work.
 1. Prepare a separate RFI for each specific item.
 - a. Review, coordinate, and comment on requests originating with Subcontractors and/or materials suppliers.

- b. Do not forward requests which solely require internal coordination between Subcontractors.
- 2. Prepare using software provided by the Electronic Document Submittal Service.
- 3. Combine RFI and its attachments into a single PDF file.
- B. Reason for the RFI: Prior to initiation of an RFI, carefully study all Contract Documents to confirm that information sufficient for their interpretation is definitely not included.
 - 1. Unacceptable Uses for RFIs: Do not use RFIs to request the following::
 - a. Approval of submittals (use procedures specified elsewhere in this section).
 - b. Approval of substitutions (see Section - 01 2500 - Substitution Procedures).
 - 2. Frivolous RFIs: Requests regarding information that is clearly indicated on, or reasonably inferable from, Contract Documents, with no additional input required to clarify the question. They will be returned without a response, with an explanatory notation.
- C. Content: Include identifiers necessary for tracking the status of each RFI, and information necessary to provide an actionable response.
 - 1. Official Project name and number, and any additional required identifiers established in Contract Documents.
 - 2. Discrete and consecutive RFI number, and descriptive subject/title.
 - 3. Issue date, and requested reply date.
 - 4. Reference to particular Contract Document(s) requiring additional information/interpretation. Identify pertinent drawing and detail number and/or specification section number, title, and paragraph(s).
 - 5. Annotations: Field dimensions and/or description of conditions which have engendered the request.
 - 6. Contractor's suggested resolution: A written and/or a graphic solution, to scale, is required in cases where clarification of coordination issues is involved, for example; routing, clearances, and/or specific locations of work shown diagrammatically in Contract Documents. If applicable, state the likely impact of the suggested resolution on Contract Time or the Contract Sum.
- D. Attachments: Include sketches, coordination drawings, descriptions, photos, submittals, and other information necessary to substantiate the reason for the request.
- E. Review Time: Architect will respond and return RFIs to Contractor within seven calendar days of receipt. For the purpose of establishing the start of the mandated response period, RFIs received after 3:00 PM will be considered as having been received on the following regular working day.
- F. Responses: Content of answered RFIs will not constitute in any manner a directive or authorization to perform extra work or delay the project. If in Contractor's belief it is likely to lead to a change to Contract Sum or Contract Time, promptly issue a notice to this effect, and follow up with an appropriate Change Order request to Owner.

3.09 SUBMITTAL SCHEDULE

- A. Submit to Architect for review a schedule for submittals in tabular format.
 - 1. Submit at the same time as the preliminary schedule.
 - 2. Coordinate with Contractor's construction schedule and schedule of values.
 - 3. Format schedule to allow tracking of status of submittals throughout duration of construction.
 - 4. Arrange information to include scheduled date for initial submittal, specification number and title, submittal category (for review or for information), description of item of work covered, and role and name of subcontractor.
 - 5. Account for time required for preparation, review, manufacturing, fabrication and delivery when establishing submittal delivery and review deadline dates.

3.10 SUBMITTALS FOR REVIEW

- A. When the following are specified in individual sections, submit them for review:
 - 1. Product data.
 - 2. Shop drawings.
 - 3. Samples for selection.
 - 4. Samples for verification.
- B. Submit to Architect for review for the limited purpose of checking for compliance with information given and the design concept expressed in Contract Documents.
 - 1. The Contractor shall be responsible for dimensions, fabrication, means, methods, sequences, and procedures of construction including coordination of the Work.
- C. Samples will be reviewed for aesthetic, color, or finish selection.
- D. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 01 7800 - Closeout Submittals.

3.11 SUBMITTALS FOR INFORMATION

- A. When the following are specified in individual sections, submit them for information:
 - 1. Design data.
 - 2. Certificates.
 - 3. Test reports.
 - 4. Inspection reports.
 - 5. Manufacturer's instructions.
 - 6. Manufacturer's field reports.
 - 7. Other types indicated.
- B. Submit for Architect's knowledge as contract administrator or for Owner.

3.12 SUBMITTALS FOR PROJECT CLOSEOUT

- A. Submit Correction Punch List for Substantial Completion.
- B. Submit Final Correction Punch List for Substantial Completion.
- C. Refer to Section 01 7800 - Closeout Submittals for closeout submittals.
- D. Submit for Owner's benefit during and after project completion.

3.13 NUMBER OF COPIES OF SUBMITTALS

- A. Electronic Documents: Submit one electronic copy in PDF format; an electronically-marked up file will be returned. Create PDFs at native size and right-side up; illegible files will be rejected.
- B. Samples: Submit the number specified in individual specification sections; one of which will be retained by Architect.
 - 1. After review, produce duplicates.
 - 2. Retained samples will not be returned to Contractor unless specifically so stated.

3.14 SUBMITTAL PROCEDURES

- A. General Requirements:
 - 1. Use a separate transmittal for each item.
 - 2. Transmit using approved form.
 - 3. Sequentially identify each item beginning with the specification section in which the items is found. For revised submittals use original number and a sequential numerical suffix.
 - 4. Identify: Project; Contractor; Subcontractors or supplier; pertinent drawing and detail number; and specification section number and article/paragraph, as appropriate on each copy.

5. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of products required, field dimensions, adjacent construction work, and coordination of information is in accordance with the requirements of the work and Contract Documents.
 - a. Submittals from sources other than the Contractor, or without Contractor's stamp will not be acknowledged, reviewed, or returned.
 6. Schedule submittals to expedite the Project, and coordinate submission of related items.
 - a. For each submittal for review, allow 14 days excluding delivery time to and from the Contractor.
 - b. For sequential reviews involving Architect's consultants, Owner, or another affected party, allow an additional 7 days.
 - c. For sequential reviews involving approval from authorities having jurisdiction (AHJ), in addition to Architect's approval, allow an additional 30 days.
 - d. Review of submittals may be delayed pending submission of related information by the Contractor. The Architect shall notify the Contractor in writing of related submittals required to complete the review.
 7. Identify variations from Contract Documents and product or system limitations that may be detrimental to successful performance of the completed work.
 8. Provide space for Contractor and Architect review stamps.
 9. When revised for resubmission, identify all changes made since previous submission.
 10. Distribute reviewed submittals. Instruct parties to promptly report inability to comply with requirements.
 11. Submittals not requested will not be recognized or processed.
 12. Re-submittals beyond one will result in additional services by the Architect and a deduct change in the Contract Sum to cover the cost of services.
- B. Product Data Procedures:
1. Submit only information required by individual specification sections.
 2. Collect required information into a single submittal.
 3. Submit concurrently with related shop drawing submittal.
 4. Do not submit (Material) Safety Data Sheets for materials or products.
- C. Shop Drawing Procedures:
1. Prepare accurate, drawn-to-scale, original shop drawing documentation by interpreting Contract Documents and coordinating related work.
 2. Do not reproduce Contract Documents to create shop drawings.
 3. Generic, non-project-specific information submitted as shop drawings do not meet the requirements for shop drawings.
 4. Building Enclosure Shop Drawings:
 - a. The Contractor will be responsible for reviewing and coordinating building enclosure shop drawings of Subcontractors providing or installing overlapping and intersecting materials/work.
 - b. Contractor shall submit building enclosure shop drawings that include substrate information, adjacent materials, air barriers, flashings, sealants, and sequencing requirements that are coordinated between the affected trades and ready for execution in the field.
 - c. Where exterior building enclosure elements intersect, product data and material compatibility test results shall accompany shop drawings of all affected Subcontractors.
 - d. Contractor shall carefully review and coordinate Subcontractors shop drawings prior to submission to the Architect. Building enclosure shop drawings lacking substrates, adjoining materials or statement "by others" shall be grounds for rejection.
- D. Samples Procedures:
1. Transmit related items together as single package.

2. Identify each item to allow review for applicability in relation to shop drawings showing installation locations.
3. Include with transmittal high-resolution image files of samples to facilitate electronic review and approval. Provide separate submittal page for each item image.
4. Review of high-resolution image files shall not commence until physical samples are received by the Architect.

3.15 ELECTRONIC (AUTOCAD) DRAWING FILES

- A. Architect will provide Contractor or its Subcontractors with CAD background files, in .DWG format, as defined in Section 00 5433 and upon the following conditions:
 1. Drawing files requested were prepared by the Architect and not by the Architect's Consultant.
 - a. Requests for drawing files prepared by Architect's Consultant may include other requirements.
 2. Receipt of Architect's Limited License Agreement (LLA) prepared and signed by Architect and Contractor or its Subcontractors.
 3. Electronic drawing files will only be provided to the party that signed the LLA and that party assumes the responsibility and the risk of conversion into another format.

END OF SECTION

SECTION 01 31 00

SUBCONTRACTOR BIM EXECUTION PLAN

SECTION 1 – GENERAL

- 1.1 SUMMARY - Improve construction processes, create efficiencies in the product delivery, and enhance the quality of the construction project through Virtual Design and Construction (VDC) techniques. VDC uses 3D models to construct the project in a virtual environment, optimizing the design and construction process and identifying and resolving potential conflicts early, when they are easier and less expensive to correct. VDC utilizes the principles of Integrated Project Delivery (IPD) to establish a line of communication and coordination among members of the construction team, making the construction process more coordinated and predictable. This can reduce the risk for all project participants.
- 1.2 GOALS - One of the goals of this process is to perform clash detection between the construction trades and to verify constructability. It should be noted that this process will result in a model sign-off in which all participants agree that the BIM is coordinated and that their final submitted model files will be used for field installation. For the purpose of field installation, the subcontractors shall consider the final coordinated models as a contract for space. The subcontractors reserve space by modeling the components included in their scope of work, including access space, etc. If a conflict arises in the field during installation, the subcontractor who did not reserve space for their components is responsible for moving their components at no additional cost to the subcontractor who did reserve space. This frequent sharing of models during development allows subcontractors to become familiar with the project's constraints early and to raise concerns before other trades in the coordination effort finalize their work. This also allows each trade to use other trades' models as 3D backgrounds during their modeling process. This practice should promote proactive modeling leading to clash avoidance. The Spatial Coordination Process serves as a supplement to the existing coordination process. Subcontractors are ultimately responsible for coordination with other trades. Therefore, all trades need to be proactive in uploading revised, up-to-date files so others can use models and/or backgrounds from other team members when planning and modeling their respective scopes of work.

SECTION 2 – LEVEL OF DETAIL (LOD)

- 2.1 GENERAL
- 2.2 All trades shall model to a Level of Development – LOD 300 to 400 as defined in the AIA Document E202™–2022. Clash tolerance will be determined and adhered to by the coordination manager based on input from the design engineers and/or installers (e.g., insulation can be compressed by x/x", clash tolerance for flex duct is x/x", etc.).
- 2.3 LOD 300: Elements will be modeled as specific assemblies accurate in terms of quantity, size, shape, location, and orientation. Non-geometric information may also be attached to model elements. LOD 400 for model elements represents objects at the fabrication level of detail.
- 2.4 All trades shall identify clearance requirements for service access, code compliance, installation, etc., and these clearances shall be identified as a separate layer within the trade model.
- 2.5 It is the subcontractor's responsibility to model accurate equipment information based upon approved submittals for the project. Therefore, time is of the essence for the submittal process to ensure accurate information is modeled. Subcontractors can only model what they have accurate information for.

- 2.6 The Model may vary in LOD for individual Model Elements, but at a minimum must include all features that would be included on a quarter inch (1/4"=1'-0") scaled drawing.

SECTION 3 – COORDINATION DRAWINGS & FILE REQUIREMENTS

3.1 COORDINATION DRAWINGS

- A. Coordination Drawings, General: Prepare coordination drawings in accordance with requirements in individual Sections, where installation is not completely shown on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.
1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:
 - a. Use applicable Drawings as a basis for the preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe the relationship of various systems and components.
 - b. Coordinate the addition of trade-specific information to the coordination drawings by multiple contractors in a sequence that best provides coordination of the information and resolution of conflicts between installed components before submitting for review.
 - c. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
 - d. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
 - e. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
 - f. Indicate required installation sequences.
 - g. Indicate dimensions shown on the Drawings. Specifically note dimensions that appear to conflict with the submitted equipment and minimum clearance requirements. Provide alternate sketches to the Architect that indicate the proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.
- B. Coordination Drawing Organization: Organize coordination drawings as follows:
1. Plenum Space: Indicate sub-framing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work. Locate components within the ceiling plenum to accommodate the layout of light fixtures indicated on the drawings. Indicate areas of conflict between light fixtures and other components.
 2. Mechanical Rooms: Provide coordination drawings for mechanical rooms showing plans and elevations of mechanical, plumbing, fire protection, fire alarm, and electrical equipment.
 3. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
 4. Slab Edge and Embedded Items: Indicate slab edge locations and sizes, and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs, and housekeeping pads, and similar items.
 5. Mechanical and Plumbing Work: Show the following:
 - a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.

- b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts, and electrical distribution equipment.
 - c. Fire-rated enclosures around ductwork.
- 6. Electrical Work: Show the following:
 - a. Runs of vertical and horizontal conduit 1-1/4 inch diameter and larger.
 - b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire alarm locations.
 - c. Panel board, switch board, switchgear, transformer, busway, generator, and motor control center locations.
 - d. Location of pull boxes and junction boxes, dimensioned from column center lines.
- 7. Fire Protection System: Show the Following:
 - a. Location of standpipes, main branches, branch lines, pipe drops, and sprinkler heads.

3.2 FILE REQUIREMENTS

The required submittal file formats are Autodesk AutoCAD 2026 (*.DWG) and Navisworks (*.NWC), with components of the subcontractor's scope represented as 3D solids (not polymesh). If using a CAD package with object enablers on top of AutoCAD, export a *.DWG file that fully expresses all model geometry in a single file, so that the enablers are not required for viewing. *.NWC files must be exported directly from the subcontractor's trade-specific software. *.NWC files converted from *.DWG by Navisworks do not meet this requirement. The use of formats other than *.DWG shall be coordinated with Terra Construction. Model files are to be free of unnecessary data, including any x-refs (except for grid lines), text, or marks that are not used in the Spatial Coordination Process. The layer names of the submitted model files shall be intuitive for construction practitioners. The models for each subcontracting discipline will be developed in zones that are defined by each level of the building. Each model for a given level will contain objects above that level's finish floor elevation and below the next level's finish floor elevation. There shall be no overlap or gap between components represented in different model files, with the exception of riser drawings, should a trade choose to model their respective risers through the building in a single model file. The subcontractors shall use the 3D models they create and submit for spatial validation as the basis of developing their 2D paper shop drawings.

SECTION 4 – PROJECT PLAN AREAS AND ZONES

4.1 PROJECT PLAN AREA

Models will be broken up into phases following the schema set forth by the Architect. Reference Architectural Drawings for the corresponding phase match lines. Submitted models will follow this phasing sequence to divide the building into manageable pieces to streamline the coordination effort.

4.2 PROJECT ZONES

The model should be broken up and submitted by Level. Each Level is defined from the finished floor to the finished floor.

END OF SECTION



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Electronic Information Waiver

Terra Construction may withhold access to the "Electronic Information" described below until a duly authorized company representative signs the waiver provided herein.

Terra Construction is supplying CAD drawings and models in the form of two-dimensional (2D) and three-dimensional (3D) digital files (collectively, the "Electronic Information"). This Electronic Information is provided solely for reference purposes. Terra Construction makes no representations or warranties, whether express or implied, regarding the accuracy or completeness of the Electronic Information. Any use of the Electronic Information is at the Subcontractor's sole risk. The Subcontractor acknowledges that the Electronic Information does not constitute a Contract Document and agrees to verify its consistency with the Contract Documents prior to use. Nothing contained within the Electronic Information shall be interpreted as authorization to proceed with the Work.

Please complete the information below and sign to acknowledge your understanding and acceptance of these terms.

Company: _____

Name of Company Representative (please print): _____

Signature: _____

Date: _____



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**SECTION 01 4000
QUALITY REQUIREMENTS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Submittals.
- B. Quality assurance.
- C. References and standards.
- D. Inspection agencies and services.
- E. Control of installation.
- F. Mock-ups.
- G. Tolerances.
- H. Manufacturers' field services.
- I. Defect Assessment.

1.02 REFERENCE STANDARDS

- A. ASTM C1021 - Standard Practice for Laboratories Engaged in Testing of Building Sealants; 2008 (Reapproved 2023).
- B. ASTM C1077 - Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation; 2026.
- C. ASTM C1093 - Standard Practice for Accreditation of Testing Agencies for Masonry; 2023.
- D. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection; 2025a.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Design Data: Submit for Architect's knowledge as contract administrator for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents, or for Owner's information.
- C. Test Reports: After each test/inspection, promptly submit PDF copies of report to Architect, Building Official, and Contractor.
 - 1. Include:
 - a. Date issued.
 - b. Project title and number.
 - c. Name of inspector.
 - d. Date and time of sampling or inspection.
 - e. Identification of product and specifications section.
 - f. Location in the Project.
 - g. Type of test/inspection.
 - h. Date of test/inspection.
 - i. Results of test/inspection.
 - j. Compliance with Contract Documents.
 - k. When requested by Architect, provide interpretation of results.
- D. Certificates: When specified in individual specification sections, submit certification by the manufacturer and Contractor or installation/application subcontractor to Architect, in quantities specified for Product Data.
 - 1. Indicate material or product complies with or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.

2. Certificates may be recent or previous test results on material or product, but must be acceptable to Architect.
- E. Manufacturer's Instructions: When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, for the Owner's information. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.
- F. Manufacturer's Field Reports: Submit reports for Architect's benefit as contract administrator or for Owner.
 1. Submit report within 30 days of observation to Architect for information.
 2. Submit for information for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents.
- G. Erection Drawings: Submit drawings for Architect's benefit as contract administrator or for Owner.
 1. Submit for information for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents.
 2. Data indicating inappropriate or unacceptable Work may be subject to action by Architect or Owner.

1.04 QUALITY ASSURANCE

- A. Testing Agency Qualifications:
 1. Prior to start of work, submit agency name, address, and telephone number, and names of full time registered Engineer and responsible officer.
 2. Submit copy of report of laboratory facilities inspection made by NIST Construction Materials Reference Laboratory during most recent inspection, with memorandum of remedies of any deficiencies reported by the inspection.
- B. The Contractor shall designate an experienced quality assurance/control on-site person responsible for the various building enclosure components. When constructing the exterior shell, framing and back-up wall, the Contractor shall coordinate with their Subcontractors throughout its construction to ensure that critical intersecting building envelope substrates are installed in accordance with Minnesota State FDS, Construction Documents, specified tolerances and conditions acceptable to their sub-contractors and manufacturers.

1.05 REFERENCES AND STANDARDS

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

- G. All Work shall be in accordance with the latest laws and regulations of the state of Minnesota, with applicable federal government and local codes and ordinances, with applicable design codes referenced in the Code, subject to code amendments, and with latest adopted edition of codes and industry standards referenced herein. Following is a summary of organizations with codes and standards referenced herein:

1. Minnesota State Building Code and Energy Code
2. Minnesota Accessibility Code
3. B3 Guidelines, including Sustainable Building 2030 Energy Standards
4. Minnesota State Fire Code
5. Life Safety Code, Latest Edition, by National Fire Protection Agency
6. OSHA - Occupational Safety and Health Administration
7. ASTM – American Society for Testing and Materials
8. ANSI – American National Standards Institute
9. UL - Underwriters' Laboratories, Inc.
10. FM – Factory Mutual
11. ACI – American Concrete Institute
12. AISC – American Institute of Steel Construction
13. ASCE – American Society of Civil Engineers
14. AAMA - American Architectural Manufacturers Association
15. SDI – Standard Deck Institute
16. IBC – International Building Code
17. ASHRAE – American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc.
18. MPCA – Minnesota Pollution Control Agency
19. TMS – The Masonry Society
20. MSJC – Masonry Standards Joint Committee

1.06 CODE-REQUIRED SPECIAL INSPECTIONS AND PROCEDURES

- A. Comply with requirements of 01 4533 - Code-Required Special Inspections and Procedures.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 CONTROL OF INSTALLATION

- A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.
- B. Comply with manufacturers' instructions, including each step in sequence.
- C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect before proceeding.
- D. Comply with specified standards as minimum quality for the work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Have work performed by persons qualified to produce required and specified quality.
- F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.
- G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

3.02 MOCK-UPS

- A. Before installing portions of the Work where mock-ups are required, construct mock-ups in location and size indicated for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work. The purpose of mock-up is to demonstrate the proposed range of aesthetic effects and workmanship.
- B. Mock-ups shall be performed under provisions identified in this section and identified in the respective product specification sections.
- C. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.
- D. Obtain Architect's approval of mock-ups before starting work, fabrication, or construction.
 - 1. Architect will issue written comments within seven (7) working days of initial review and each subsequent follow up review of each mock-up.
 - 2. Make corrections as necessary until Architect's approval is issued.
- E. Architect will use accepted mock-ups as a comparison standard for the remaining Work.
- F. Where mock-up has been accepted by Architect and is specified in product specification sections to be removed, protect mock-up throughout construction, remove mock-up and clear area when directed to do so by Architect.

3.03 TOLERANCES

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

3.04 MANUFACTURERS' FIELD SERVICES

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

3.05 DEFECT ASSESSMENT

- A. Replace Work or portions of the Work not complying with specified requirements.

3.06 OWNER CONSULTANTS' PARTICIPATION IN OBSERVATION AND TESTING

- A. The following schedule identifies the Owner's consultants' participation in the observation and testing process. NOTE: These may be more than one firm.

Section	Test Specified	Field Consultant Observation	Testing Lab(s) Testing	Testing Labs Observation	Roof Consultant	BECx Observations & Tests
Earthwork	X		X	X		
Soil Grouting	X		X	X		
Storm Drainage Utilities	X		X	X		
Concrete Reinforcing	X		X			

Section	Test Specified	Field Consultant Observation	Testing Lab(s) Testing	Testing Labs Observation	Roof Consultant	BECx Observations & Tests
Cast-in-Place Concrete	X		X			
Precast Concrete Hollow Core Planks	X					X
Precast Architectural Concrete	X					X
Masonry Mortaring	X	X	X			
Unit Masonry	X	X	X			
Structural Steel	X		X	X		
Steel Roof Deck	X		X	X		
Steel Floor Deck	X		X	X		
Metal Fabrications	X		X	X		
Waterproofing	X	X				
Traffic Coatings	X	X				
Applied Fireproofing	X		X	X		
Air/Vapor Barriers	X	X				
Elastomeric Membrane Roofing	X				X	
Flashing and Sheet Metal	X	X			X	
Roof & Wall Specialties & Accessories	X	X			X	
Joint Protection	X	X				
Aluminum Windows	X		X			X
Glazed Aluminum Curtain Wall	X		X			X
Test / Adjust / Balance / HVAC	X	X				

END OF SECTION

SECTION 01 4533
CODE-REQUIRED SPECIAL INSPECTIONS AND PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Code-required special inspections.
- B. Testing services incidental to special inspections.
- C. Submittals.
- D. Payment
- E. Testing Agency's, Contractor's and Owner's Duties and Responsibilities.
- F. Structural Testing and Special Inspection Schedule.
- G. Manufacturers' field services.
- H. Fabricators' field services.

1.02 ABBREVIATIONS AND ACRONYMS

- A. IAS: International Accreditation Service, Inc.
- B. NIST: National Institute of Standards and Technology.

1.03 DEFINITIONS

- A. Code or Building Code: ICC (IBC)-2018 Edition of the International Building Code and specifically, Chapter 17 - Structural Tests and Special Inspections.
- B. Authority Having Jurisdiction (AHJ): Agency or individual officially empowered to enforce the building, fire and life safety code requirements of the permitting jurisdiction in which the Project is located.
- C. NIST: National Institute of Standards and Technology.
- D. Special Inspection:
 - 1. Special inspections are inspections and testing of materials, installation, fabrication, erection or placement of components and connections mandated by the AHJ that also require special expertise to ensure compliance with the approved Contract Documents and the referenced standards.
- E. Testing: Evaluation of systems, primarily requiring physical manipulation and analysis of materials, in accordance with approved standards.
- F. Structural Special Inspections: Structural special inspections include inspections of structural items required by the current IBC Section 1704, and other items, which in the professional judgment of the Structural Engineer of Record, are critical to the integrity of the building structure and are indicated to be performed under the requirements of this Section. They do not include special inspections for non-structural items such as fireproofing and smoke control systems.
- G. Structural Testing: Structural testing includes those tests of structural items required by the current IBC, or other tests which in the professional judgment of the Structural Engineer of Record, are critical to the integrity of the building structure and are indicated to be performed under the requirements of this Section.
- H. Architect of Record: The prime consultant in charge of overall design and coordination of the Project.
- I. Structural Engineer of Record (SER): The licensed professional engineer in responsible charge of the structural design for the Project.

- J. Licensed Structural Engineer: A professional engineer with education and experience in the design of structures similar to this Project licensed to practice in the state in which the Project is located.
- K. Testing Agency (TA): The properly qualified firm performing testing services.
- L. Special Inspector (SI): A properly qualified individual or firm performing special inspections.
- M. Building Official: The officer or their duly authorized representative charged with the administration and enforcement of the building code for the Project.

1.04 REFERENCE STANDARDS

- A. ASTM C1077 - Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation; 2026.
- B. ASTM C1093 - Standard Practice for Accreditation of Testing Agencies for Masonry; 2023.
- C. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection; 2025a.
- D. ASTM E543 - Standard Specification for Agencies Performing Nondestructive Testing; 2026.
- E. IAS AC89 - Accreditation Criteria for Testing Laboratories; 2021.
- F. IAS AC291 - Accreditation Criteria for Special Inspection Agencies AC291; 2025, with Editorial Revision.
- G. ICC (IBC)-2009 - International Building Code; 2009.
- H. ICC (IBC)-2018 - International Building Code; 2018.

1.05 INTENT AND CONDITIONS

- A. Intent:
 - 1. Define and coordinate structural testing and special inspection services.
 - 2. Provide confidence that the specified Work is constructed in compliance with the contract documents and the intent of applicable codes including Sections 106 and 1704 of the current International Building Code (IBC).
 - 3. Structural testing and special inspection services are intended to assist in determining probable compliance of the Work with requirements specified. These services do not relieve the Contractor of responsibility for compliance with the requirements of the Contract Documents.
- B. Conditions:
 - 1. If inspection of a fabricator's work is required, the Owner or Architect may require testing and inspection of the Work at the plant, before shipment. Owner and Architect reserve the right to reject material not complying with the Contract Documents.
 - 2. Refer to individual technical specification sections for specific qualifications, inspections, tests, frequency and standards required. Testing and inspection shall be performed in accordance with the referenced standard for the specific material or procedure unless other criteria are specified. In the absence of a referenced standard, tests shall be performed in accordance with generally accepted industry standards.
 - 3. Work shall be checked as it progresses. Failure to detect any defective Work or materials shall not prevent later rejection if defective Work or materials are discovered, nor shall it obligate Owner to accept such Work.
 - 4. Structural testing, special inspection, and periodic inspections by the Building Official do not preclude the normal field involvement and site observations by Architect or SER.
 - 5. Structural testing, special inspection, and periodic inspections by the Building Official do not relieve the Contractor of any responsibility to complete the Work in accordance with the approved Drawings and Specifications.

6. Testing agents and/or Special Inspectors may not waive or alter Contract Document requirements, or approve, accept, or reject any portion of the Work unless specifically authorized by the Architect or SER. They may not assume any duties of the Contractor, and they have no authority to stop or reject Work.

1.06 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Special Inspection Agency Qualifications: Prior to start of work, Special Inspection Agency is required to:
 1. Submit agency name, address, and telephone number, names of full time registered Engineer and responsible officer.
 2. Submit copy of report of laboratory facilities inspection made by NIST Construction Materials Reference Laboratory during most recent inspection, with memorandum of remedies of any deficiencies reported by the inspection.
 3. Submit certification that Special Inspection Agency is acceptable to AHJ.
 4. Submit documentation that Special Inspection Agency is accredited by IAS according to IAS AC291.
- C. General Requirements:
 1. Testing agency and Special Inspectors shall submit reports for structural testing and special inspection in a timely manner to the Owner, Contractor, Building Official, SER, and Architect of Record. Provide reports of daily activities to the SER and Contractor. Submit reports to the Contractor on a daily basis and to the SER on a daily or weekly basis. Provide summary reports to the Owner, Building Official and Architect on a monthly basis unless they request otherwise.
 2. Provide reports for ongoing work, containing the following information:
 - a. Whether test specimens, test results or observations indicate compliance with Contract Documents. Specifically state any discrepancies.
 - b. Types and locations of discrepancies found in the Work.
 - c. Work required to correct discrepancies and Work performed to correct previously noted discrepancies. Discrepancies corrected during an inspection need not be reported.
 3. Submit certified final special inspection report stating that, to the best of the Special Inspector's knowledge, the Work requiring special inspection conformed to the Contract Documents.
- D. Special Inspection Reports: After each special inspection, Special Inspector is required to promptly submit a PDF copy of report to Architect and to the AHJ.
 1. Include:
 - a. Date issued.
 - b. Project title and number.
 - c. Name and signature of Special Inspector.
 - d. Date and time of special inspection.
 - e. Identification of product and specifications section.
 - f. Location in the Project, including elevations, grid locations and details.
 - g. Type of special inspection.
 - h. Date and time of special inspection, sampling, or test
 - i. Results of special inspection.
 - j. Compliance with Contract Documents. Specifically state any discrepancies.
 - k. Types and locations of discrepancies found in the Work.
 - l. Work required to correct discrepancies and Work performed to correct previously noted discrepancies. Discrepancies corrected during an inspection need not be reported.

- m. Submit certified final special inspection report stating that, to the best of the Special Inspector's knowledge, the Work requiring special inspection conformed to the Contract Documents.
- E. Test Reports: After each test or inspection, promptly submit a PDF copy of the report to Architect and to AHJ.
 - 1. Include:
 - a. Date issued.
 - b. Project title and number.
 - c. Firm name and address.
 - d. Name and signature of inspector.
 - e. Date and time of sampling or inspection.
 - f. Identification of product and specifications section.
 - g. Location in the Project, including elevations, grid locations and details.
 - h. Type of test or inspection.
 - i. Date and time of inspection, sampling, or test.
 - j. Results of test or inspection.
 - k. Compliance with Contract Documents. Specifically state any discrepancies.
 - l. Types and locations of discrepancies found in the Work.
 - m. Work required to correct discrepancies and Work performed to correct previously noted discrepancies. Discrepancies corrected during an inspection need not be reported.
 - n. Submit certified final special inspection report stating that, to the best of the Special Inspector's knowledge, the Work requiring special inspection conformed to the Contract Documents.
- F. Certificates: When specified in individual special inspection requirements, Special Inspector shall submit certification by the manufacturer, fabricator, and installation subcontractor to Architect and AHJ, in quantities specified for Product Data.
 - 1. Indicate material or product complies with or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
- G. Manufacturer's Field Reports: Submit reports to Architect and AHJ.
 - 1. Submit for information for the limited purpose of assessing compliance with information given and the design concept expressed in Contract Documents.
- H. Fabricator's Inspection Reports: When required by AHJ, submit reports to Architect and AHJ.
 - 1. Submit for information for the limited purpose of assessing compliance with information given and the design concept expressed in Contract Documents.

1.07 SPECIAL INSPECTION AND TESTING AGENCY

- A. Owner or Architect to employ services of Special Inspection Agency to perform inspections and associated testing and sampling in accordance with ASTM E329 and required by building code.
- B. Special Inspection Agency may delegate to independent testing agency to perform testing and sampling associated with special inspections and required by building code.
- C. Employment of agency in no way relieves Contractor of obligation to perform work in accordance with requirements of Contract Documents.

1.08 TESTING AND INSPECTION AGENCIES

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

1.09 QUALITY ASSURANCE

- A. Special Inspection Agency Qualifications:
 - 1. An approved independent firm acceptable to the Owner, Architect and SER specializing in performing testing and inspections of the type specified in this section.
 - 2. Accredited by IAS according to IAS AC291.
 - 3. Special Inspector: Either an appropriately certified inspector or a civil/structural engineer performing under the direct supervision of a licensed civil/structural engineer (as defined earlier in this Section) and acceptable to the SER and Building Official. Unique Special Inspector requirements, for specific materials and systems, are noted in related technical Specification Sections.
 - 4. Tests to Demonstrate Qualifications:
 - a. Any tests required to qualify the Contractor or the workers for any phase of the Work, shall be performed at no additional cost to the Owner.
 - b. If the Contractor proposes a product material, method, or other system that has not been pre-qualified, the Architect / SER may require applicable tests to establish a basis for acceptance or rejection. The Contractor shall pay for these tests.
 - c. The Architect / SER reserves the right to require certification or other proof that the system proposed is in compliance with specified tests, criteria or standards. A representative of an independent testing agency shall sign the certificate.
- B. Testing Agency Qualifications:
 - 1. An approved independent firm acceptable to the Owner, Architect and SER, specializing in performing testing and inspections of the type specified in this section.
 - 2. Accredited by IAS according to IAS AC89.
 - 3. Authorized to operate in the State in which the Project is located and experienced with the requirements and testing methods specified in the Contract Documents.
 - 4. Meet applicable requirements of references stated in paragraph 1.03.
 - 5. Have available testing equipment that is calibrated, at reasonable intervals, by devices of accuracy traceable to either the National Bureau of Standards, or to accepted values of natural physical constants.
 - 6. Provide individuals performing tests and taking samples with appropriate certifications for Work performed.
 - 7. Tests to Demonstrate Qualifications:
 - a. Any tests required to qualify the Contractor or the workers for any phase of the Work, shall be performed at no additional cost to the Owner.
 - b. If the Contractor proposes a product material, method, or other system that has not been pre-qualified, the Architect / SER may require applicable tests to establish a basis for acceptance or rejection. The Contractor shall pay for these tests.
 - c. The Architect / SER reserves the right to require certification or other proof that the system proposed is in compliance with specified tests, criteria or standards. A representative of an independent testing agency shall sign the certificate.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 FREQUENCY OF TESTING AND INSPECTION

- A. For detailed requirements, see individual technical Specification Sections and the Structural Testing and Special Inspection Schedule, copy included after this Section.

3.02 PROTECTION AND REPAIR

- A. Upon completion of testing, sample-taking, or inspection, the Contractor shall repair damaged Work and restore substrates and finishes to eliminate deficiencies, including deficiencies in the visual qualities of exposed surfaces, as judged solely by the Architect / SER. Protect Work exposed by or for testing and/or inspection and protect repaired work. Repair and protection is the Contractor's responsibility, regardless of the assignment of responsibility for testing and/or inspection.

3.03 TESTING AND INSPECTION

- A. See individual specification sections and Special Structural Testing and Inspection Program Summary Schedule for quality control testing and inspection required.

3.04 SPECIAL INSPECTION AND TESTING AGENCY DUTIES AND RESPONSIBILITIES

- A. Special Inspection Agency Duties:
 - 1. Inspect the Work assigned for conformance with the building department approved Drawings, Specifications, and applicable material and workmanship provisions of the code. Perform inspection in a timely manner to avoid delay of Work.
 - 2. Bring nonconforming items to the immediate attention of the Contractor for correction. If not corrected within 24 hours or if Inspector will not be on site the following day, bring to the attention of the SER by the end of the business day. If uncorrected after a reasonable period of time, bring to the attention of the Building Official, the Architect and the Owner. Notify SER immediately if non-conforming items are enclosed, embedded, or obscured prior to verification of correction.
 - 3. Submit inspection reports to the Building Official, Contractor, the Architect, the SER, the Owner and other designated persons in accordance with the Structural Testing and Special Inspection Schedule.
 - 4. Submit a final signed report stating whether the Work requiring special inspection was, to the best of his/her knowledge, in conformance with the approved Drawings, Specifications and the applicable workmanship provisions of the code.
 - 5. Sign the Structural Testing and Special Inspection Schedule in conjunction with other responsible parties.
 - 6. Attend preconstruction meetings and progress meetings.
- B. Testing Agency Duties:
 - 1. Test the Work assigned for conformance with the building department approved Drawings, Specifications, and applicable material provisions of the documents. Perform tests in a timely manner to avoid delay of Work.
 - 2. Provide qualified personnel at site. Cooperate with Architect and Contractor in performance of services.
 - 3. Perform specified sampling and testing of products in accordance with specified standards.
 - 4. Ascertain compliance of materials and mixes with requirements of Contract Documents.
 - 5. Promptly notify Architect and Contractor of observed irregularities or non-compliance of work or products.
 - 6. Perform additional tests and inspections required by Architect.
 - 7. Attend preconstruction meetings and progress meetings.
 - 8. Submit test reports to the Building Official, Contractor, Architect, SER, Owner, and other designated persons in accordance with the Structural Testing and Special Inspection Schedule.
 - 9. Sign the Structural Testing and Special Inspection schedule in conjunction with other responsible parties.
- C. Limits on Testing or Inspection Agency Authority:
 - 1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.

2. Agency may not approve or accept any portion of the work.
 3. Agency may not assume any duties of Contractor.
 4. Agency has no authority to stop the work.
- D. On instructions by Architect, perform re-testing required because of non-compliance with specified requirements, using the same agency.
- E. Contractor will pay for re-testing required because of non-compliance with specified requirements.

3.05 CONTRACTOR DUTIES AND RESPONSIBILITIES

- A. Provide minimum of 5 working days prior to starting work and 3 working days prior to continuing work for all items requiring testing or inspection. Items requiring testing and inspection services prior to or during placement shall not be placed until testing and inspection services are available. Items requiring testing and inspection services after placement shall not be enclosed or obscured until testing and inspection services are performed. If the Work is covered up prior to any required testing or observation, it shall be uncovered for review at the Contractor's expense.
- B. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
- C. Attend a Preconstruction meeting to review scope of structural testing and special inspection.
- D. Schedule and coordinate Preconstruction and Construction testing and inspections.
- E. Post or make available the Structural Testing and Special Inspection Schedule within its office at the job site. Provide notice to Owner and Architect. Also, provide adequate notification to those parties designated on the Schedule so they may properly prepare for and schedule their work.
- F. Provide Special Inspectors access to the approved Drawings and Specifications at the job site.
- G. Review all reports issued by Special Inspectors.
- H. Retain, at the job site, all reports submitted by the Special Inspectors for review on the Building Official's request.
- I. Correct deficiencies identified in inspection or testing reports in a timely manner.
- J. Provide safe access to the Work requiring inspection or testing.
- K. Provide labor and facilities to provide access to the Work, to obtain, handle and deliver samples, to facilitate testing and inspection and for storage and curing of test samples.
- L. Verify conformance of the Work with specified construction tolerances.
- M. Immediately remove all rejected materials from the site. Do not incorporate any rejected materials into the Work.
- N. Inspections by Building Official: Provide adequate notice for inspections performed by the building official, as required by IBC Section 109.
- O. Sign the Structural Testing and Special Inspection Schedule in conjunction with other responsible parties prior to commencing construction.

3.06 FABRICATORS' FIELD SERVICES

- A. Submit a Certificate of Compliance to the Building Official, Special Inspector, and SER that the Work was performed in accordance with the approved Drawings and Specifications.
- B. Sign the Structural Testing and Special Inspection Schedule in conjunction with other responsible parties prior to commencing construction.

3.07 OWNER'S DUTIES AND RESPONSIBILITIES

- A. Establish direct funding to provide for cost of structural testing and special inspection services.

- B. Provide Special Inspector with approved Drawings, Specifications and approved shop drawings.
- C. Provide Special Inspectors and testing agencies with full access to the site at all times.
- D. Sign the Structural Testing and Special Inspection Schedule in conjunction with other responsible parties.

3.08 PAYMENT

- A. The Owner will employ and pay for services of the Special Inspectors and testing agency to perform required structural testing and special inspections as mandated by code.
- B. The Contractor shall provide and pay for all materials, samples, mock-ups, and assemblies required for testing and inspection and shall pay for shipping costs related to delivery of such items to the Owner's testing agency testing facility.
- C. If items requiring testing or inspection are enclosed, embedded or obscured prior to testing or inspection or if such items are placed without tests or inspections, the Contractor shall pay for the costs of any exploratory work deemed necessary by the Architect / SER to verify compliance with the Contract Documents.
- D. When any testing or observations indicate the Work is non-compliant with the Contract Documents, all retesting and re-observations shall be performed by the Owner's testing or observation agencies. All costs for retesting and re-observations, including additional services of the design professionals, the design professional's consultants and the Owner's consultants are the Contractor's responsibility and shall be deducted from the Contract Sum by Change Order.

3.09 STRUCTURAL TESTING AND SPECIAL INSPECTION SCHEDULE

- A. The parties involved shall complete and sign the Structural Testing and Special Inspection Schedule. Schedule to be complete at time of permit issuance.
- B. The completed Schedule is an element of the Contract Documents and after permit issuance, becomes part of the building department approved Drawings and Specifications.

END OF SECTION

Special Structural Testing and Inspection Program Summary Schedule

Project Name ATCC-23 Transportation Center
 Location Alexandria, MN

Project No. 230736
 Permit No. _____ (1)

IBC Ref. or Technical (2)		Description (3)	Type of Inspector (4)	Specific Report Frequency, Unless Noted Otherwise (5)	Assigned Firm (6)
Section	Article				
1704	6	Structural Observations	PE	Per observation, (3) total	SER
1705	6	Verify site preparation	SI-T	Per soil report/spec, prior to work	TA
1705	6	Verify fill material and lift thickness	SI-T	Per soil report/spec	TA
1705	6	Verify fill compaction density	SI-T	Per soil report/spec	TA
1705	3	Verify concrete reinf. Placement	SI-S	Periodic	TA
1705	3	Verify anchors cast in concrete	SI-S	Periodic	TA
1705	3	Verify anchors post-installed in concrete	SI-S	Periodic	TA
1705	3	Verify concrete mix designs	SI-S	Periodic	TA
1705	3	Sample/test concrete	SI-S	Slump, air, temp & 4 cylinders per 50 cy	TA
1705	3	Observe concrete placement	SI-S	Periodic	TA
1705	3	Observe maintenance of concrete curing	SI-S	Periodic	TA
1705	3	Observe precast concrete installation	SI-S	Periodic	TA
1705	3	Verify formwork for concrete members	SI-S	Periodic	TA
1705	4	Early construction methods verification	SI-S	Periodic: mortar and grout mix designs	TA
1705	4	Masonry Inspection Program	SI-S	Periodic: anchors, reinf. mat'l., hot/cold plcm't	TA
1705	4	Pre-grouting inspection	SI-S	Periodic: obs grout space, reinf. placement	TA
1705	4	Observe grout and mortar placement	SI-S	Periodic	TA
1705	4	Observe prep and test grout and prisms	SI-S	3 specimens prior to work and every 5,000 sf	TA
1705	4	Masonry compl. w/ cd's and submittals	SI-S	Periodic	TA
1704/1705	2, 2	Steel Fabricator Inspection	SI-S	At start of project fabrication	TA
1705	2	Verify bolt, nut, and washer materials	SI-S	Periodic	TA
1705	2	Bolts, bearing type	SI-S	100% visual, test 10%	TA
1705	2	Bolts, slip-critical type	SI-S	Pre-inst test per AISC, 100% visual of contact surface, test 10%, 100% visual of twist-off	TA
1705	2	Verify structural steel materials	SI-S	Periodic	TA
1705	2	Verify weld filler materials	SI-S	Periodic	TA
1705	2	Welds: fillet	SI-S	100% visual, >5/16" cont., otherwise periodic	TA
1705	2	Welds: CJP and PJP	SI-S	100% UT > 5/16", 25% MP <= 5/16"	TA
1705	2	Welds: roof and floor deck	SI-S	Periodic	TA
1705	2	Steel framing compliance w/ cd's	SI-S	Periodic	TA
1705.17	1, 2	Fire-resistant penetrations and joints	SI-T	Periodic	TA

- (1) Permit No. to be provided by the Building Official
- (2) Referenced to the specific technical scope section in the program, or IBC reference.
- (3) Use descriptions per IBC Chapter 17, as adopted by Minnesota State Building Code.
- (4) SER = Structural Engineer of Record, SI-T = Special Inspector – Technical, TA = Testing Agency, SI-S = Special Inspector – Str'l., PE = Professional Engineer, F = Fabricator
- (5) Weekly, monthly, per test/inspection, per floor, etc.
- (6) Name of Firm contracted to perform services. If requested by engineer/architect of record or building official, the individual names of all prospective special inspectors and the work they intend to observe shall be identified as an attachment.

ACKNOWLEDGEMENTS (Each appropriate representative shall sign below)

Owner: Randy Anderson Firm/Signed: ATCC Randy Anderson Date: 3/12/2026
 Contractor: DALTON HAWK Firm/Signed: TERRA CONSTRUCTION Dalton Hawk Date: 3/9/2026
 Architect: Sara G. Phillips Firm/Signed: LHB Sara G. Phillips Date: 03/05/2026
 SER: Gregg M. Curtis Firm/Signed: LHB Gregg M. Curtis Date: 3/12/2026
 SI-S: Weston Nordhausen Firm/Signed: Chosen Valley Testing, Inc. Date: 3/6/26

S.I.T.: Weston Nordhausen Firm/Signed: Chosen Valley Testing, Inc. Date: 3/6/26

TA: Weston Nordhausen Firm/Signed: Chosen Valley Testing, Inc. Date: 3/6/26

F: _____ Firm/Signed: _____ Date: _____

Accepted for the Building Department By _____ Date _____

SECTION 01 50 00

TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Electricity, Lighting.
- B. Heat, Ventilation.
- E. Water.
- I. Protection of Installed Work.
- K. Water Control.
- L. Cleaning During Construction.
- M. Project Identification.
- N. Field Offices and Sheds.
- O. Fire Extinguishers.

1.2 RELATED SECTIONS

- A. Document 00 72 00 - General Conditions: Protection of Persons and Property.
- B. Individual Sections: Minimum temperature, humidity, and ventilation requirements.

1.3 ELECTRICITY, POWER AND LIGHTING (By Electrical Bid Category Contractor)

- A. Provide service required for construction operations, with branch wiring and distribution boxes located to allow service and lighting by means of construction-type power cords.
- B. Power Service:
 - 1. If the existing building does not provide a power source, then provide temporary terminal/metering pole, meter socket and enclosure with current transformers as required by local utility company, service entrance switch for 400-amp, 120/208 volt, 3 phase, 4 wire temporary service.
- C. Power distribution:
 - 1. Weatherproof distribution boxes, each with a minimum of eight 20-amp, 120-volt duplex outlets, with GFI grounding, spaced so that a 100-foot extension cord will reach all areas of the building. Circuit each outlet separately.
 - 2. Wiring, connections, and protection for temporary and permanent equipment for environmental control, for temporary use of electrically operated equipment, and for testing.
- D. Lighting:
 - 1. Provide lighting for construction operations.
 - 2. Locate Fixtures in Areas of Work: One light in rooms, except closets and utility chases; one light for every 750 sq ft in large areas.
 - 3. Lighting levels to be equivalent to not less than one 150-watt incandescent lamp per 500 sq ft of floor area, and one 100-watt lamp per 50 ft of corridor and per flight of stairs.
- E. Permanent power and lighting devices and fixtures may be used during construction under the following conditions:

- F. Obtain written agreement with Owner establishing start of warranty and conditions of use.
- G. Provide barriers and warning labels on energized equipment.
- H. Replace plates, devices, equipment, wiring or fixtures damaged during construction.
- I. Costs:
 - 1. Obtain and pay for permits and inspections.
 - 2. Obtain and pay for temporary easements across property other than Owner's.
 - 3. Pay for installation, operation, maintenance, and removal of equipment and restoration of permanent equipment used.

1.4 HEAT AND VENTILATION

- A. Maintain temperature, humidity, and ventilation in enclosed areas to provide specified ambient conditions for Work; to cure installed materials, to prevent condensation, and to prevent accumulations of dust, fumes and gases.
- B. During non-working hours maintain temperature in enclosed areas at a minimum 60 degrees F, or higher as specified in individual Sections.
- C. Prior to use of permanent system for temporary purposes:
 - 1. Obtain written agreement with Owner establishing start of warranty and conditions of use.
 - 2. Verify installation is approved for operation.
 - 3. Verify system is complete with all utility connections and safety devices.
 - 4. Verify automatic controls operational.
 - 5. Verify temporary filters are in place.
- D. Locate units and outlets to provide uniform distribution of heating, cooling, and ventilating. Vent exhaust ducts to the exterior.
- E. Modify and extend systems as Work progresses.
- F. Install temporary filters in air handling units and ducts, replace as necessary to prevent dust in equipment and ducts, to avoid contamination in Work or finished areas.
- G. Remove temporary materials and equipment when the permanent system is operational.
- H. After Substantial Completion replace temporary filters with new, clean, filters.
- I. Costs:
 - 1. Obtain and pay for permits and inspections.
 - 2. Pay for installation, operation, maintenance, and removal of equipment and restoration of permanent equipment used.

1.7 WATER

- A. If the existing building does not have a water source, provide the service required for construction operations. Extend branch piping with outlets located so that water is available by use of hoses.

1.11 PROTECTION OF INSTALLED WORK

- A. Provide temporary protection for installed products. Control traffic in the immediate area to minimize damage.
- B. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings. Protect finished floors and stairs from traffic, movement of heavy objects, and storage.
- C. Prohibit traffic and storage on waterproofed and roofed surfaces, on lawn and landscaped areas.

1.13 WATER CONTROL (If Exterior Earthwork is included in the work scope)

- A. Grade site to drain. Maintain excavations free of water. Provide and operate pumping equipment.
- B. Provide temporary piped drainage system to extent surface drainage cannot be utilized to dispose of wastewater from construction operations, storm water, and sanitary sewage, including sanitary drainage from temporary offices, if any.
- C. Provide temporary pumps, sewage ejectors, and similar equipment as necessary for adequate drainage from temporary drainage systems. Refer to Division 2 sections of specifications for dewatering of excavations.

1.14 CLEANING DURING CONSTRUCTION

- A. Control accumulation of waste materials and rubbish; periodically dispose of off-site.
- B. Clean interior areas prior to start of finish work, maintain areas free of dust and other contaminants during finishing operations.
- C. Provide containers and enforce compliance with daily disposal of wind-blown material.

1.17 FIRE EXTINGUISHERS

- A. Comply with General Conditions of the Contract requirements for protection of persons and property.
- B. Until fire protection needs may be fulfilled by permanent facilities, install temporary fire protection facilities of types and sizes, as reasonably effective in extinguishing fires during early stages, and as required for construction work being performed or recommended by insurance and governing authorities.
- C. Comply with applicable recommendations of NFPA Standard No.10.
- D. Locate fire extinguishers where they are most convenient and effective for their intended purpose; but not less than one extinguisher at each building exit, and at each stairwell.
- E. At the earliest feasible date in each area of the Project, complete installation of the permanent fire protection facilities.

PART 2 - PRODUCTS

(Not Used)

PART 3 - EXECUTION

(Not Used)

END OF SECTION

**SECTION 01 5713
TEMPORARY EROSION AND SEDIMENT CONTROL**

PART 1 GENERAL

1.01 SECTION INCLUDES

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

1.02 REFERENCE STANDARDS

- A. ASTM D4355/D4355M - Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture, and Heat in a Xenon Arc-Type Apparatus; 2021.
- B. ASTM D4491/D4491M - Standard Test Methods for Water Permeability of Geotextiles by Permittivity; 2022.
- C. ASTM D4533/D4533M - Standard Test Method for Trapezoid Tearing Strength of Geotextiles; 2015 (Reapproved 2023).
- D. ASTM D4632/D4632M - Standard Test Method for Grab Breaking Load and Elongation of Geotextiles; 2015a (Reapproved 2023).
- E. ASTM D4751 - Standard Test Methods for Determining Apparent Opening Size of a Geotextile; 2021a.
- F. ASTM D4873/D4873M - Standard Guide for Identification, Storage, and Handling of Geosynthetic Rolls and Samples; 2017 (Reapproved 2021).
- G. EPA (NPDES) - National Pollutant Discharge Elimination System (NPDES), Construction General Permit; Current Edition.

1.03 PERFORMANCE REQUIREMENTS

- A. Comply with requirements of EPA (NPDES) for erosion and sedimentation control, as specified by the NPDES, for Phases I and II, and in compliance with requirements of Construction General Permit (CGP), whether the project is required by law to comply or not.
- B. Comply with all requirements of the City of Alexandria for erosion and sedimentation control , even though this project is not required by law to comply.
- C. Develop and follow an Erosion and Sedimentation Prevention Plan and submit periodic inspection reports.
- D. Do not begin clearing, grading, or other work involving disturbance of ground surface cover until applicable permits have been obtained; furnish all documentation required to obtain applicable permits.
- E. Timing: Put preventive measures in place as soon as possible after disturbance of surface cover and before precipitation occurs.
- F. Storm Water Runoff: Control increased storm water runoff due to disturbance of surface cover due to construction activities for this project.
 - 1. Prevent runoff into storm and sanitary sewer systems, including open drainage channels, in excess of actual capacity or amount allowed by authorities having jurisdiction, whichever is less.
 - 2. Anticipate runoff volume due to the most extreme short term and 24-hour rainfall events that might occur in 25 years.

- G. Erosion On Site: Minimize wind, water, and vehicular erosion of soil on project site due to construction activities for this project.
 - 1. Control movement of sediment and soil from temporary stockpiles of soil.
 - 2. Prevent development of ruts due to equipment and vehicular traffic.
 - 3. If erosion occurs due to non-compliance with these requirements, restore eroded areas at no cost to Owner.
- H. Erosion Off Site: Prevent erosion of soil and deposition of sediment on other properties caused by water leaving the project site due to construction activities for this project.
 - 1. Prevent windblown soil from leaving the project site.
 - 2. Prevent tracking of mud onto public roads outside site.
 - 3. Prevent mud and sediment from flowing onto sidewalks and pavements.
 - 4. If erosion occurs due to non-compliance with these requirements, restore eroded areas at no cost to Owner.
- I. Sedimentation of Waterways On Site: Prevent sedimentation of waterways on the project site, including rivers, streams, lakes, ponds, open drainage ways, storm sewers, and sanitary sewers.
 - 1. If sedimentation occurs, install or correct preventive measures immediately at no cost to Owner; remove deposited sediments; comply with requirements of authorities having jurisdiction.
 - 2. If sediment basins are used as temporary preventive measures, pump dry and remove deposited sediment after each storm.
- J. Sedimentation of Waterways Off Site: Prevent sedimentation of waterways off the project site, including rivers, streams, lakes, ponds, open drainage ways, storm sewers, and sanitary sewers.
 - 1. If sedimentation occurs, install or correct preventive measures immediately at no cost to Owner; remove deposited sediments; comply with requirements of authorities having jurisdiction.
- K. Open Water: Prevent standing water that could become stagnant.
- L. Maintenance: Maintain temporary preventive measures until permanent measures have been established.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Erosion and Sedimentation Control Plan:
 - 1. Include:
 - a. Site plan identifying soils and vegetation, existing erosion problems, and areas vulnerable to erosion due to topography, soils, vegetation, or drainage.
 - b. Site plan showing grading; new improvements; temporary roads, traffic accesses, and other temporary construction; and proposed preventive measures.
 - c. Where extensive areas of soil will be disturbed, include storm water flow and volume calculations, soil loss predictions, and proposed preventive measures.
 - d. Schedule of temporary preventive measures, in relation to ground disturbing activities.
 - e. Other information required by law.
 - f. Format required by law is acceptable, provided any additional information specified is also included.
 - 2. Obtain the approval of the Plan by authorities having jurisdiction.
 - 3. Obtain the approval of the Plan by Owner.
- C. Inspection Reports: Submit report of each inspection; identify each preventive measure, indicate condition, and specify maintenance or repair required and accomplished.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Mulch: Use one of the following:
 - 1. Straw or hay.
 - 2. Erosion control matting or netting.
- B. Grass Seed For Temporary Cover: Select a species appropriate to climate, planting season, and intended purpose. If same area will later be planted with permanent vegetation, do not use species known to be excessively competitive or prone to volunteer in subsequent seasons.
- C. Silt Fence Fabric: Polypropylene geotextile resistant to common soil chemicals, mildew, and insects; non-biodegradable; in longest lengths possible; fabric including seams with the following minimum average roll lengths:
 - 1. Average Opening Size: 30 U.S. Std. Sieve, maximum, when tested in accordance with ASTM D4751.
 - 2. Permittivity: 0.05 sec^{-1} , minimum, when tested in accordance with ASTM D4491/D4491M.
 - 3. Ultraviolet Resistance: Retaining at least 70 percent of tensile strength, when tested in accordance with ASTM D4355/D4355M after 500 hours exposure.
 - 4. Tensile Strength: 100 pounds-force, minimum, in cross-machine direction; 124 pounds-force, minimum, in machine direction; when tested in accordance with ASTM D4632/D4632M.
 - 5. Elongation: 15 to 30 percent, when tested in accordance with ASTM D4632/D4632M.
 - 6. Tear Strength: 55 pounds-force, minimum, when tested in accordance with ASTM D4533/D4533M.
 - 7. Color: Manufacturer's standard, with embedment and fastener lines preprinted.
- D. Silt Fence Posts: One of the following, minimum 5 feet long:
 - 1. Steel U- or T-section, with minimum mass of 1.33 pound per linear foot.
 - 2. Softwood, 4 by 4 inches in cross section.
 - 3. Hardwood, 2 by 2 inches in cross section.
- E. Erosion Control Blanket: MNDOT 3885 Rolled Erosion Prevention, Category 20 with biodegradable or photodegradable netting.
- F. Gravel: See Section 31 2323 for aggregate.

PART 3 EXECUTION

3.01 EXAMINATION

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

3.02 PREPARATION

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

3.03 SCOPE OF PREVENTIVE MEASURES

- A. In all cases, if permanent erosion resistant measures have been installed, temporary preventive measures are not required.
- B. Construction Entrances: Traffic-bearing aggregate surface.
 - 1. Width: As required; 20 feet, minimum.
 - 2. Length: 50 feet, minimum.
 - 3. Provide at each construction entrance from public right-of-way.
 - 4. Where necessary to prevent tracking of mud onto right-of-way, provide wheel washing area out of direct traffic lane, with drain into sediment trap or basin.
- C. Linear Sediment Barriers: Made of silt fences.

1. Provide linear sediment barriers:
 - a. Along downhill perimeter edge of disturbed areas, including soil stockpiles.
2. Space sediment barriers with the following maximum slope length upslope from barrier:
 - a. Slope of Less Than 2 Percent: 100 feet..
 - b. Slope Between 2 and 5 Percent: 75 feet.
 - c. Slope Between 5 and 10 Percent: 50 feet.
 - d. Slope Between 10 and 20 Percent: 25 feet.
 - e. Slope Over 20 Percent: 15 feet.
- D. Storm Drain Curb Inlet Sediment Trap: Protect each curb inlet using one of the following measures:
 1. Filter fabric wrapped around hollow concrete blocks blocking entire inlet face area; use one piece of fabric wrapped at least 1-1/2 times around concrete blocks and secured to prevent dislodging; orient cores of blocks so runoff passes into inlet.
 2. Straw bale row blocking entire inlet face area; anchor into pavement.
- E. Storm Drain Drop Inlet Sediment Traps: As detailed on drawings.
- F. Temporary Splash Pads: Stone aggregate over filter fabric; size to suit application; provide at downspout outlets and storm water outlets.
- G. Soil Stockpiles: Protect using one of the following measures:
 1. Cover with polyethylene film, secured by placing soil on outer edges.
 2. Cover with mulch at least 4 inches thickness of pine needles, sawdust, bark, wood chips, or shredded leaves, or 6 inches of straw or hay.
- H. Mulching: Use only for areas that may be subjected to erosion for less than 6 months.
- I. Temporary Seeding: Use where temporary vegetated cover is required.

3.04 INSTALLATION

- A. Traffic-Bearing Aggregate Surface:
 1. Excavate minimum of 6 inches.
 2. Place geotextile fabric full width and length, with minimum 12 inch overlap at joints.
 3. Place and compact at least 6 inches of 1 1/2 to 3 1/2 inch diameter stone.
- B. Silt Fences:
 1. Store and handle fabric in accordance with ASTM D4873/D4873M.
 2. Where slope gradient is less than 3:1 or barriers will be in place less than 6 months, use nominal 16 inch high barriers with minimum 36 inch long posts spaced at 6 feet maximum, with fabric embedded at least 4 inches in ground.
 3. Where slope gradient is steeper than 3:1 or barriers will be in place over 6 months, use nominal 28 inch high barriers, minimum 48 inch long posts spaced at 6 feet maximum, with fabric embedded at least 6 inches in ground.
 4. Where slope gradient is steeper than 3:1 and vertical height of slope between barriers is more than 20 feet, use nominal 32 inch high barriers with woven wire reinforcement and steel posts spaced at 4 feet maximum, with fabric embedded at least 6 inches in ground.
 5. Install with top of fabric at nominal height and embedment indicated on drawings.
 6. Embed bottom of fabric in a trench on the upslope side of fence, with 2 inches of fabric laid flat on bottom of trench facing upslope; backfill trench and compact.
 7. Do not splice fabric width; minimize splices in fabric length; splice at post only, overlapping at least 18 inches, with extra post.
 8. Fasten fabric to wood posts using one of the following:
 - a. Four nails per post with 3/4 inch diameter flat or button head, 1 inch long, and 14 gauge, 0.083 inch shank diameter.
 - b. Five staples per post with at least 17 gauge, 0.0453 inch wire, 3/4 inch crown width and 1/2 inch long legs.

9. Fasten fabric to steel posts using wire, nylon cord, or integral pockets.
 10. Wherever runoff will flow around end of barrier or over the top, provide temporary splash pad or other outlet protection; at such outlets in the run of the barrier, make barrier not more than 12 inches high with post spacing not more than 4 feet.
- C. Erosion Control Blanket: As indicated on the Drawings.
- D. Mulching Over Large Areas:
1. Dry Straw and Hay: Apply 2-1/2 tons per acre; anchor using dull disc harrow or emulsified asphalt applied using same spraying machine at 100 gallons of water per ton of mulch.
 2. Erosion Control Matting: Comply with manufacturer's instructions.
- E. Mulching Over Small and Medium Areas:
1. Dry Straw and Hay: Apply 4 to 6 inches depth.
 2. Erosion Control Matting: Comply with manufacturer's instructions.
- F. Temporary Seeding:
1. When hydraulic seeder is used, seedbed preparation is not required.
 2. When surface soil has been sealed by rainfall or consists of smooth undisturbed cut slopes, and conventional or manual seeding is to be used, prepare seedbed by scarifying sufficiently to allow seed to lodge and germinate.
 3. If temporary mulching was used on planting area but not removed, apply nitrogen fertilizer at 1 pound per 1000 sq ft.
 4. On soils of very low fertility, apply 10-10-10 fertilizer at rate of 12 to 16 pounds per 1000 sq ft.
 5. Incorporate fertilizer into soil before seeding.
 6. Apply seed uniformly; if using drill or cultipacker seeders place seed 1/2 to 1 inch deep.
 7. Irrigate as required to thoroughly wet soil to depth that will ensure germination, without causing runoff or erosion.
 8. Repeat irrigation as required until grass is established.

3.05 MAINTENANCE

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

3.06 CLEAN UP

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

END OF SECTION

**SECTION 01 5813
TEMPORARY PROJECT SIGNAGE**

PART 1 GENERAL

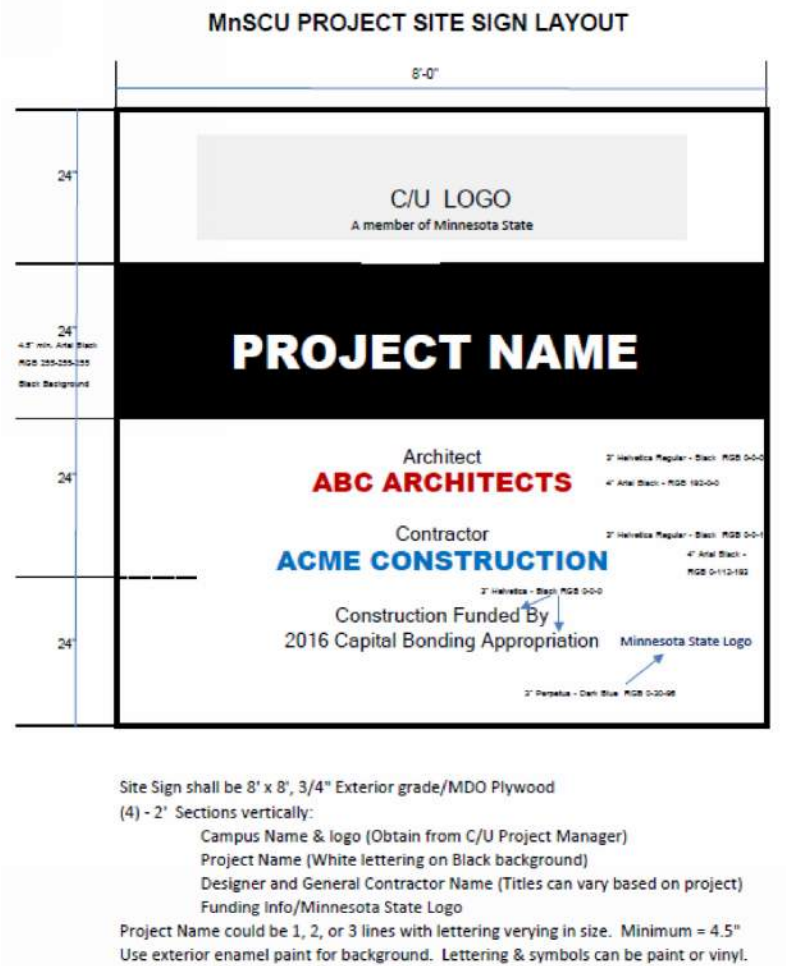
1.01 SECTION INCLUDES

- A. Project identification sign.

PART 2 PRODUCTS

2.01 PROJECT IDENTIFICATION SIGN

- A. Signage will be designed by the Architect based on lettering and logo information provided by the Owner and approved in advance by the Owner.
- B. Size: 8 feet X 8 feet.
- C. Material:
 - 1. 3/4" Exterior grade/MDO plywood (APA rating A-B).
 - 2. All fasteners shall be of a rustproof nature.
 - 3. All plywood and support lumber shall be painted white.
- D. Paint: Outdoor enamel - Background = White, RGB = 255-255-255.
- E. Content:
 - 1. Project Name:
 - a. White lettering with Black background. One, two or three lines depending on Project name.
 - b. Color: Lettering = White, RGB = 255-255-255. Background = Black, RGB 0-0-0.
 - c. Typeface: 4" minimum, Arial Black.
 - 2. Minnesota State Logo - Seal:
 - a. Color: Minnesota State Dark Blue (Pantone 2757) = RGB 00-30-96
 - b. Size: 12" – Top of Banner to bottom of Lettering
 - c. Tagline Color: Dark Blue = RGB 00-30-96
 - d. Type Face: 3" Perpetua primary, Palatino – alternate
 - e. Contact Minnesota State system office to obtain a copy of the Minnesota State Brand Identity Manual for more detail information on logo and brand requirements.
 - 3. College / University Logo: Obtain campus logo standards from the Campus Project Manager. Use lettering typeface and color standards of campus on white Background = White, RGB = 255-255-255.
 - 4. Names and titles of Architect and Consultants.
 - a. Color:
 - 1) Architect = Black – RGB 0-0-0
 - 2) Name of Firm = Red – RGB 192-0-0
 - 3) Background= White, RGB = 255-255-255
 - b. Typeface: Architect - 3" Helvetica Regular. Name of Firm - 4" Arial.
 - 5. Name of Contractor.
 - a. Color:
 - 1) Contractor - Black = RGB 0-0-0.
 - 2) Name of Firm - Blue = 0-112-192
 - b. Type face: Contractor - 3" Helvetica Regular. Name of Firm - 4" Arial.
 - 6. Funding Source: Obtain the funding information from the Owner.
 - a. Color: Black = RGB 0-0-0.
 - b. Type Face: 3" Helvetica
- F. Layout:



PART 3 EXECUTION

3.01 INSTALLATION

- A. Construction signage shall be erected prior to or at the start of construction and be maintained through final completion of the project.
- B. Project site signs shall not be erected on public highway rights-of-way. If any possibility exists for obstruction to traffic line of sight, the location and height of the sign will be coordinated with the agency responsible for highway or street safety in the area. Contractor shall coordinate location of sign with Owner.
- C. Signs shall be securely mounted at least 4 feet above the ground
- D. Install sign surface plumb and level, with butt joints. Anchor securely.

3.02 REMOVAL

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

END OF SECTION

**SECTION 01 6000
PRODUCT REQUIREMENTS**

PART 1 GENERAL

1.01 SECTION INCLUDES

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

1.02 REFERENCE STANDARDS

- A. 16 CFR 260.13 - Guides for the Use of Environmental Marketing Claims; Federal Trade Commission; Recycled Content; Current Edition.
- B. ANSI A138.1 - Green Squared American National Standard Specifications for Sustainable Ceramic Tiles, Glass Tiles, and Tile Installation Materials; 2011 (Reaffirmed 2021).
- C. ASTM D6866 - Standard Test Methods for Determining the Biobased Content of Solid, Liquid, and Gaseous Samples Using Radiocarbon Analysis; 2024a.
- D. C2C (DIR) - C2C Certified Products Registry; Cradle to Cradle Products Innovation Institute; Current Edition.
- E. CAL (CDPH SM) - Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers Version 1.2; 2017.
- F. EN 15804 - Sustainability of Construction Works - Environmental Product Declarations - Core Rules for the Product Category of Construction Products; 2022 (Corrigendum 2021).
- G. GreenScreen (LIST) - GreenScreen for Safer Chemicals List Translator; Clean Production Action; Current Edition.
- H. GreenScreen (METH) - GreenScreen for Safer Chemicals Method v1.2; Clean Production Action; Current Edition.
- I. ISO 14025 - Environmental Labels and Declarations - Type III Environmental Declarations - Principles and Procedures; 2006.
- J. ISO 14040 - Environmental Management - Life Cycle Assessment - Principles and Framework; 2006, with Amendment (2020).
- K. ISO 14044 - Environmental Management - Life Cycle Assessment - Requirements and Guidelines; 2006, with Amendment (2020).
- L. ISO 21930 - Sustainability in Buildings and Civil Engineering Works — Core Rules for Environmental Product Declarations of Construction Products and Services; 2017.
- M. NSF 332 - Sustainability Assessment for Resilient Floor Coverings; 2022.
- N. NSF/ANSI 140 - Sustainability Assessment for Carpet; 2024.
- O. UL 100 - Standard for Sustainability for Gypsum Boards and Panels; Current Edition, Including All Revisions.

1.03 SUBMITTALS

- A. Proposed Products List: Submit list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.
 - 1. Submit within 15 days after date of Agreement.

2. For products specified only by reference standards, list applicable reference standards.
- B. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.
- C. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
- D. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
 1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

1.04 QUALITY ASSURANCE

- A. Bio-Based Content: Of vegetable or animal origin, not including products made by killing the animal.
 1. Determine percentage of bio-based content in accordance with ASTM D6866.
 2. Materials that comply the requirements of USDA 7CFR Part 2902
- B. CAL (CDPH SM) v1.1: California Department of Public Health (CDPH) Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers, v. 1.1–2010, for the emissions testing and requirements of products and materials.
- C. Chain-of-Custody (COC): A procedure that tracks a product from the point of harvest or extraction to its end use, including successive stages of processing, transformation, manufacturing, and distribution.
- D. Chain-of-Custody Certificates: Certificates signed by manufacturers and fabricators certifying that wood used to make products was obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001.
- E. Composite Wood and Agrifiber: Products made of wood particles and/or plant material pressed and bonded with adhesive or resin such as particleboard, medium density fiberboard (MDF), plywood, wheatboard, strawboard, panel substrates, and door cores.
- F. Corporate Sustainability Report: A third-party verified report that outlines the environmental impacts of extraction operations and activities associated with the manufacturer's product and the product's supply chain.
- G. Cradle-to-Cradle Certified: End use product certified Cradle-to-Cradle v2 Basic or Cradle-to-Cradle v3 Bronze, minimum, as evidenced by C2C (DIR).
- H. Environmental Product Declaration (EPD): Publicly available, critically reviewed life cycle analysis having at least a cradle-to-gate scope.
 1. Good: Product-specific; compliant with ISO 14044.
 2. Better: Industry-wide, generic; compliant with ISO 21930, or with ISO 14044, ISO 14040, ISO 14025, and EN 15804; Type III third-party certification with external verification, in which the manufacturer is recognized as the program operator.
 3. Best: Commercial-product-specific; compliant with ISO 21930, or with ISO 14044, ISO 14040, ISO 14025, and EN 15804; Type III third-party certification with external verification, in which the manufacturer is recognized as the program operator.
 4. Where demonstration of impact reduction below industry average is required, submit both industry-wide and commercial-product-specific declarations; or submit at least 5 declarations for products of the same type by other manufacturers in the same industry.
- I. GreenScreen Chemical Hazard Analysis: Ingredients of 100 parts-per-million or greater evaluated using GreenScreen (METH).

1. Good: GreenScreen (LIST) evaluation to identify Benchmark 1 hazards; a Health Product Declaration includes this information.
 2. Better: GreenScreen Full Assessment.
 3. Best: GreenScreen Full Assessment by GreenScreen Licensed Profiler.
 4. Acceptable Evidence: GreenScreen report.
- J. Health Product Declarations (HPD): Complete, published declaration with full disclosure of known hazards, prepared using one of the HPDC (HPD-OLT) online tools.
- K. Manufacturer's Inventory of Product Content: Publicly available inventory of every ingredient identified by name and Chemical Abstract Service Registration Number (CAS RN).
1. For ingredients considered a trade secret or intellectual property, the name and CAS RN may be omitted, provided the ingredient's role, amount, and GreenScreen Benchmark are given.
- L. Multi-Attribute Certifications: Lifecycle-based environmental certifications that indicate that a product has undergone rigorous scientific testing, exhaustive auditing, or both, to prove its compliance with stringent, third-party, environmental performance standards. Third-party certifications include the following:
1. Green Squared/ANSI A138.1 for Ceramic Tiles, Glass Tiles and Tile Installation Materials.
 2. NSF/ANSI 140 Sustainability Assessment for Carpet.
 3. NSF 332 Sustainability Assessment for Resilient Floor Coverings.
 4. UL 100 Standard for Sustainability for Gypsum Board and Panels.
- M. Rapidly Renewable Materials: Made from agricultural products that are typically harvested within a 10-year or shorter cycle.
- N. Recycled Content: Determine percentage of post-consumer and pre-consumer (post-industrial) content separately, using the guidelines contained in 16 CFR 260.13.
1. Previously used, reused, refurbished, and salvaged products are not considered recycled.
 2. Wood fabricated from timber abandoned in transit to original mill is considered reused, not recycled.
 3. Determine percentage of recycled content of any item by dividing the weight of recycled content in the item by the total weight of materials in the item.
- O. Regional Materials: Materials that are extracted, harvested, recovered, and manufactured within a radius of 500 miles from the Project site.
- P. Reused Products: Materials and equipment previously used in this or other construction, salvaged and refurbished as specified.
1. Wood fabricated from timber abandoned in transit after harvesting is considered reused, not recycled.
 2. Acceptable Evidence: Information about the origin or source, from Contractor or supplier.
- Q. Source Location: Location of harvest, extraction, recovery, or manufacture; where information about source location is required to be submitted, give the postal address:
1. In every case, indicate the location of final assembly.
 2. For harvested products, indicate location of harvest.
 3. For extracted (i.e. mined) products, indicate location of extraction.
 4. For recovered products, indicate location of recovery.
 5. For products involving multiple manufacturing steps, provide a description of the process at each step, with location.
 6. Acceptable Evidence:
 - a. Manufacturer's certification.
 - b. Life cycle analysis (LCA) performed by third-party.
- R. Sustainably Harvested Wood: Solid wood, wood chips, and wood fiber certified or labeled by an accredited organization.
1. Wood products harvested in North America must be accredited by one of the following:

- a. American Forest Foundation, The American Tree Farm System (ATF); refer to <http://www.treefarmssystem.org>.
 - b. Canadian Sustainable Forest Management System (CSA), under CAN/CSA Z809; refer to <http://www.csasfmforests.ca>.
 - c. The Forest Stewardship Council (FSC), The Principles for Natural Forest Management; for Canada visit <http://www.fsccanada.org>, for the USA visit <http://www.fscus.org>.
 - d. Sustainable Forestry Board, under The Sustainable Forestry Initiative® of the American Forest & Paper Association (SFI); refer to <http://www.afandpa.org>.
2. Wood products harvested in North America must be accredited by one of the following:
 - a. The Forest Stewardship Council (FSC), The Principles for Natural Forest Management; for Canada visit <http://www.fsccanada.org>, for the USA visit <http://www.fscus.org>.
 - b. The Programme for the Endorsement of Forest Certification (PEFC); refer to <http://www.pefc.org>.
 3. Acceptable Evidence: Copies of invoices bearing the certifying organization's certification numbers.

PART 2 PRODUCTS

2.01 EXISTING PRODUCTS

- A. Do not use materials and equipment removed from existing premises unless specifically required or permitted by Contract Documents.
- B. Existing materials and equipment indicated to be removed, but not to be re-used, relocated, reinstalled, delivered to the Owner, or otherwise indicated as to remain the property of the Owner, become the property of the Contractor; remove from site.
- C. Specific Products to be Reused: The reuse of certain materials and equipment already existing on the project site is required.
 1. See Section 01 1000 for list of items required to be salvaged for reuse and relocation.
 2. If reuse of other existing materials or equipment is desired, submit substitution request.

2.02 NEW PRODUCTS

- A. Provide new products unless specifically required or permitted by Contract Documents.
- B. See Section 01 4000 - Quality Requirements, for additional source quality control requirements.
- C. Use of products having any of the following characteristics is not permitted:
 1. Made using or containing CFC's or HCFC's.
 2. Made of wood from newly cut old growth timber.
 3. Containing lead, cadmium, or asbestos.
- D. Where other criteria are met, Contractor shall give preference to products that:
 1. If used on interior, have lower emissions, as defined in Section 01 6116.
 2. If wet-applied, have lower VOC content, as defined in Section 01 6116.
 3. Are extracted, harvested, and/or manufactured closer to the location of the project.
 4. Have longer documented life span under normal use.
 5. Result in less construction waste. See Section 01 7419
 6. Are made of vegetable materials that are rapidly renewable.
 7. Are made of recycled materials.
 8. If made of wood, are made of sustainably harvested wood, wood chips, or wood fiber.
 9. If bio-based, other than wood, are or are made of Sustainable Agriculture Network certified products.
 10. Are Cradle-to-Cradle Certified.
 11. Have a published Environmental Product Declaration (EPD).
 12. Have a published Health Product Declaration (HPD).

13. Have a published GreenScreen Chemical Hazard Analysis.
14. Have a published Manufacturer's Inventory of Chemical Content.

2.03 PRODUCT OPTIONS

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

2.04 MAINTENANCE MATERIALS

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

PART 3 EXECUTION

3.01 SUBSTITUTION LIMITATIONS

- A. See Section 01 2500 - Substitution Procedures.

3.02 OWNER-SUPPLIED PRODUCTS

- A. See Section 01 1000 - Summary for identification of Owner-supplied products.
- B. Owner's Responsibilities:
 1. Arrange for and deliver Owner reviewed shop drawings, product data, and samples, to Contractor.
 2. Arrange and pay for product delivery to site.
 3. On delivery, inspect products jointly with Contractor.
 4. Submit claims for transportation damage and replace damaged, defective, or deficient items.
 5. Arrange for manufacturers' warranties, inspections, and service.
- C. Contractor's Responsibilities:
 1. Review Owner reviewed shop drawings, product data, and samples.
 2. Receive and unload products at site; inspect for completeness or damage jointly with Owner.
 3. Handle, store, install and finish products.
 4. Repair or replace items damaged after receipt.

3.03 TRANSPORTATION AND HANDLING

- A. Package products for shipment in manner to prevent damage; for equipment, package to avoid loss of factory calibration.
- B. If special precautions are required, attach instructions prominently and legibly on outside of packaging.
- C. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.
- D. Transport and handle products in accordance with manufacturer's instructions.
- E. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.
- F. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.

- G. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage, and to minimize handling.
- H. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

3.04 STORAGE AND PROTECTION

- A. Provide protection of stored materials and products against theft, casualty, or deterioration.
- B. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication. See Section 01 7419.
 - 1. Structural Loading Limitations: Handle and store products and materials so as not to exceed static and dynamic load-bearing capacities of project floor and roof areas.
- C. Store and protect products in accordance with manufacturers' instructions.
- D. Store with seals and labels intact and legible.
- E. Store sensitive products in weathertight, climate-controlled enclosures in an environment favorable to product.
- F. For exterior storage of fabricated products, place on sloped supports above ground.
- G. Provide off-site storage and protection when site does not permit on-site storage or protection.
- H. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.
- I. Comply with manufacturer's warranty conditions, if any.
- J. Do not store products directly on the ground.
- K. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
- L. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.
- M. Prevent contact with material that may cause corrosion, discoloration, or staining.
- N. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- O. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

END OF SECTION

SECTION 01 6116
VOLATILE ORGANIC COMPOUND (VOC) CONTENT RESTRICTIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Requirements for Indoor-Emissions-Restricted products.
- B. Requirements for VOC-Content-Restricted products.
- C. Requirement for installer certification that they did not use any non-compliant products.

1.02 DEFINITIONS

- A. Indoor-Emissions-Restricted Products: All products in the following product categories, whether specified or not:
 - 1. Interior paints and coatings applied on site.
 - 2. Interior adhesives and sealants applied on site, including flooring adhesives.
 - 3. Composite wood.
 - 4. Other products when specifically stated in the specifications.
- B. VOC-Content-Restricted Products: All products in the following product categories, whether specified or not:
 - 1. Interior paints and coatings applied on site.
 - 2. Interior adhesives and sealants applied on site, including flooring adhesives.
 - 3. Other products when specifically stated in the specifications.
- C. Interior of Building: Anywhere inside the exterior weather barrier.
- D. Adhesives: All gunnable, trowelable, liquid-applied, and aerosol adhesives, whether specified or not; including flooring adhesives, resilient base adhesives, and pipe jointing adhesives.
- E. Sealants: All gunnable, trowelable, and liquid-applied joint sealants and sealant primers, whether specified or not; including firestopping sealants and duct joint sealers.
- F. Inherently Non-Emitting Materials: Products composed wholly of minerals or metals, unless they include organic-based surface coatings, binders, or sealants; and specifically the following:
 - 1. Concrete.
 - 2. Metals that are plated, anodized, or powder-coated.
 - 3. Glass.
 - 4. Ceramics.

1.03 REFERENCE STANDARDS

- A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; Current Edition.
- B. CAL (CDPH SM) - Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers Version 1.2; 2017.
- C. CARB (ATCM) - Airborne Toxic Control Measure to Reduce Formaldehyde Emissions from Composite Wood Products; Current Edition.
- D. CARB (SCM) - Suggested Control Measure for Architectural Coatings; California Air Resources Board; 2020.
- E. CHPS (HPPD) - High Performance Products Database; Current Edition.
- F. CRI (GLP) - Green Label Plus Testing Program - Certified Products; Current Edition.
- G. GreenSeal GS-36 - Standard for Adhesives for Commercial Use; 2025.
- H. SCAQMD 1113 - Architectural Coatings; 1977, with Amendment (2016).
- I. SCAQMD 1168 - Adhesive and Sealant Applications; 1989, with Amendment (2022).
- J. SCS (CPD) - SCS Certified Products; Current Edition.

- K. UL (GGG) - GREENGUARD Gold Certified Products; Current Edition.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data: For each VOC-restricted product used in the project, submit evidence of compliance.
- C. Installer Certifications Regarding Prohibited Content: Require each installer of any type of product (not just the products for which VOC restrictions are specified) to certify that either 1) no adhesives, joint sealants, paints, coatings, or composite wood or agrifiber products have been used in the installation of installer's products, or 2) that such products used comply with these requirements.

1.05 QUALITY ASSURANCE

- A. Indoor Emissions Standard and Test Method: CAL (CDPH SM), using Standard Private Office exposure scenario and the allowable concentrations specified in the method, and range of total VOC's after 14 days.
 - 1. Wet-Applied Products: State amount applied in mass per surface area.
 - 2. Paints and Coatings: Test tinted products, not just tinting bases.
 - 3. Evidence of Compliance: Acceptable types of evidence are the following;
 - a. Current UL (GGG) certification.
 - b. Current SCS (CPD) Floorscore certification.
 - c. Current SCS (CPD) Indoor Advantage Gold certification.
 - d. Current listing in CHPS (HPPD) as a low-emitting product.
 - e. Current CRI (GLP) certification.
 - f. Test report showing compliance and stating exposure scenario used.
 - 4. Product data submittal showing VOC content is NOT acceptable evidence.
 - 5. Manufacturer's certification without test report by independent agency is NOT acceptable evidence.
- B. Composite Wood Emissions Standard: CARB (ATCM) for ultra-low emitting formaldehyde (ULEF) resins.
 - 1. Evidence of Compliance: Acceptable types of evidence are:
 - a. Current SCS "No Added Formaldehyde (NAF)" certification; www.scs-certified.com.
 - b. Report of laboratory testing performed in accordance with requirements.
 - c. Published product data showing compliance with requirements.
- C. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.

PART 2 PRODUCTS

2.01 MATERIALS

- A. All Products: Comply with the most stringent of federal, State, and local requirements, or these specifications.
- B. Indoor-Emissions-Restricted Products: Comply with Indoor Emissions Standard and Test Method, except for:
 - 1. Composite Wood, Wood Fiber, and Wood Chip Products: Comply with Composite Wood Emissions Standard or contain no added formaldehyde resins.
 - 2. Inherently Non-Emitting Materials.
- C. VOC-Content-Restricted Products: VOC content not greater than required by the following:
 - 1. Adhesives, Including Flooring Adhesives: SCAQMD 1168 Rule.
 - 2. Aerosol Adhesives: GreenSeal GS-36.
 - 3. Joint Sealants: SCAQMD 1168 Rule.
 - 4. Paints and Coatings: Each color; most stringent of the following:

- a. 40 CFR 59, Subpart D.
- b. SCAQMD 1113 Rule.
- c. CARB (SCM).

PART 3 EXECUTION

3.01 FIELD QUALITY CONTROL

- A. Owner reserves the right to reject non-compliant products, whether installed or not, and require their removal and replacement with compliant products at no extra cost to Owner.
- B. Additional costs to restore indoor air quality due to installation of non-compliant products will be borne by Contractor.

END OF SECTION

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**SECTION 01 6116.01
ACCESSORY MATERIAL VOC CONTENT CERTIFICATION FORM**

FORM

1.01 IDENTIFICATION:

- A. Project Name: ATCC-23 Transportation Center
- B. Project No.: 230736
- C. Architect: Sara Phillips, LHB Inc.

1.02 USE OF THIS FORM:

- A. Because installers are allowed and directed to choose accessory materials suitable for the applicable installation, there is a possibility that such accessory materials might contain VOC content in excess of that permitted, especially where such materials have not been explicitly specified.
- B. Contractor is required to obtain and submit this form from each installer of work on this project.
- C. For each product category listed, circle the correct words in brackets: either [HAS] or [HAS NOT].
- D. If any of these accessory materials has been used, attach to this form product data and MSDS sheet for each such product.

1.03 VOC CONTENT RESTRICTIONS ARE SPECIFIED IN SECTION 01 6116.

2.01 PRODUCT CERTIFICATION

- A. I certify that the installation work of my firm on this project:
 - 1. [HAS] [HAS NOT] required the use of any ADHESIVES.
 - 2. [HAS] [HAS NOT] required the use of any JOINT SEALANTS.
 - 3. [HAS] [HAS NOT] required the use of any PAINTS OR COATINGS.
 - 4. [HAS] [HAS NOT] required the use of any COMPOSITE WOOD or AGRIFIBER PRODUCTS.
- B. Product data and MSDS sheets are attached.

3.01 CERTIFIED BY: (INSTALLER/MANUFACTURER/SUPPLIER FIRM)

- A. Firm Name: _____
- B. Print Name: _____
- C. Signature: _____
- D. Title: _____ (officer of company)
- E. Date: _____

END OF SECTION

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SECTION 01 7000
EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Examination, preparation, and general installation procedures.
- B. Requirements for alterations work, including selective demolition.
- C. Pre-installation meetings.
- D. Cutting and patching.
- E. Surveying for laying out the work.
- F. Cleaning and protection.
- G. Starting of systems and equipment.
- H. Closeout procedures, including Contractor's Correction Punch List, except payment procedures.
- I. General requirements for maintenance service.

1.02 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Survey work: Submit name, address, and telephone number of Surveyor before starting survey work.
 - 1. On request, submit documentation verifying accuracy of survey work.
 - 2. Submit a copy of site drawing signed by the Land Surveyor, that the elevations and locations of the work are in compliance with Contract Documents.
 - 3. Submit surveys and survey logs for the project record.
- C. Cutting and Patching: Submit written request in advance of cutting or alteration that affects:
 - 1. Structural integrity of any element of Project.
 - 2. Integrity of weather exposed or moisture resistant element.
 - 3. Efficiency, maintenance, or safety of any operational element.
 - 4. Visual qualities of sight exposed elements.
 - 5. Work of Owner or separate Contractor.
- D. Project Record Documents: Accurately record actual locations of capped and active utilities.

1.03 QUALIFICATIONS

1.04 PROJECT CONDITIONS

- A. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.
- B. Dust Control: Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere and over adjacent property.
 - 1. Provide dust-proof barriers between construction areas and areas continuing to be occupied by Owner.
- C. Noise Control: Provide methods, means, and facilities to minimize noise produced by construction operations.
 - 1. Outdoors: Limit conduct of especially noisy exterior work to the hours of 8 am to 5 pm.
 - 2. Indoors: Limit conduct of especially noisy interior work to the hours of 6 pm to 7 am.
- D. Pest and Rodent Control: Provide methods, means, and facilities to prevent pests and insects from damaging the work.

- E. Rodent Control: Provide methods, means, and facilities to prevent rodents from accessing or invading premises.
- F. Pollution Control: Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations. Comply with federal, state, and local regulations.

PART 2 PRODUCTS

2.01 PATCHING MATERIALS

- A. New Materials: As specified in product sections; match existing products and work for patching and extending work.
- B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.
- C. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 01 2500 - Substitution Procedures.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.
- B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.
- C. Examine and verify specific conditions described in individual specification sections.
- D. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misfabrication.
- E. Verify that utility services are available, of the correct characteristics, and in the correct locations.
- F. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

3.02 PREPARATION

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

3.03 PREINSTALLATION MEETINGS

- A. When required in individual specification sections, convene a preinstallation meeting at the site prior to commencing work of the section.
- B. Require attendance of parties directly affecting, or affected by, work of the specific section.
- C. Notify Owner and Architect seven (7) days in advance of meeting date.
- D. Prepare agenda and preside at meeting:
 - 1. Confirm required submittals have been reviewed.
 - 2. Review conditions of examination, preparation and installation procedures.
 - 3. Review coordination with related work.
- E. Record minutes and distribute copies within four days after meeting to participants, with electronic copies to Architect, Owner, Owner's Consultants, participants, and those affected by decisions made.

- F. The following Pre-Installation meetings are, at the discretion of the Owner, to be scheduled the same day as regular progress review meetings:
1. Quality Control meeting.
 2. Building Envelope Pre-installation Meeting and Mock-8
 3. Excavation, backfill.
 4. Concrete formwork, placing, and back-shoring.
 5. Concrete topping.
 6. Waterproofing.
 7. Masonry mockup: Mortar, masonry, through-wall flashing, and air/vapor barrier.
 8. Roof and roof sheet metal flashing.
 9. Windows and curtain wall installation.
 10. Sealants.
 11. Cabinetry and casework.
 12. Specialty flooring.
 13. Systems or custom furniture.

3.04 LAYING OUT THE WORK

3.05 GENERAL INSTALLATION REQUIREMENTS

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

3.06 ALTERATIONS

- A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
 1. Verify that construction and utility arrangements are as indicated.
 2. Report discrepancies to Architect before disturbing existing installation.
 3. Beginning of alterations work constitutes acceptance of existing conditions.
- B. Keep areas in which alterations are being conducted separated from other areas that are still occupied.
 1. Provide, erect, and maintain temporary dustproof partitions of construction specified in Section 01 5000 in locations as needed to protect occupied areas of the building.
- C. Remove existing work as indicated and as required to accomplish new work.
 1. Remove items indicated on drawings.
 2. Relocate items indicated on drawings.
 3. Where new surface finishes are to be applied to existing work, perform removals, patch, and prepare existing surfaces as required to receive new finish; remove existing finish if necessary for successful application of new finish.
 4. Where new surface finishes are not specified or indicated, patch holes and damaged surfaces to match adjacent finished surfaces as closely as possible.
- D. Protect existing work to remain.
 1. Prevent movement of structure; provide shoring and bracing if necessary.
 2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
 3. Repair adjacent construction and finishes damaged during removal work.
- E. Adapt existing work to fit new work: Make as neat and smooth transition as possible.

1. When existing finished surfaces are cut so that a smooth transition with new work is not possible, terminate existing surface along a straight line at a natural line of division and make recommendation to Architect.
 2. Where removal of partitions or walls results in adjacent spaces becoming one, rework floors, walls, and ceilings to a smooth plane without breaks, steps, or bulkheads.
 3. Where a change of plane of 1/4 inch or more occurs in existing work, submit recommendation for providing a smooth transition for Architect review and request instructions.
 4. Trim existing wood doors as necessary to clear new floor finish. Refinish trim as required.
- F. Patching: Where the existing surface is not indicated to be refinished, patch to match the surface finish that existed prior to cutting. Where the surface is indicated to be refinished, patch so that the substrate is ready for the new finish.
- G. Refinish existing surfaces as indicated:
1. Where rooms or spaces are indicated to be refinished, refinish all visible existing surfaces to remain to the specified condition for each material, with a neat transition to adjacent finishes.
 2. If mechanical or electrical work is exposed accidentally during the work, re-cover and refinish to match.
- H. Clean existing systems and equipment.
- I. Remove demolition debris and abandoned items from alterations areas and dispose of off-site; do not burn or bury.
- J. Do not begin new construction in alterations areas before demolition is complete.
- K. Comply with all other applicable requirements of this section.

3.07 CUTTING AND PATCHING

- A. Whenever possible, execute the work by methods that avoid cutting or patching.
- B. See Alterations article above for additional requirements.
- C. Perform whatever cutting and patching is necessary to:
1. Complete the work.
 2. Fit products together to integrate with other work.
 3. Provide openings for penetration of mechanical, electrical, and other services.
 4. Match work that has been cut to adjacent work.
 5. Repair areas adjacent to cuts to required condition.
 6. Repair new work damaged by subsequent work.
 7. Remove samples of installed work for testing when requested.
 8. Remove and replace defective and non-complying work.
- D. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.
- E. Employ skilled and experienced installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces if warranty of work is still in effect.
- F. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.
- G. Restore work with new products in accordance with requirements of Contract Documents.
- H. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- I. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material in accordance with Section 07 8400, to full thickness of the penetrated element.

- J. Patching:
1. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
 2. Match color, texture, and appearance.
 3. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate prior to repairing finish.

3.08 PROGRESS CLEANING

- A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.
- B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.
- C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.
- D. Collect and remove waste materials, debris, and trash/rubbish from site periodically and dispose off-site; do not burn or bury.

3.09 PROTECTION OF INSTALLED WORK

- A. Protect installed work from damage by construction operations.
- B. Provide special protection where specified in individual specification sections.
- C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.
- D. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
- E. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
- F. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.
- G. Remove protective coverings when no longer needed; reuse or recycle coverings if possible.

3.10 SYSTEM STARTUP

- A. Coordinate schedule for start-up of various equipment and systems.
- B. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions that may cause damage.
- C. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.
- D. Verify that wiring and support components for equipment are complete and tested.
- E. Execute start-up under supervision of applicable Contractor personnel and manufacturer's representative in accordance with manufacturers' instructions.
- F. When specified in individual specification Sections, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.
- G. Submit a written report that equipment or system has been properly installed and is functioning correctly.

3.11 DEMONSTRATION AND INSTRUCTION

- A. See Section 01 7900 - Demonstration and Training.

3.12 ADJUSTING

- A. Adjust operating products and equipment to ensure smooth and unhindered operation.
- B. Testing, adjusting, and balancing HVAC systems: See Section 23 0593 - Testing, Adjusting, and Balancing for HVAC.

3.13 FINAL CLEANING

- A. Execute final cleaning prior to final project assessment.
- B. Use cleaning materials that are nonhazardous, with low-VOC content. Verify they are appropriate to material being cleaned.
- C. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.
- D. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.
- E. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.
- F. Replace filters of operating equipment.
- G. Clean debris from roofs, gutters, downspouts, scuppers, overflow drains, area drains, and drainage systems.
- H. Clean site; sweep paved areas, rake clean landscaped surfaces.
- I. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

3.14 CLOSEOUT PROCEDURES

- A. Make submittals that are required by governing or other authorities.
 - 1. Provide copies to Architect.
- B. Complete Minnesota State project closeout procedures available at https://www.minnstate.edu/system/finance/facilities/design-construction/pm_emanual/index.html and included at the end of this section.
 - 1. Contractor Substantial Completion Checklist.
 - 2. Contractor Final Completion Checklist
 - 3. Closeout procedures shall be completed in the EPMS (e-Builder).
- C. As a condition of and prior to Project Final Completion of the Contract, the Contractor shall prepare and submit to the Architect for approval and delivery to the Owner, signed copies of each of the following:
 - 1. "Withholding Tax Affidavit" forms, Minnesota Department of Revenue Form IC-134, for the Contractor and all Subcontractors, in accordance with form instructions.
 - 2. Consent of Surety.
 - 3. All Mechanical Systems certified Test and Balance Reports.
 - 4. Punchlist: Contractor noting completion of each item.
 - 5. Contractor Final Completion Checklist: Noting completion of each item
 - 6. A written check list describing all extra materials specified in the various technical Specifications Sections and as delivered to the Owner. Include signature of Owner's Designated Representative indicating acceptance of each material.
 - 7. Updated Subcontractors and Products Lists indicating final Record Information for the following: firm name, address, telephone and contact person, type of work or product, brand name or manufacturer's name, and model number, all in the sequential order of the Project Manual.
 - 8. All Project Record Documents as specified in Section 01 7800, submitted in final form.
 - 9. All Operating and Maintenance Data as specified in Section 01 7800.

10. Confirmed specific written arrangements for the Owner's designated operating and maintenance personnel to receive instructions in the operation, adjustment and maintenance of all products, equipment and systems as specified in Section 01 7800. All written Warranties and Guarantees as specified per individual Specifications Sections, submitted as described in Section 01 7800.
 11. A total Contract Warranty as specified in Section 01 7800.
 12. Refer to Section 01 780001 7800 for further information regarding Final Completion submittals.
- D. Notify Architect when work is considered ready for Architect's Substantial Completion in compliance with the requirements of the General Conditions. Provide Punch List created during preliminary inspection.
 - E. Submit written certification containing Contractor's Correction Punch List, that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Architect's Substantial Completion inspection.
 - F. Conduct Substantial Completion inspection and create Final Correction Punch List containing Architect's and Contractor's comprehensive list of items identified to be completed or corrected and submit to Architect.
 - G. Correct items of work listed in Final Correction Punch List and comply with requirements for access to Owner-occupied areas.
 - H. Notify Architect when work is considered finally complete and ready for Architect's Substantial Completion final inspection.
 - I. Complete items of work determined by Architect listed in executed Certificate of Substantial Completion.

3.15 MAINTENANCE

- A. Provide service and maintenance of components indicated in specification sections.
- B. Maintenance Period: As indicated in specification sections or, if not indicated, not less than one year from the Date of Substantial Completion or the length of the specified warranty, whichever is longer.
- C. Examine system components at a frequency consistent with reliable operation. Clean, adjust, and lubricate as required.
- D. Include systematic examination, adjustment, and lubrication of components. Repair or replace parts whenever required. Use parts produced by the manufacturer of the original component.
- E. Maintenance service shall not be assigned or transferred to any agent or subcontractor without prior written consent of the Owner.

END OF SECTION

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**SECTION 01 7100
SITE EXECUTION REQUIREMENTS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Governing Specification - Reference specification for civil work.
- B. Utility Property and Service - Identifying and working around existing utilities.

1.02 REFERENCE STANDARDS

- A. CEAM - City Engineers of Minnesota Standard Specifications; 2018.
- B. Mn/DOT Standard Specifications for Construction - Mn/DOT Standard Specifications for Construction; latest edition.

1.03 GOVERNING SPECIFICATION

- A. Mn/DOT Standard Specifications for Construction, 2018 Edition shall apply on all Division 31 through 35 work, except as modified or altered in the following sections: 31 0000 through 35 9999
- B. City Engineers Association of Minnesota (CEAM) - Standard Specifications 2018 Edition.
- C. All traffic control devices and signing shall conform to the MN MUTCD 2014, including the most current edition of the field manual. The Contractor is responsible for all traffic control on the Project.
- D. All references to measurement and payment in the Governing Specifications shall not apply.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 UTILITY AND PROPERTY SERVICE

- A. Construction operations in proximity of utility properties shall be performed in accordance with the provisions of MnDOT 1507, except as modified below:
 - 1. Interference of Underground Structures
 - a. When any underground structure interferes with planned placement of the pipeline or appurtenances, to such an extent that alterations in the work are necessary to eliminate conflict or avoid endangering effects on either existing or proposed facilities, Contractor shall immediately notify Engineer of the affected structure. When any existing facilities are endangered by Contractor's operations, Contractor shall cease work associated with the interference and take such precautions as may be necessary to protect in-place structures until a decision is made as to how the conflict will be resolved.
 - b. Without specific authorization from Engineer, no essential utility service shall be disrupted, nor shall any change be made in either the existing structures or the planned installations to overcome the interference. Alterations in existing facilities will be allowed only to the extent that service will not be curtailed unavoidably, and then only when the encroachment or relocation will satisfy all applicable regulations and conditions.
 - c. Whenever alterations are required as a result of unforeseen underground interferences, not due to any fault or negligence of Contractor, Engineer will issue a written order covering any additional or extra work involved and specifying the revised basis of payment, if any. Any alterations made strictly for the convenience of Contractor shall be subject to prior approval and shall be at Contractor's expense.

END OF SECTION

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**SECTION 01 7123
CONSTRUCTION SURVEYING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Construction surveying by Contractor.

1.02 DESCRIPTION OF SERVICES

- A. Specific services listed in this section are in addition to, and do not supersede, general Execution and Closeout Requirements.
- B. Sole responsibility for establishing all locations, dimensions and levels of items of work.
- C. Sole responsibility for provision of all materials required to establish and maintain benchmarks and control points, including batter boards, grade stakes, structure, and pipeline elevation stakes, and other items.
- D. Preparation and maintenance of professional-quality, accurate, well organized, legible notes of all measurements and calculations made while surveying and laying out the work.

1.03 REFERENCE STANDARDS

- A. 29 CFR 1926 - Safety and Health Regulations for Construction; Current Edition.

1.04 DEFINITIONS

- A. Construction Surveying: Accurately providing all necessary computations, stakes and marks to establish lines, slopes, elevations, points, continuous profile grades and the requirements shown in the Contract Documents for Construction Staking; so that the Contractor is able to construct all the required work for the Project in accordance with the Contract requirements; and so that the Owner's Engineers and Inspectors are able to complete all necessary inspection and Contract Administration duties.

1.05 ADMINISTRATIVE REQUIREMENTS

- A. Preconstruction Meeting: At the preconstruction conference, the Contractor shall submit to the Architect for approval, a written Construction Surveying Work Plan and Schedule, detailing the following
 1. Pertinent information as to how the requirements in these specifications are being met by the Contractor's Surveyor.
 2. A proposed method of communications between the Contractor, Contractor's Surveyor, Architect, and the Owner.
 3. How and when the Contractor's Surveyor will make delivery of the as-built survey data to the Engineer.
- B. The Contractor shall give the Architect a 14-calendar day written notice before the Contractor needs the Architect to establish any horizontal and vertical control points in the Plan for Construction Surveying.

1.06 COORDINATION

- A. The Owner's Engineer has set the initial horizontal and vertical control points in the field for the Project as indicated in the Plans. Upon request by the Contractor, the Architect will also provide electronic data in the format that was used in the accomplishment of the surveys for the Construction Plan, and in Construction Plan development itself. Refer to Section 01 3000 - Administrative Requirements for Electronic Drawing Files.

1. Due to the many different processes that the design survey data goes through and the large variety of sources of input in the final production of the Plan itself, no warrantee is made as to the value or adaptability of the electronic data to the Contractor. No warrantee is made that the data systems used by the Architect, or any consultants employed by the Owner for Surveying or Construction Plan preparation, will be compatible with the systems used by the Contractor. Information shown on the printed "Plan" shall always govern over any electronic "Plan" data.
- B. At the discretion of the Owner's Engineer, spot checks may be performed upon the Contractor's surveying calculations, records, field procedures, and actual staking. If the Architect determines that the work is not being performed in a manner that will assure proper controls and accuracy, the Architect will order the Contractor to redo such work to the standards specified in the Contract, at no additional cost to the Owner.

1.07 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Informational Submittals: Submit the following:
 1. As-built Survey Data:
 - a. Changes from the Drawings:
 - 1) Manhole and catch basin inverts and top of castings
 - 2) Entrance floor elevations
 - 3) Valve box covers
 - 4) Fence and gate locations
 - 5) Contours of constructed stormwater ponds and swales
 - b. Locations of utilities relocated or replaced as part of the Project.
 - c. Identify any alignment, property, or control monumentation destroyed or placed during the Project.
 - d. The information shall include the X, Y and if applicable, the Z coordinates in the Project datum. If the original item had no coordinate reference, then show the revised centerline station and offset.
 - e. Provide in both electronic AutoCAD and PDF format.
 - f. Furnish survey documentation and as-built survey data to the Architect within the time limits indicated in the surveying work schedule and prior to application for final payment.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify layout information shown on drawings in relation to property survey and existing benchmarks.
- B. Notify Owner's representative and Architect of discrepancies immediately in writing before proceeding to lay out work.
- C. Locate and protect existing benchmarks, base lines, and demarcations. Preserve permanent reference points during construction.

3.02 VERIFICATION OF EXISTING AND INSTALLED CONDITIONS

- A. Prior to layout and construction of proposed improvements, the Contractor shall field-verify all existing conditions, including but not limited to pavements, entries, curbs, utilities, and other adjacent infrastructure that may affect grading, alignment, or placement of new work.
- B. The Contractor shall also verify all work installed under this Contract that is to serve as a basis for subsequent construction, ensuring that such work has been installed in accordance with the Contract Documents.

- C. The Contractor shall immediately notify the Architect in writing of any discrepancies, conflicts, or conditions that may impact the proposed work. Work shall not proceed in areas where discrepancies exist until written direction is received from the Architect.
- D. Failure to perform such verification shall not relieve the Contractor of responsibility for proper installation. Any work installed incorrectly due to the Contractor's failure to verify conditions shall be removed and replaced at the Contractor's sole expense.

3.03 CONSTRUCTION SURVEYING

- A. General: Perform all Construction Surveying as applicable to specific items necessary for proper execution of work.
 - 1. Contractor is advised that the Contract Documents may not fully describe every detail or make specific allowances for all probable exceptions and contingencies related to Construction Surveying requirements for this Project.
 - 2. The building location and layout shall be established from the Architectural and Structural Drawings. Electronic data shall not be used to set the building location and/or layout. The Contractor shall verify the building location with site interfaces including but not limited to utilities, sidewalks, existing grades, and proposed grades. The Contractor shall field verify all dimensions prior to executing the work.
- B. Staking shall include, but not be limited to clearing, grubbing, removals, grading, culverts, embankments, borrow, aggregate base course, pavements, buildings, utilities, signs, pavement parking, erosion control and turf establishment items to complete the Project as represented in the Plans. The surveying must be done in a way that is timely, and that is reflective of the continuing and ongoing nature of construction and inspection activities which will generally require frequent, separate Project visits by the Contractor's survey crew to the Project to accommodate the various stages of construction and inspection activities that will occur.
- C. Contractor shall be prepared to make all necessary surveying checks for field verification of actual conditions and shall make the necessary minor surveying and staking adjustments to fit the construction to actual field conditions. In addition, some Plan details may be dependent upon actual field conditions at the time of construction. It may be necessary to perform some field surveying or office computations in order to stake these components. All work referred to in this paragraph is considered part of the work of Construction Surveying and no additional payment will be made for this work.
- D. Contractor is responsible for the preservation of all reference points, monuments, government land corners, horizontal and vertical control points, stakes, and marks that are established by the Architect or others within the Project limits. If the Contractor or its surveyor fails to preserve these items, and if they must be re-established by the Owner, the Architect will deduct a charge from monies due or becoming due the Contractor according to the Owner's costs.
- E. Verify the original site control points provided on the plans by the Contractor's surveyor. Any site control points subject to disturbance by the planned construction operations shall be transferred by the Contractor to an undisturbed location on the site or to an offsite location. Contractor shall preserve, protect and maintain a minimum of three site control points at all times throughout the duration of construction and for a period of one year following substantial completion of the project.
- F. Start and end all level runs, traverses, or GPS control surveys from known control.

3.04 RECORDS

- A. Maintain at the Site a complete and accurate log of control and survey work as it progresses.

1. Organize and record survey data in accordance with recognized professional surveying standards, Laws and Regulations, and prevailing standards of practice in the State in which the Project is located. Record Contractor's surveyor's original field notes, computations, and other surveying data in Contractor-furnished hard-bound field books. Contractor is solely responsible for completeness and accuracy of survey work, and completeness and accuracy of survey records, including field books. Survey records,(including field books) may be rejected by Owner due to failure to organize and maintain survey records in a manner that allows reasonable and independent verification of calculations, and/or allows identification of elevations, dimensions, and grades of the work.
 2. Illegible notes or data, and erasures on any page of field books, are unacceptable. Do not submit copied notes or data. Corrections by ruling or lining out errors will be unacceptable unless initialed by the surveyor. Violation of these requirements may require re-surveying the data questioned by Architect.
- B. Submit three copies of final property survey to Owner. Include on the survey a certification, signed by the surveyor, that principal metes, bounds, lines, and levels of the Project are accurately positioned as shown on the survey. Include the following information:
1. Dimensions and locations of drives, walks, walls, underground utilities, appurtenances, major site features, and stormwater management areas.
 2. Final grading topographic survey.

END OF SECTION

**SECTION 01 7419
CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL**

PART 1 GENERAL

1.01 WASTE MANAGEMENT REQUIREMENTS

- A. Owner requires that this project generate the least amount of trash and waste possible.
- B. Employ processes that ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors.
- C. Minimize trash/waste disposal in landfills; reuse, salvage, or recycle as much waste as economically feasible.
 - 1. At least 75% of nonhazardous construction and demolition waste must be diverted from landfill to comply with Minnesota B3 Sustainability Guidelines requirements.
- D. Required Recycling, Salvage, and Reuse: The following may not be disposed of in landfills or by incineration:
 - 1. Aluminum and plastic beverage containers.
 - 2. Corrugated cardboard.
 - 3. Wood pallets.
 - 4. Clean dimensional wood.
 - 5. Land clearing debris, including brush, branches, logs, and stumps; see Section 31 1000 - Site Clearing for use options.
 - 6. Concrete: May be crushed and used as riprap, aggregate, sub-base material, or fill.
 - 7. Bricks: May be used on project if whole, or crushed and used as landscape cover, sub-base material, or fill.
 - 8. Concrete masonry units: May be used on project if whole, or crushed and used as sub-base material or fill.
 - 9. Precast concrete panels: May be used for erosion control or landscape features.
 - 10. Asphalt paving: May be recycled into paving for project.
 - 11. Metals, including packaging banding, metal studs, sheet metal, structural steel, piping, reinforcing bars, door frames, and other items made of steel, iron, galvanized steel, stainless steel, aluminum, copper, zinc, lead, brass, and bronze.
 - 12. Glass.
 - 13. Gypsum drywall and plaster.
 - 14. Plastic buckets.
 - 15. Carpet, carpet cushion, carpet tile, and carpet remnants, both new and removed: DuPont (<http://flooring.dupont.com>) and Interface (www.interfaceinc.com) conduct reclamation programs.
 - 16. Paint.
 - 17. Plastic sheeting.
 - 18. Rigid foam insulation.
 - 19. Windows, doors, and door hardware.
 - 20. Plumbing fixtures.
 - 21. Mechanical and electrical equipment.
 - 22. Fluorescent lamps (light bulbs).
 - 23. Acoustical ceiling tile and panels.
- E. Contractor Reporting Responsibilities: Submit periodic Waste Disposal Reports; report landfill disposal, recycling, salvage, and reuse regardless of to whom the cost or savings accrues; use the same units of measure on required reports.
- F. Develop and follow a Waste Management Plan designed to implement these requirements.
- G. Methods of trash/waste disposal that are not acceptable are:
 - 1. Burning on the project site.

2. Burying on the project site.
 3. Dumping or burying on other property, public or private.
 4. Other illegal dumping or burying.
 5. Incineration, either on- or off-site.
- H. Regulatory Requirements: Contractor is responsible for knowing and complying with regulatory requirements, including but not limited to Federal, state and local requirements, pertaining to legal disposal of all construction and demolition waste materials.

1.02 DEFINITIONS

- A. Clean: Untreated and unpainted; not contaminated with oils, solvents, caulk, or the like.
- B. Construction and Demolition Waste: Solid wastes typically including building materials, packaging, trash, debris, and rubble resulting from construction, remodeling, repair and demolition operations.
- C. Hazardous: Exhibiting the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity or reactivity.
- D. Nonhazardous: Exhibiting none of the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity, or reactivity.
- E. Nontoxic: Neither immediately poisonous to humans nor poisonous after a long period of exposure.
- F. Recyclable: The ability of a product or material to be recovered at the end of its life cycle and remanufactured into a new product for reuse by others.
- G. Recycle: To remove a waste material from the project site to another site for remanufacture into a new product for reuse by others.
- H. Recycling: The process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for the purpose of using the altered form. Recycling does not include burning, incinerating, or thermally destroying waste.
- I. Return: To give back reusable items or unused products to vendors for credit.
- J. Reuse: To reuse a construction waste material in some manner on the project site.
- K. Salvage: To remove a waste material from the project site to another site for resale or reuse by others.
- L. Sediment: Soil and other debris that has been eroded and transported by storm or well production run-off water.
- M. Source Separation: The act of keeping different types of waste materials separate beginning from the first time they become waste.
- N. Toxic: Poisonous to humans either immediately or after a long period of exposure.
- O. Trash: Any product or material unable to be reused, returned, recycled, or salvaged.
- P. Waste: Extra material or material that has reached the end of its useful life in its intended use. Waste includes salvageable, returnable, recyclable, and reusable material.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Submit Waste Management Plan within 10 calendar days after receipt of Notice of Award of Bid, or prior to any trash or waste removal, whichever occurs sooner; submit projection of all trash and waste that will require disposal and alternatives to landfilling.
1. For the purposes of the Waste Management Plan, construction materials and waste includes, but is not limited to:
 - a. All materials delivered to the site and intended for installation prior to the issuance of the certificate of occupancy, including related packaging

- b. Construction materials and waste removal during demolition or razing.
 - 2. For the purposes of the Waste Management Plan, construction materials and waste does not include the following:
 - a. Land-clearing debris, such as trees, rocks, and vegetation
 - b. Excavated soils, fill, and base materials such as topsoil, sand, and gravel.
 - 3. Waste used as alternative daily cover or in waste-to-energy incineration will not be counted as diverted material.
- C. Waste Management Plan: Include the following information:
 - 1. Analysis of the trash and waste projected to be generated during the entire project construction cycle, including types and quantities.
 - a. Specification of materials to be diverted from disposal by efficient usage, recycling, reuse, manufacturer's reclamation, or salvage for future use, donation or sale.
 - b. Specification of the percentage of materials to be diverted; calculate by weight or volume, but not both. Include separate average percentages for those materials collected by construction and demolition materials processing facilities that end up as alternative daily cover and incineration.
 - c. Description of waste streams and discuss how waste will be minimized and diverted from disposal (recycled, composted, reverse distribution).
 - d. Description of the collection plan including a collection plan for consumables and durables.
 - 2. Landfill Options: The name, address, and telephone number of the landfill(s) where trash/waste will be disposed of, the applicable landfill tipping fee(s), and the projected cost of disposing of all project trash/waste in the landfill(s).
 - 3. Landfill Alternatives: List all waste materials that will be diverted from landfills by reuse, salvage, or recycling.
 - a. List each material proposed to be salvaged, reused, or recycled.
 - b. List the local market for each material.
 - c. State the estimated net cost, versus landfill disposal.
 - 4. Meetings: Describe regular meetings to be held to address waste prevention, reduction, recycling, salvage, reuse, and disposal.
 - 5. Materials Handling Procedures: Describe the means by which materials to be diverted from landfills will be protected from contamination and prepared for acceptance by designated facilities; include separation procedures for recyclables, storage, and packaging.
 - 6. Transportation: Identify the destination and means of transportation of materials to be recycled; i.e. whether materials will be site-separated and self-hauled to designated centers, or whether mixed materials will be collected by a waste hauler.
- D. Waste Disposal Reports: Submit at specified intervals, with details of quantities of trash and waste, means of disposal or reuse, and costs; show both totals to date and since last report.
 - 1. Submit updated Report with each Application for Progress Payment; failure to submit Report will delay payment.
 - 2. Submit Report on a form acceptable to Owner.
 - 3. Landfill Disposal: Include the following information:
 - a. Identification of material.
 - b. Amount, in tons or cubic yards, of trash/waste material from the project disposed of in landfills.
 - c. State the identity of landfills, total amount of tipping fees paid to landfill, and total disposal cost.
 - d. Include manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.
 - 4. Recycled and Salvaged Materials: Include the following information for each:

- a. Identification of material, including those retrieved by installer for use on other projects.
 - b. Amount, in tons or cubic yards, date removed from the project site, and receiving party.
 - c. Transportation cost, amount paid or received for the material, and the net total cost or savings of salvage or recycling each material.
 - d. Include manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.
 - e. Certification by receiving party that materials will not be disposed of in landfills or by incineration.
5. Material Reused on Project: Include the following information for each:
 - a. Identification of material and how it was used in the project.
 - b. Amount, in tons or cubic yards.
 - c. Include weight tickets as evidence of quantity.
 6. Other Disposal Methods: Include information similar to that described above, as appropriate to disposal method.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 WASTE MANAGEMENT PROCEDURES

- A. See Section 01 1000 for list of items to be salvaged from the existing building for relocation in project or for Owner.
- B. See Section 01 3000 for additional requirements for project meetings, reports, submittal procedures, and project documentation.
- C. See Section 01 5000 for additional requirements related to trash/waste collection and removal facilities and services.
- D. See Section 01 6000 for waste prevention requirements related to delivery, storage, and handling.
- E. See Section 01 7000 for trash/waste prevention procedures related to demolition, cutting and patching, installation, protection, and cleaning.

3.02 WASTE MANAGEMENT PLAN IMPLEMENTATION

- A. Manager: Designate an on-site person or persons responsible for instructing workers and overseeing and documenting results of the Waste Management Plan.
- B. Communication: Distribute copies of the Waste Management Plan to job site foreman, each Subcontractors, Owner, and Architect.
- C. Instruction: Provide on-site instruction of appropriate separation, handling, and recycling, salvage, reuse, and return methods to be used by all parties at the appropriate stages of the project.
- D. Meetings: Discuss trash/waste management goals and issues at project meetings.
 1. Prebid meeting.
 2. Preconstruction meeting.
 3. Regular job-site meetings.
 4. Job safety meetings.
- E. Facilities: Provide specific facilities for separation and storage of materials for recycling, salvage, reuse, return, and trash disposal, for use by all contractors and installers.
 1. As a minimum, provide:
 - a. Separate area for storage of materials to be reused on-site, such as wood cut-offs for blocking.
 - b. Separate dumpsters for each category of recyclable.

- c. Recycling bins at worker lunch area.
 - 2. Provide containers as required.
 - 3. Provide adequate space for pick-up and delivery and convenience to Subcontractorss.
 - 4. If an enclosed area is not provided, clearly lay out and label a specific area on-site.
 - 5. Keep recycling and trash/waste bin areas neat and clean and clearly marked in order to avoid contamination of materials.
- F. Hazardous Wastes: Separate, store, and dispose of hazardous wastes according to applicable regulations.
- G. Recycling: Separate, store, protect, and handle at the site identified recyclable waste products in order to prevent contamination of materials and to maximize recyclability of identified materials. Arrange for timely pickups from the site or deliveries to recycling facility in order to prevent contamination of recyclable materials.
- H. Reuse of Materials On-Site: Set aside, sort, and protect separated products in preparation for reuse.
- I. Salvage: Set aside, sort, and protect products to be salvaged for reuse off-site.

END OF SECTION

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**SECTION 01 7800
CLOSEOUT SUBMITTALS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Project record documents.
- B. Operation and maintenance data.
- C. Warranties and bonds.
- D. Forms Required at Project Closeout.

1.02 SUBMITTALS

- A. Project Record Documents: Submit documents to Architect two weeks prior to claim for final Application for Payment.
 - 1. Hardcopy: Submit two copies to the Owner with a transmittal letter within 30-days after date of Substantial Completion.
- B. Operation and Maintenance Data:
 - 1. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. Architect will review draft and return one copy with comments.
 - 2. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit completed documents within ten days after acceptance.
 - 3. Submit one copy of completed documents 15 days prior to final inspection. This copy will be reviewed and returned after final inspection, with Architect comments. Revise content of all document sets as required prior to final submission.
 - 4. Submit two sets of revised final documents in final form within 10 days after final inspection.
- C. Warranties and Bonds:
 - 1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within 10 days after acceptance.
 - 2. Make other submittals within 10 days after Date of Substantial Completion, prior to final Application for Payment.
 - 3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within 10 days after acceptance, listing the date of acceptance as the beginning of the warranty period.
- D. Forms Required: Prior to final payment, Contractor must submit a complete:
 - 1. "Contractor's Affidavit" for Sole Proprietor or Partnership/Corporation on a form acceptable to the Owner.
 - 2. "Consent of Surety to Final Payment" on a form acceptable to the Owner.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 CERTIFICATE OF OCCUPANCY

- A. The Contractor is responsible to obtain Certificate(s) of Occupancy from the building officials having jurisdiction.

3.02 PROJECT RECORD DOCUMENTS

- A. Maintain on site one set of the following record documents; record actual revisions to the Work:
 - 1. Drawings.
 - 2. Specifications.
 - 3. Addenda.
 - 4. Change Orders and other modifications to the Contract.
 - 5. Reviewed shop drawings, product data, and samples.

- 6. Manufacturer's instruction for assembly, installation, and adjusting.
- B. Ensure entries are complete and accurate, enabling future reference by Owner.
- C. Store record documents separate from documents used for construction.
- D. Record information concurrent with construction progress.
- E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
 - 1. Changes made by Addenda and modifications.
- F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
 - 1. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 - 2. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
 - 3. Field changes of dimension and detail.
 - 4. Details not on original Contract drawings.

3.03 OPERATION AND MAINTENANCE DATA

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

3.04 OPERATION AND MAINTENANCE DATA FOR MATERIALS AND FINISHES

- A. For Each Product, Applied Material, and Finish:
 - 1. Product data, with catalog number, size, composition, and color and texture designations.
- B. Instructions for Care and Maintenance: Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental cleaning agents and methods, and recommended schedule for cleaning and maintenance.
- C. Moisture protection and weather-exposed products: Include product data listing applicable reference standards, chemical composition, and details of installation. Provide recommendations for inspections, maintenance, and repair.
- D. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

3.05 OPERATION AND MAINTENANCE DATA FOR EQUIPMENT AND SYSTEMS

- A. For Each Item of Equipment and Each System:
 - 1. Description of unit or system, and component parts.
 - 2. Identify function, normal operating characteristics, and limiting conditions.
 - 3. Include performance curves, with engineering data and tests.
 - 4. Complete nomenclature and model number of replaceable parts.
- B. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

- C. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.
- D. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and trouble shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
- E. Provide servicing and lubrication schedule, and list of lubricants required.
- F. Include manufacturer's printed operation and maintenance instructions.
- G. Include sequence of operation by controls manufacturer.
- H. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- I. Additional Requirements: As specified in individual product specification sections.

3.06 ASSEMBLY OF OPERATION AND MAINTENANCE MANUALS

- A. Assemble operation and maintenance data into durable manuals for Owner's personnel use, with data arranged in the same sequence as, and identified by, the specification sections.
- B. Where systems involve more than one specification section, provide separate tabbed divider for each system.
- C. Prepare instructions and data by personnel experienced in maintenance and operation of described products.
- D. Prepare data in the form of an instructional manual.
- E. Binders: Commercial quality, 8-1/2 by 11 inch three D side ring binders with durable plastic covers; 2 inch maximum ring size. When multiple binders are used, correlate data into related consistent groupings.
- F. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.
- G. Project Directory: Title and address of Project; names, addresses, and telephone numbers of Architect, Consultants, Contractor and subcontractors, with names of responsible parties.
- H. Tables of Contents: List every item separated by a divider, using the same identification as on the divider tab; where multiple volumes are required, include all volumes Tables of Contents in each volume, with the current volume clearly identified.
- I. Dividers: Provide tabbed dividers for each separate product and system; identify the contents on the divider tab; immediately following the divider tab include a description of product and major component parts of equipment.
- J. Text: Manufacturer's printed data, or typewritten data on 24 pound paper.
- K. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.
- L. Arrangement of Contents: Prepare a Table of Contents for each volume, with each product or system description identified, in three parts as follows:
 - 1. **Part 1 - Table of Contents and Project Directory**
 - a. Table of Contents, of all volumes, and of this volume including schedule of products and systems, indexed to content of the volume.
 - b. Directory, listing names, addresses, and telephone numbers of Architect, Contractor, Subcontractors, and major equipment suppliers.
 - 2. **Part 2 - Operation and Maintenance Data:** Arranged by system, then by specification section.
 - a. Significant design criteria.
 - b. List of equipment.

- c. Parts list for each component.
- d. Operation and maintenance data.
- e. Maintenance instructions for special finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
- 3. **Part 3 - Project Documents and Certificates:**
 - a. Product data, shop drawings, and other submittals.
 - b. Air and water balance reports.
 - c. Certificates.
 - d. Photocopies of warranties and bonds.

3.07 WARRANTIES AND BONDS

- A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractorss, suppliers, and manufacturers, within 10 days after completion of the applicable item of work. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Date of Substantial completion is determined.
- B. Verify that documents are in proper form, contain full information, and are notarized.
- C. Co-execute submittals when required.
- D. Retain warranties and bonds until time specified for submittal.

3.08 LOOSE PARTS

- A. Unless otherwise specified, submit to the Owner the following minimum quantities of materials:
 - 1. Loose parts for mechanical equipment.
 - 2. Adjustment wrenches and hardware.
 - 3. Keys for door hardware, accessories, and other products.

3.09 EXTRA STOCK MATERIALS

- A. Unless otherwise specified, submit to the Owner the following minimum quantities of materials:
 - 1. Floor Tile: One unopened case of each type.
 - 2. Wall Tile: One unopened case of each type.
 - 3. Ceiling Tile: One unopened case of each type.
 - 4. Paint: Two unopened gallons of each type and color.

3.10 JOB CLOSEOUT AND DOCUMENT TURNOVER

- A. Construction Documents (CD's), Owner and Operation Manuals (O&M's), As-Built's, Specifications and other documents turned over at the completion of the projects shall be furnished to the Owner in both paper hard copy and digital PDF format.
 - 1. Construction Documents:
 - a. PDF Creation: Each roll of drawings shall be scanned or converted to one single PDF document.
 - 1) Scanning: 200 DPI Grayscale; Cropped to original size; Color corrected and despeckled
 - b. Bookmarking: Each page of the PDF shall be bookmarked with the number and name of the sheet.
 - c. Naming: The PDF file shall be labeled: "Building Name_Year_Title_Spec_Type"
 - 1) Name = Building Name
 - 2) Year = Date of Documents
 - 3) Title = "Addition" "Remodel," etc...
 - 4) CD = Construction Document
 - 5) Type = Arch, Mech, Electrical Communications or a combination of the above
 - 2. Specifications:
 - a. PDF Creation: Each book of specifications shall be scanned or converted to one single PDF document.
 - 1) Scanning: 200 DPI Grayscale

- b. Bookmarking: Not required.
- c. Naming: The PDF shall be labeled: "Building Name_Year_Title_Spec_Type"
 - 1) Name = Building Name
 - 2) Year = Date of Documents
 - 3) Title = "Addition" "Remodel," etc...
 - 4) CD = Construction Document
 - 5) Type = Arch, Mech, Electrical Communications or a combination of the above
- 3. Owner and Operation Manuals
 - a. O&M's shall be turned over by the Contractor.
 - b. O&M's Verification: Submit two (2) hard copies of the O&M Manual to the Architect for verification and delivery to the Owner prior to the Application for Final Payment.
 - 1) Submit one (1) digital copy of the O&M Manual to the Architect for verification and delivery to the Owner prior to the Application for Final Payment.
 - 2) Deliver two (2) hard copies of the O&M Manual to the Owner upon Architect's review and prior to the Application for Final Payment.
 - c. PDF Creation: Each book of specifications shall be scanned or converted to PDF document.
 - 1) Scanning:
 - (a) 200 DPI Grayscale
 - d. Bookmarking: Bookmarking of O&M Manuals shall be extensive

END OF SECTION

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**SECTION 01 7900
DEMONSTRATION AND TRAINING**

PART 1 GENERAL

1.01 SUMMARY

- A. Demonstration of products and systems to be commissioned and where indicated in specific specification sections.
- B. Training of Owner personnel in operation and maintenance is required for:
 - 1. HVAC systems and equipment.
 - 2. Electrical systems and equipment.
 - 3. Items specified in individual product Sections.

1.02 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures; except:
 - 1. Make all submittals specified in this section, and elsewhere where indicated for commissioning purposes, directly to the Commissioning Authority.
 - 2. Submit one copy to the Commissioning Authority, not to be returned.
 - 3. Make commissioning submittals on time schedule specified by Commissioning Authority.
 - 4. Submittals indicated as "Draft" are intended for the use of the Commissioning Authority in preparation of overall Training Plan; submit in editable electronic format, Microsoft Word .docx file preferred.
- B. Draft Training Plans: Owner will designate personnel to be trained; tailor training to needs and skill-level of attendees.
 - 1. Submit to Commissioning Authority for review and inclusion in overall training plan.
 - 2. Submit not less than four weeks prior to start of training.
 - 3. Revise and resubmit until acceptable.
 - 4. Provide an overall schedule showing all training sessions.
 - 5. Include at least the following for each training session:
 - a. Identification, date, time, and duration.
 - b. Description of products and/or systems to be covered.
 - c. Name of firm and person conducting training; include qualifications.
 - d. Intended audience, such as job description.
 - e. Objectives of training and suggested methods of ensuring adequate training.
 - f. Methods to be used, such as classroom lecture, live demonstrations, hands-on, etc.
 - g. Media to be used, such as slides, hand-outs, etc.
 - h. Training equipment required, such as projector, projection screen, etc., to be provided by Contractor.
- C. Training Manuals: Provide training manual for each attendee; allow for minimum of two attendees per training session.
 - 1. Include applicable portion of O&M manuals.
 - 2. Include copies of all hand-outs, slides, overheads, video presentations, etc., that are not included in O&M manuals.
 - 3. Provide one extra copy of each training manual to be included with operation and maintenance data.

1.03 QUALITY ASSURANCE

- A. Instructor Qualifications: Familiar with design, operation, maintenance and troubleshooting of the relevant products and systems.
 - 1. Provide as instructors the most qualified trainer of those Contractors and/or installers who actually supplied and installed the systems and equipment.
 - 2. Where a single person is not familiar with all aspects, provide specialists with necessary qualifications.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 DEMONSTRATION - GENERAL

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

3.02 TRAINING - GENERAL

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

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

END OF SECTION

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SECTION 01 8113
B3 SUSTAINABLE DESIGN REQUIREMENTS

PART 1 GENERAL

1.01 PROJECT GOALS

- A. This project has been designed to comply with the Minnesota B3 Sustainability Guidelines including the SB2030 Energy Standard.
- B. Many of the Minnesota B3 requirements can be achieved only through intelligent design of the project and are beyond the control of the Contractor. However, certain credits relate to the products and procedures used for construction. Therefore, the full cooperation of the Contractor and subcontractors is essential to achieving compliance.
- C. Contractor shall familiarize himself/herself with the relevant requirements and provide the necessary information and instruction to all subcontractors and installers.
- D. Since Contractor and subcontractors may not be familiar with B3 requirements, this section includes a summary of the products and procedures intended to achieve compliance with specific Indoor Environmental Quality and Materials and Waste B3 guidelines.
- E. Some requirements are dependent on proper performance by Contractor and subcontractors.
- F. Some requirements involve quantifying percentages by weight and cost; these require careful recordkeeping and reporting by the Contractor.
- G. See <https://www.b3mn.org/guidelines/> for more information.

1.02 SECTION INCLUDES

- A. Minimum Sustainable Performance Requirements.
- B. State of Minnesota Sustainable Building Guidelines for New Buildings.
 - 1. Version 3.2 r 01 of the State of Minnesota Sustainable Building Guidelines (B3 Guidelines) are included by reference and can be found at: www.b3mn.org/guidelines/.

1.03 REFERENCE STANDARDS

- A. See the current Minnesota B3 Guidelines, and the Specification Divisions 01 - 33 for specific reference standards related to these Sustainable Requirements.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. The Contractor shall coordinate with the Owners energy professional during construction to provide access to the building and building systems relative to their work and shall complete checklists provided by this professional and as required by the performance requirements.
- B. The Contractor shall correct work that fails to meet the performance requirements as determined from testing and inspections by the Owners Commissioning Agent. The cost of additional testing and inspections will be borne by the Contractor.
- C. Contractor shall provide a team member assigned responsibility for coordinating the contractor's responsibilities as identified by the Minnesota B3 Guidelines.

1.05 BUILDING PRODUCT PERFORMANCE REQUIREMENTS

- A. See the current State of Minnesota Sustainable Building Guidelines (version 3.2 r 01) at www.b3mn.org/guidelines/ for guidelines not listed below. General categories are as follows:
 - 1. P: Performance Management.
 - 2. S: Site and Water.
 - 3. E: Energy and Atmosphere.
 - 4. I: Indoor Environment Quality.
 - 5. M: Materials and Waste.
- B. For detailed product requirements, see Part 2 Products.

1.06 SUBMITTALS

- A. See the Division 00 Sections, and the Specification Divisions 01 - 33 for specific submittal requirements related to these Sustainable Requirements.
- B. Pre-Bid Substitutions: The Owner encourages pre-bid substitution requests for Guideline M.2 - Environmentally Preferable Materials, to support the project requirements for recycled, renewable, and bio-based materials.

PART 2 PRODUCTS

2.01 BASIC PRODUCT REQUIREMENTS

- A. The requirements listed below are the overall requirements for the project. See the Specification Divisions 01-33 for requirements on specific products.
- B. Guideline I.1A - All newly installed interior materials must comply with California Department of Public Health (CDPH) Standard Method v1.1–2010 or v1.2-2017. Interior materials are defined as all materials and finishes interior to the enclosure's least vapor-permeable and continually air-sealed barrier system. This includes but is not limited to flooring adhesives, sealants, carpets, resilient flooring, paints, acoustical insulation products, gypsum board, acoustical ceilings, acoustic wall panels, casework, composite wood subflooring, and furnishings.
 - 1. Exceptions: Refer to current B3 Guidelines for exceptions.
 - 2. Approved databases of materials recognized as compliant with the most current CDHP standard:
 - a. Carpet and Rug Institute (CRI) Green Label Plus™ Certification (for carpet, cushion, and adhesive products).
 - b. Collaborative for High Performance Schools (CHPS) Low Emitting Materials (which includes several of the other third-party certifications below).
 - c. Scientific Certification Systems (SCS) Indoor Advantage Gold™ Certification.
 - d. Resilient Flooring Institute (RFI) FloorScore™ Certification.
 - e. Underwriters Laboratory (UL) GREENGUARD Gold™.
 - f. Intertek ETL Environmental™ VOC+.
 - g. Materials Analytical Services, LLC (MAS) Certified Green™ (for Building Materials).
 - h. NSF/ANSI 332 (for Resilient Floor Coverings).
 - i. Berkeley Analytical Associates ClearChem (for Interior Building Products).
 - j. Coatings Research Group, Incorporated (CRGI) Green Wise Gold (for Paints).
- C. Guideline I.1B - Wet-applied materials: All onsite wet-applied materials must meet the applicable requirements below. Interior onsite wet-applied materials also must meet the general requirements for VOC emissions under 11A.
 - 1. I.1B.1 All paints and coatings wet-applied onsite must meet the applicable VOC limits of the California Air Resources Board (CARB) 2007, Suggested Control Measure (SCM) for Architectural Coatings, or the South Coast Air Quality Management District (SCAQMD) Rule 1113, effective June 3, 2011.
 - 2. I.1B.2 All adhesives and sealants wet-applied onsite must meet the applicable chemical content requirements of SCAQMD Rule 1168, July 1, 2005, Adhesive and Sealant Applications, as analyzed by the methods specified in Rule 1168.
 - 3. Paints, coatings, adhesives and sealants wet-applied onsite may not include any intentionally added methylene chloride or perchloroethylene.
- D. Guideline I.1C - Composite Wood Products: Newly installed composite wood must meet the California Air Resources Board ATCM for formaldehyde requirements for ultra-low-emitting formaldehyde (ULEF) resins or no added formaldehyde resins.
- E. Guideline M.1B - Product Life-Cycle Assessments: Use at least 5 different permanently installed products sourced from at least five different manufacturers that meet one of the disclosure criteria below:
 - 1. Product-specific declaration.

- a. Products with a publicly available, critically reviewed life-cycle assessment conforming to ISO 14044 that report impacts from at least Cradle to Gate.
 - 2. Environmental Product Declarations (EPD) which conform to ISO 14025, 14040, 14044, and EN 15804 or ISO 21930 and have at least a cradle-to-gate scope.
 - a. Industry-wide (generic) EPD – Products with third-party certification (Type III), including external verification, in which the manufacturer is explicitly recognized as a participant by the program operator are valued as one-half (½) of a product for purposes of compliance.
 - b. Product-specific Type III EPD – Products with third-party certification (Type III), including external verification, in which the manufacturer is explicitly recognized as the participant by the program operator are valued as one whole product for purposes of compliance
- F. Guideline M.2A - Environmentally Preferable Materials: At least 55% of the total building materials used in the project must have one of the following attributes: salvaged or reused, recycled content, recyclable, bio-based, responsibly sourced or regional as defined in Sections 1 through 5 below. The combined calculation is based on mass, volume or cost. Where a material has more than one attribute, the material value will be multiplied by its number of qualifying attributes.
- 1. Guideline M.2A.1 - Salvaged or reused materials and components:
 - a. The salvaged material content will be determined based on the actual mass, volume, or cost of the salvaged material or the cost of a comparable alternative component material. Portions of a building retained and reused in a renovation may contribute in this category.
 - 2. Guideline M.2A.2 - Recycled content building materials must comply with one of the following:
 - a. Contain not less than 25% combined postconsumer and/or pre-consumer recovered material and be recyclable.
 - b. Contain not less than 50% combined postconsumer and/or pre-consumer recovered material.
 - c. Pre-consumer recycled content does not include reutilization of material such as rework, regrind, or scrap generated in a process and capable of being reclaimed within the same process that generated it (IGCC 2015).
 - 3. Guideline M.2A.3 - Bio-based materials are materials that comply with one or more of the following:
 - a. The bio-based content is not less than 75% as determined by testing in accordance with ASTM D6866.
 - b. The requirements of USDA 7CFR Part 2902.
 - 4. Guideline M.2A.4 - Responsibly sourced materials are materials that comply with the following:
 - a. Wood and wood products labeled in accordance with the following standards:
 - 1) If wood comes from a North American source, it is certified using SFI, FSC, CSA, or ATF.
 - 2) If wood comes from a source outside North America, it is certified using FSC or PEFC.
 - b. Other approved standards for extraction of raw materials. Refer to B3.1 Guidelines for additional information and resources.
 - 5. Guideline M.2A.5 - Regional materials or components must be composed of resources that are recovered, harvested, extracted, and manufactured within a 500-mile radius of the building site:
 - a. Where only a portion of a material or product is recovered, harvested, extracted, and manufactured within 500 miles, only that portion can be included.

- b. Where resources are transported by water or rail, the distance to the building site must be determined by multiplying the distance that the resources are transported by water or rail by 0.25 and adding that number to the distance transported by means other than water or rail.
- G. Guideline M.4A - Demonstrate that the chemical inventories of at least ten permanently installed interior materials from at least five different manufacturers do not contain likely hazardous materials by one of the following methods. Manufacturers may report qualification under Method 1 or Method 2 below by inclusion in a Health Product Declaration (HPD). Qualifying materials that are among the ten most prevalent by area may be double-counted.
 - 1. GreenScreen List Translator: Qualifying materials must demonstrate, based on a full chemical inventory to 100 ppm, that they are free of List-Translator-1 (LT-1) or List-Translator Possible 1 chemicals (LT-P1) as defined by the most current version of GreenScreen.
 - 2. Full GreenScreen Assessment: Qualifying materials must demonstrate, based on a full chemical inventory to 100 ppm that they are free of Benchmark-1 (BM-1) chemicals as defined by the most current version of GreenScreen. A GreenScreen label indicating the product is free of BM-1 chemicals is sufficient for this method.
 - 3. Products certified under Cradle to Cradle v2 Gold or Platinum or Cradle to Cradle v3 Silver, Gold or Platinum.
 - 4. Products certified as meeting Declare Label Declaration Status of LBC Red List Free.
- H. Guideline M.4B - Mercury content in fluorescent lamps. The mercury content in straight and compact fluorescent lamps must comply with the limitations stated in the B3 Guidelines.

PART 3 EXECUTION

3.01 GENERAL OPERATIONAL REQUIREMENTS:

- 1. It is the responsibility of the general contractor to ensure that their labor force, all subcontractors and their labor forces, all suppliers, and other visitors be made aware of the following rules and follow them at all times to maintain a healthy work environment for all in accordance with Minnesota B3 Sustainability Guidelines. The following sign is to be made and prominently posted on the job site.
 - a. "This building is being constructed as a healthy building. Only specified products and procedures may be used. Alternatives to specified materials and products must be approved in writing by the owner and /or architect prior to use. If in doubt, contact the general contractor."
- 2. The contractor shall perform and maintain the special project procedures with the same quality of workmanship as would be expected with standard materials and methods. The contractor shall maintain a quality control program that ensures full protection of work against exposure to prohibited materials and practices.
- 3. Building cavities shall be left clean and free of debris. All wall cavities shall be free of debris prior to installation of the gypsum board.
- 4. All foodstuffs shall be disposed of in containers which will be removed from the job site and emptied at the end of each workday.
- 5. All debris shall be removed from under and around the building premises and properly disposed of in a dumpster.
- 6. The dumpster shall be removed when full on a regular basis so that piles of debris do not accumulate on the ground around it.
- 7. Smoking is prohibited within or near any structure on the job site.
- 8. The use of gas-generated machinery is to be minimized within or near the building after the foundation is completed.

9. Heaters fueled by gasoline or kerosene are prohibited. If relative humidity rises above 55%, electric dehumidification should be applied until relative humidity remains consistently between 45% and 55% without additional dehumidification. Interior surface temperatures shall remain above 50 degrees. The joint compound must be completely dry before the application of primer.
10. Provide construction ventilation with minimum 1.5 air changes per hour during the day of application and for two days afterwards:
 - a. for paints and adhesives.
 - b. for vinyl flooring and carpeting.
 - c. for any other materials and products that off-gas.
11. Keep site, ducts and mechanical equipment and wall cavities clean.
12. Clean duct system after painting and trim is completed.
13. Spills of fuels, solvents, or chemicals must be avoided. If a spill occurs, report it to the general contractor immediately.
14. Finish flooring materials shall not be applied over insufficiently cured concrete slabs. Quickly and thoroughly dry out precipitation that enters an unfinished structure. Wood members shall have a moisture content less than 17%. Walls shall not be enclosed until wet applied insulation systems such as cellulose or spray foams are properly cured.
15. Provide MSDS sheets for wet-applied materials such as paints, coatings, sealants and adhesives and maintain copy on site.
16. Commercial Cleaning Products - Green Seal has recommended industrial and institutional cleaners that meet the following criteria:
 - a. Are not toxic to human or aquatic life.
 - b. Contain VOC levels under 10% by weight when diluted for use.
 - c. Are readily biodegradable.
 - d. Are not made of petrochemical compounds or petroleum.
 - e. Do not contain chlorine bleach.
 - f. Are free of phosphates and derivatives.
 - g. Do not contain phenolic compounds or glycol ethers.
 - h. Are free of arsenic, cadmium, chromium, lead, mercury, nickel, and selenium.
 - i. Have acceptable pH levels.
 - j. Work optimally at room temperature.

3.02 GENERAL MATERIALS REQUIREMENTS:

- A. Contractors must comply with the following additional requirements while handling materials on the project site.
 1. All materials are to be protected from contamination and moisture damage during storage and after installation.
 2. The contractor shall verify, prior to installation, that all materials are undamaged, uncontaminated, and free of acquired odors. Any products found to be defective shall not be used unless approved by the owner or architect.
 3. The use of substances listed below is prohibited: Herbicides, fungicides, insecticides and other pesticides, except as specified.
 - a. Composite wood products containing urea-formaldehyde binders.
 - b. Commercial cleaning products other than those specified.
 - c. Adhesives, paints, sealers, stains, and other finishes except as specified.
 - d. Any building materials or components that have been contaminated while in storage or during shipment. Contact the architect for further instructions about any application where these substances would normally be used if information for a substitution is not in this document.

4. No products may be substituted for the specified product unless agreed upon in writing by the owner or architect. An MSDS sheet and product literature must be provided on any substitution in order for it to be considered. Submit a physical sample to the owner or architect whenever possible.

END OF SECTION

SECTION 01 9113
GENERAL COMMISSIONING REQUIREMENTS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section Includes:
1. Commissioning Plan
 2. Meetings
 3. Schedule
 4. Submittals
 5. O&M Manuals
 6. Installation Checklists
 7. Functional Performance Testing and Retesting
 8. Documentation of equipment and system deficiencies
 9. Corrective actions and acceptance of corrected equipment and systems
 10. Equipment operations and maintenance training
- B. Related Sections include the following:
1. 01 7000 – Execution and Closeout Requirements
 2. 22 1006 – Plumbing Piping Specialties
 3. 22 3000 – Plumbing Equipment
 4. Compressed Air system spec section
 5. 23 0593 – Testing, Adjusting, and Balancing for HVAC
 6. 23 0915 – Variable Frequency Controllers
 7. 23 0916 – Airflow Measurement Station
 8. 23 2114 – Hydronic Specialties
 9. 23 2123 – Hydronic Pumps
 10. 23 8124 – Computer Room Air Conditioners – Floor Mounted
 11. 23 8129 – Air Cooled Unitary Heat Pumps
 12. 23 8200 – Convection Heating and Cooling Units
 13. 26 0923 – Occupancy Sensors
 14. 26 0924 – Daylight Sensors
 15. 26 0926 – Misc Lighting Control Devices
 16. 26 0944 – Digital Lighting Control Equipment
 17. 26 5113 – Lighting
 18. Solar PV spec section
 19. 28 3100 – Fire Alarm and Networked, Intelligent Voice Evacuation Systems

1.03 SYSTEMS TO BE COMMISSIONED

- A. The commissioning process for the project will be applied to the following systems:
1. Domestic hot water system
 2. Compressed air system
 3. Emergency eyewash stations
 4. Air handling units
 5. Humidifiers
 6. Energy recovery ventilators
 7. Lab ventilation systems
 8. Packaged DX systems

9. Heating hot water system
10. Snow melt system
11. Air source heat pumps
12. Variable air volume terminal units
13. Finned tube radiation
14. Electric baseboard radiation
15. Destratification fans
16. Exhaust fans
17. Unit heaters
18. Split system air conditioners
19. Interior lighting controls
20. Exterior lighting controls
21. Solar PV system
22. Fire alarm system
23. Building automation system (as applicable to above systems)

1.04 COMMISSIONING TEAM

Owner	Alexandria Technical & Community College
Owner's Representative	Minnesota State Colleges & Universities
Architect	LHB
MEP Engineers	Hallberg Engineering
Construction Manager	Terra
Mechanical Contractor	TBD
Electrical Contractor	TBD
Photovoltaic Contractor	TBD
Controls Contractor	TBD
Test & Balance Contractor	TBD
Commissioning Professional	Questions & Solutions Engineering

- A. Commissioning Coordination Supervisor: The Construction Manager shall assign a person with no less than five (5) years of experience with the coordination of disciplines of construction. The coordinator's responsibilities include:
 1. Communication with Owner's Commissioning Professional
 2. Commissioning coordination meeting attendance
 3. Planning
 4. Scheduling
 5. Enforcement of contractors' specification requirements
 6. Contractors' quality assurance
 7. Documentation
 8. Direction of contractors' corrective action
- B. Contractors' Representative: Each of the contractors shall assign a person responsible for communications with the Construction Manager's Commissioning Coordination Supervisor. Responsibilities include:
 1. Communication with Commissioning Coordination Supervisor
 2. Commissioning coordination meeting attendance
 3. Planning
 4. Scheduling
 5. Operations & Maintenance training
 6. Completing installation checklists
 7. Functional performance test participation
 8. Corrective action

1.05 SUBMITTALS

- A. Construction Manager shall submit the name of person(s) assigned as Commissioning Coordination Supervisor within (2) weeks of construction notice to proceed. Construction Manager shall submit the following information for each assigned Commissioning Representative:
 - 1. Company Name
 - 2. Name
 - 3. Title
 - 4. Years of Experience
 - 5. Phone Number
 - 6. E-Mail Address
- B. Each contractor shall submit the name of person(s) assigned as representatives to Commissioning Team within (2) weeks of construction notice to proceed. Each Contractor shall submit the following information for each assigned Commissioning Representative:
 - 1. Company Name
 - 2. Name
 - 3. Title
 - 4. Years of Experience
 - 5. Phone Number
 - 6. E-Mail Address
- C. Equipment submittals and shop drawings:
 - 1. Submit a list of all required submittals to the Commissioning Professional prior to submitting any equipment submittals for review.
 - 2. Commissioning Professional will identify submittals for which copies shall be submitted to the Commissioning Professional.
 - 3. Submit copies of selected submittals to Commissioning Professional and Owner concurrent with submission to the Design Team for review.
 - 4. Submit annotated copies, with Engineer of Record Stamps, of selected submittals to the Commissioning Professional and the Owner following formal review by the Design Team.
- D. Master Construction Schedule: Incorporate all commissioning milestones into the Master Construction Schedule. See 3.2-A below for a listing of minimum milestones for inclusion in the Master Construction Schedule.
 - 1. Submit Master Construction Schedule with the inclusion of the commissioning milestones no later than 8 weeks after Construction Notice-to-Proceed.
 - 2. Submit updated Master Construction Schedule to the Commissioning Professional (at least) monthly.
- E. Submit copies of Construction Phase and Design Change Documentation which includes Requests for Information, Proposal Requests, Meeting Minutes, etc., to the Commissioning Professional.
- F. Submit the name, company, and phone number of the proposed trainer for each training session no later than eight (8) weeks prior to the scheduled training sessions.
- G. Submit the specific date, time, and place for individual training sessions no later than 4 weeks prior to the scheduled training sessions.
- H. Submit completed training documentation immediately following the completion of each training session.
- I. Submit completed Installation Checklists to the Commissioning Professional upon completion and at least two weeks before the scheduled start of functional performance testing for the respective system. System functional performance testing shall not commence until its system is documented to be ready for testing.

- J. Submit estimated completion dates and status updates to open items on the Commissioning Action List to the Commissioning Professional weekly.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Provide tools, services and instruments required to test and adjust equipment associated with systems to be commissioned to verify compliance with construction documents.

PART 3 EXECUTION

3.01 COORDINATION

- A. Assign Commissioning Representatives (see 1.5-A. and 1.5-B. for submittal requirements).
- B. Participate in Commissioning Coordination meetings conducted by the Commissioning Professional.
- C. Review the commissioning requirements.
- D. Request clarification as needed.

3.02 COMMISSIONING SCHEDULING

- A. Include the following commissioning milestone activities (for each phase) in the master schedule (not a separate commissioning schedule). Coordinate durations and timing of specific activities with the commissioning professional:
 - 1. Permanent power established
 - 2. Hydronic systems, flush, fill, & start-up
 - 3. Air systems start-up
 - 4. Testing & balancing
 - 5. Controls pretesting & graphics
 - 6. Functional performance testing

3.03 EQUIPMENT TRAINING

- A. Coordinate operation and maintenance training activities through the Owner.
- B. Provide electronic copies to the Owner of all training materials used during training including presentations, drawings, manuals, etc. Provide source files and PDF files of this training material.
- C. Training documentation forms shall be completed for each training session associated with the systems being commissioned. For each training session, document and submit to the Commissioning Professional the following information:
 - 1. Date
 - 2. Start time
 - 3. End time
 - 4. List of attendees
 - 5. Trainer name and contact information

3.04 INSTALLATION CHECKLISTS

- A. Prior to the scheduled start of functional performance test procedures, contractor shall check systems to confirm readiness for testing.
- B. Completion of the Installation Checklists shall be a joint effort between all contractors responsible for each system. The Construction Manager shall be responsible for coordinating and submitting completed Installation Checklists.
- C. Final Installation Checklists shall be prepared by the Commissioning Professional after reviewing submittals, change orders, supplemental instructions, and other construction-phase modifications and/or additions to the designed systems.
- D. There will be one Installation Checklist for each system.

- E. Submit Installation Checklists to the Commissioning Professional upon completion of the checklist. Completed checklists shall be submitted no later than one week prior to the start of functional performance testing. System functional performance testing shall not commence until its system is documented as being ready for testing. Incomplete checklists will be rejected.

3.05 FUNCTIONAL PERFORMANCE TESTS

- A. Provide personnel and equipment as required to perform the functional performance test procedures in the presence of the Commissioning Professional.
- B. Provide input into the master scheduling process with regards to timing and duration of the functional performance test procedures.
- C. Completion of HVAC controls interface shall be demonstrated to the Commissioning Professional 5 business days prior to the associated functional performance testing via virtual online meeting using screenshare. Functional performance testing for each system with HVAC controls interface shall not commence until its controls interface is demonstrated to be complete and functional.
- D. Perform deferred testing during the warranty period for systems that could not be sufficiently demonstrated at the end of construction, at the Commissioning Professional's discretion. The deferred tests shall be conducted under the direction of the Commissioning Professional.
- E. Final functional performance test procedures shall be prepared by the Commissioning Professional after reviewing submittals, change orders, supplemental instructions, and other construction phase modifications and/or additions to the designed systems. Final test procedures will be made available to the contractor upon request.
- F. There will be one Functional Performance Test for each system.

3.06 DEFICIENCY TRACKING/CORRECTIVE ACTIONS

- A. Perform corrective actions for resolution of deficiencies found during:
 - 1. Site Observations
 - 2. Test and Balance
 - 3. Installation Checkout
 - 4. HVAC Trend Log Analysis
 - 5. Functional Performance Testing
- B. During Functional Performance Testing, a deficiency is defined as equipment that does not function as expected and more than five (5) minutes is required to correct the problem.
- C. During construction or testing anyone finding deficiencies may document the deficiencies on a Commissioning Action List (CAL) (refer to 3.8-A below) within one working day of discovery. The deficiency shall then be forwarded to the Commissioning Professional.
 - 1. Deficiency Identification Process (by Commissioning Professional):
 - a. Date
 - b. Comment Generator
 - c. Responsible Party
 - d. Description of deficiency
 - e. Estimated Completion Date
 - f. Distribute copies to:
 - 1) Construction Manager
 - 2) Owner/Owner's Representative
 - 3) Design Engineers
 - 2. Corrective Action Completed (by Construction Manager or contractor)
 - a. Date of correction
 - b. Description of final equipment status or corrective action performed
 - c. Name of person(s) performing the work

- d. Construction Manager to inform the Commissioning Professional who will update the Commissioning Action List
- e. Commissioning Professional distributes updated copies to:
 - 1) Construction Manager
 - 2) Owner/Owner's Representative
 - 3) Design Engineers
- 3. Verification of Corrective Action Completion (by Commissioning Professional)
 - a. Date of retest
 - b. Status description: resolved or more work required
 - c. Enter resolution into Commissioning Action List
 - d. Distribute copies to:
 - 1) Construction Manager
 - 2) Owner/Owner's Representative
 - 3) Design Engineers

3.07 FUNCTIONAL PERFORMANCE RETESTING

- A. The commissioning professional will return to the site one time for no more than eight (8) hours total to verify and retest corrected deficiencies using the same approach as functional performance testing. Any additional retesting labor and expenses incurred by the Commissioning Professional will be at the contractor's expense.

END OF SECTION 01 9113

SECTION 02 4100 DEMOLITION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Building demolition excluding removal of hazardous materials and toxic substances.
- B. Selective demolition of built site elements.
- C. Abandonment and removal of existing utilities and utility structures.

1.02 REFERENCE STANDARDS

- A. 29 CFR 1926 - Safety and Health Regulations for Construction; Current Edition.
- B. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations; 2022, with Errata (2021).

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Site Plan: Indicate:
 - 1. Vegetation to be protected.
 - 2. Areas for temporary construction and field offices.
 - 3. Areas for temporary and permanent placement of removed materials.
- C. Demolition Plan: Submit demolition plan as required by OSHA and local AHJs.
 - 1. Indicate extent of demolition, removal sequencing, bracing and shoring, and location and construction of barricades and fences.
 - 2. Demolition firm qualifications.
- D. Project Record Documents: Accurately record actual locations of capped and active utilities and subsurface construction.
- E. Submit Waste Disposal Reports compliant with the requirements of Section 01 7919.
- F. Submit Waste Management Plan compliant with the requirements of Section 01 7919.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Fill Material: See Section 31 2323.

PART 3 EXECUTION

3.01 DEMOLITION

- A. Remove the entire building designated as the 800 Building. Remove the footings, foundations, concrete slab, and related utilities for the building designated as TH8 .
- B. Remove paving and curbs required to accomplish new work.
- C. Remove all paving and curbs within construction limits indicated on drawings.
- D. Remove concrete slabs on grade within site boundaries.
- E. Remove manholes and manhole covers, curb inlets and catch basins.
- F. Remove fences and gates.
- G. Remove other items indicated, for salvage, relocation, and recycling.
- H. Fill excavations, open pits, and holes in ground areas generated as result of removals, using specified fill; compact fill as specified in Section 31 2200.

3.02 GENERAL PROCEDURES AND PROJECT CONDITIONS

- A. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
 - 1. Obtain required permits.
 - 2. Use of explosives is not permitted.
 - 3. Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.
 - 4. Provide, erect, and maintain temporary barriers and security devices.
 - 5. Use physical barriers to prevent access to areas that could be hazardous to workers or the public.
 - 6. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
 - 7. Do not close or obstruct roadways or sidewalks without permits from authority having jurisdiction.
 - 8. Conduct operations to minimize obstruction of public and private entrances and exits. Do not obstruct required exits at any time. Protect persons using entrances and exits from removal operations.
 - 9. Obtain written permission from owners of adjacent properties when demolition equipment will traverse, infringe upon, or limit access to their property.
- B. Do not begin removal until receipt of notification to proceed from Owner.
- C. Protect existing structures and other elements to remain in place and not removed.
 - 1. Provide bracing and shoring.
 - 2. Prevent movement or settlement of adjacent structures.
 - 3. Stop work immediately if adjacent structures appear to be in danger.
- D. Minimize production of dust due to demolition operations. Do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.
- E. Hazardous Materials:
 - 1. If hazardous materials are discovered during removal operations, stop work and notify Architect and Owner; hazardous materials include regulated asbestos containing materials, lead, PCBs, and mercury.
- F. Perform demolition in a manner that maximizes salvage and recycling of materials.
 - 1. Comply with requirements of Section 01 7419 - Construction Waste Management and Disposal including diverting at least 75% of nonhazardous construction and demolition waste from landfills to comply with Minnesota B3 Sustainability Guidelines requirements.
 - 2. Dismantle existing construction and separate materials.
 - 3. Set aside reusable, recyclable, and salvageable materials; store and deliver to collection point or point of reuse.
- G. Partial Removal of Paving and Curbs: Neatly saw cut at right angle to surface.

3.03 EXISTING UTILITIES

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

- F. Locate and mark utilities to remain; mark using highly visible tags or flags, with identification of utility type; protect from damage due to subsequent construction, using substantial barricades if necessary.
- G. Remove exposed piping, valves, meters, equipment, supports, and foundations of disconnected and abandoned utilities.
- H. Prepare building demolition areas by disconnecting and capping utilities outside the demolition zone. Identify and mark, in same manner as other utilities to remain, utilities to be reconnected.

3.04 DEBRIS AND WASTE REMOVAL

- A. Remove debris, junk, and trash from site.
- B. Remove materials not to be reused on site; comply with requirements of Section 01 7419 - Waste Management.
- C. Leave site in clean condition, ready for subsequent work.
- D. Clean up spillage and wind-blown debris from public and private lands.

END OF SECTION

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**SECTION 03 1000
CONCRETE FORMING AND ACCESSORIES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Formwork for cast-in-place concrete, with shoring, bracing and anchorage.
- B. Openings for other work.
- C. Form accessories.
- D. Form stripping.

1.02 RELATED REQUIREMENTS

- A. Section 03 2000 - Concrete Reinforcing.
- B. Section 03 3000 - Cast-in-Place Concrete.
- C. Section 05 1200 - Structural Steel Framing: Placement of embedded steel anchors and plates in cast-in-place concrete.

1.03 REFERENCE STANDARDS

- A. ACI SPEC-117 - Specification for Tolerances for Concrete Construction and Materials; 2010 (Reapproved 2015).
- B. ACI SPEC-301 - Specifications for Concrete Construction; 2020.
- C. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; 2023.
- D. COE CRD-C 572 - Handbook for Concrete and Cement Corps of Engineers Specifications for Polyvinylchloride Waterstop; 1974.
- E. PS 1 - Structural Plywood; 2023.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on void form materials and installation requirements.

1.05 QUALITY ASSURANCE

- A. Perform work of this section in accordance with ACI 347R, ACI 301, and ACI 318
- B. Maintain one copy of each installation standard on site throughout the duration of concrete work.

PART 2 PRODUCTS

2.01 FORMWORK - GENERAL

- A. Provide concrete forms, accessories, shoring, and bracing as required to accomplish cast-in-place concrete work.
- B. Design and construct concrete that complies with design with respect to shape, lines, and dimensions.
- C. Comply with applicable state and local codes with respect to design, fabrication, erection, and removal of formwork.

2.02 WOOD FORM MATERIALS

- A. Softwood Plywood: PS 1, B-B High Density Concrete Form Overlay, Class I.

2.03 REMOVABLE PREFABRICATED FORMS

- A. Preformed Steel Forms: Minimum 16 gauge, 0.0598 inch thick, matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished surfaces.

- B. Preformed Plastic Forms: Thermoplastic polystyrene form liner, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished surfaces.
- C. Glass Fiber Fabric Reinforced Plastic Forms: Matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished concrete surfaces.
- D. Void Forms: Moisture resistant treated paper faces, biodegradable, structurally sufficient to support weight of wet concrete mix until initial set; 4 inches thick.

2.04 FORMWORK ACCESSORIES

- A. Form Ties: Snap-off type, plastic, fixed length, cone type, 1 inch back break dimension, free of defects that could leave holes larger than 1 inch in concrete surface.
- B. Form Release Agent: Capable of releasing forms from hardened concrete without staining or discoloring concrete or forming bugholes and other surface defects, compatible with concrete and form materials, and not requiring removal for satisfactory bonding of coatings to be applied.
- C. Dovetail Anchor Slot: Galvanized steel, at least 22 gauge, 0.0299 inch thick, foam filled, release tape sealed slots, anchors for securing to concrete formwork.
- D. Flashing Reglets: Galvanized steel, at least 22 gauge, 0.0299 inch thick, longest possible lengths, with alignment splines for joints, foam filled, release tape sealed slots, anchors for securing to concrete formwork.
- E. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages: Sized as required, of sufficient strength and character to maintain formwork in place while placing concrete.
- F. Embedded Anchor Shapes, Plates, Angles and Bars: As specified in Section 05 1200.
- G. Waterstops: PVC, complying with COE CRD-C 572.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify lines, levels and centers before proceeding with formwork. Ensure that dimensions agree with drawings.

3.02 EARTH FORMS

- A. Earth forms are not permitted.

3.03 ERECTION - FORMWORK

- A. Erect formwork, shoring and bracing to achieve design requirements, in accordance with requirements of ACI SPEC-301.
- B. Provide bracing to ensure stability of formwork. Shore or strengthen formwork subject to overstressing by construction loads.
- C. Arrange and assemble formwork to permit dismantling and stripping. Do not damage concrete during stripping. Permit removal of remaining principal shores.
- D. Align joints and make watertight. Keep form joints to a minimum.
- E. Obtain approval before framing openings in structural members that are not indicated on drawings.
- F. Install void forms in accordance with manufacturer's recommendations. Protect forms from moisture or crushing.
- G. Coordinate this section with other sections of work that require attachment of components to formwork.
- H. If formwork is placed after reinforcement, resulting in insufficient concrete cover over reinforcement, request instructions from Architect before proceeding.

3.04 APPLICATION - FORM RELEASE AGENT

- A. Apply form release agent on formwork in accordance with manufacturer's recommendations.
- B. Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.
- C. Do not apply form release agent where concrete surfaces will receive special finishes or applied coverings that are affected by agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces coated prior to placement of concrete.

3.05 INSERTS, EMBEDDED PARTS, AND OPENINGS

- A. Provide formed openings where required for items to be embedded in passing through concrete work.
- B. Locate and set in place items that will be cast directly into concrete.
- C. Coordinate with work of other sections in forming and placing openings, slots, reglets, recesses, sleeves, bolts, anchors, other inserts, and components of other work.
- D. Position recessed anchor slots for brick veneer masonry anchors to spacing and intervals specified in Section 04 2613.
- E. Install accessories in accordance with manufacturer's instructions, so they are straight, level, and plumb. Ensure items are not disturbed during concrete placement.
- F. Install waterstops in accordance with manufacturer's instructions, so they are continuous without displacing reinforcement. Heat seal joints so they are watertight.
- G. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain.
- H. Close temporary openings with tight fitting panels, flush with inside face of forms, and neatly fitted so joints will not be apparent in exposed concrete surfaces.

3.06 FORM CLEANING

- A. Clean forms as erection proceeds, to remove foreign matter within forms.
- B. Clean formed cavities of debris prior to placing concrete.
 - 1. Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.
 - 2. During cold weather, remove ice and snow from within forms. Do not use de-icing salts. Do not use water to clean out forms, unless formwork and concrete construction proceed within heated enclosure. Use compressed air or other means to remove foreign matter.

3.07 FORMWORK TOLERANCES

- A. Construct formwork to maintain tolerances required by ACI SPEC-117, unless otherwise indicated.

3.08 FORM REMOVAL

- A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads.
- B. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.
- C. Store removed forms to prevent damage to form materials or to fresh concrete. Discard damaged forms.

END OF SECTION

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**SECTION 03 2000
CONCRETE REINFORCING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Reinforcing steel for cast-in-place concrete.
- B. Supports and accessories for steel reinforcement.

1.02 RELATED REQUIREMENTS

- A. Section 03 1000 - Concrete Forming and Accessories.
- B. Section 03 3000 - Cast-in-Place Concrete.

1.03 REFERENCE STANDARDS

- A. ACI CODE-318 - Building Code Requirements for Structural Concrete and Commentary; 2019 (Reapproved 2022).
- B. ACI MNL-66 - ACI Detailing Manual; 2020.
- C. ACI SPEC-301 - Specifications for Concrete Construction; 2020.
- D. ASTM A184/A184M - Standard Specification for Welded Deformed Steel Bar Mats for Concrete Reinforcement; 2024.
- E. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2024.
- F. ASTM A706/A706M - Standard Specification for Deformed and Plain Low-Alloy Steel Bars for Concrete Reinforcement; 2024.
- G. ASTM A775/A775M - Standard Specification for Epoxy-Coated Steel Reinforcing Bars; 2022.
- H. ASTM D3963/D3963M - Standard Specification for Fabrication and Jobsite Handling of Epoxy-Coated Steel Reinforcing Bars; 2021.
- I. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification; 2021, with Errata (2023).
- J. AWS D1.4/D1.4M - Structural Welding Code - Steel Reinforcing Bars; 2018, with Amendment (2020).
- K. CRSI (DA4) - Manual of Standard Practice; 2024.
- L. CRSI (P1) - Placing Reinforcing Bars, 10th Edition; 2019.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Comply with requirements of ACI MNL-66 Include bar schedules, shapes of bent bars, spacing of bars, and location of splices.
- C. Manufacturer's Certificate: Certify that reinforcing steel and accessories supplied for this project meet or exceed specified requirements.
- D. Welders' Qualification Statement: Welders' certificates in accordance with AWS B2.1/B2.1M and dated no more than 12 months before start of scheduled welding work.

1.05 QUALITY ASSURANCE

- A. Perform work of this section in accordance with ACI CODE-318, ACI MNL-66, ACI SPEC-301, and CRSI (P1).
- B. Welder Qualifications: Welding processes and welding operators qualified in accordance with AWS D1.4/D1.4M and no more than 12 months before start of scheduled welding work.

PART 2 PRODUCTS

2.01 REINFORCEMENT

- A. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi).
 - 1. Deformed billet-steel bars.
 - 2. Epoxy coated in accordance with ASTM A775/A775M.
- B. Reinforcing Steel: ASTM A706/A706M, deformed low-alloy steel bars.
 - 1. Epoxy coated in accordance with ASTM A775/A775M.
- C. Reinforcement Accessories:
 - 1. Tie Wire: Annealed, minimum 16 gauge, 0.0508 inch.
 - 2. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement.
 - 3. Provide plastic coated steel components for placement within 1-1/2 inches of weathering surfaces.

2.02 FABRICATION

- A. Fabricate concrete reinforcing in accordance with CRSI (DA4) - Manual of Standard Practice.
- B. Welding of reinforcement is permitted only with the specific approval of Architect. Perform welding in accordance with AWS D1.4/D1.4M.
 - 1. Epoxy Coated Reinforcement: Clean surfaces, weld and re-protect welded joint in accordance with CRSI (DA4).
- C. Fabricate and handle epoxy-coated reinforcing in accordance with ASTM D3963/D3963M.

PART 3 EXECUTION

3.01 PLACEMENT

- A. Place, support and secure reinforcement against displacement. Do not deviate from required position.
- B. Comply with applicable code for concrete cover over reinforcement.

3.02 FIELD QUALITY CONTROL

- A. An independent testing agency, as specified in Section 01 4000 - Quality Requirements, will inspect installed reinforcement for compliance with contract documents before concrete placement.

END OF SECTION

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

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Floors and slabs on grade.
- B. Concrete foundation walls.
- C. Joint devices associated with concrete work.
- D. Miscellaneous concrete elements, including equipment pads, light pole bases, and flagpole bases.
- E. Concrete curing.
- F. Underslab vapor retarder.

1.02 RELATED REQUIREMENTS

- A. Section 03 1000 - Concrete Forming and Accessories: Forms and accessories for formwork.
- B. Section 03 2000 - Concrete Reinforcing.
- C. Section 03 3511 - Concrete Floor Finishes: Densifiers, hardeners, applied coatings, and polishing.
- D. Section 07 9201 - Non-Roof Related Joint Sealants: Products and installation for sealants and joint fillers for saw cut joints and isolation joints in slabs.

1.03 REFERENCE STANDARDS

- A. ACI CODE-318 - Building Code Requirements for Structural Concrete and Commentary; 2019 (Reapproved 2022).
- B. ACI PRC-211.1 - Selecting Proportions for Normal-Density and High Density-Concrete - Guide; 2022.
- C. ACI PRC-302.1 - Guide to Concrete Floor and Slab Construction; 2015.
- D. ACI PRC-304 - Guide for Measuring, Mixing, Transporting, and Placing Concrete; 2000 (Reapproved 2009).
- E. ACI PRC-305 - Guide to Hot Weather Concreting; 2020.
- F. ACI PRC-306 - Guide to Cold Weather Concreting; 2016.
- G. ACI PRC-308 - Guide to External Curing of Concrete; 2016.
- H. ACI SPEC-301 - Specifications for Concrete Construction; 2020.
- I. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2024a.
- J. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens; 2024.
- K. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete; 2025.
- L. ASTM C109/C109M - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 50 mm [2 in.] Cube Specimens); 2024.
- M. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic-Cement Concrete; 2020.
- N. ASTM C150/C150M - Standard Specification for Portland Cement; 2024.
- O. ASTM C171 - Standard Specification for Sheet Materials for Curing Concrete; 2020.
- P. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method; 2024a.
- Q. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete; 2024.

- R. ASTM C330/C330M - Standard Specification for Lightweight Aggregates for Structural Concrete; 2023.
- S. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete; 2024.
- T. ASTM C618 - Standard Specification for Coal Ash and Raw or Calcined Natural Pozzolan for Use in Concrete; 2025a.
- U. ASTM C1107/C1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink); 2020.
- V. ASTM C1116/C1116M - Standard Specification for Fiber-Reinforced Concrete; 2023.
- W. ASTM C1602/C1602M - Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete; 2022.
- X. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Asphalt Types); 2023.
- Y. ASTM D3963/D3963M - Standard Specification for Fabrication and Jobsite Handling of Epoxy-Coated Steel Reinforcing Bars; 2021.
- Z. ASTM E1155/E1155M - Standard Test Method for Determining FF Floor Flatness and FL Floor Levelness Numbers; 2023.
- AA. ASTM E1155M - Standard Test Method for Determining FF Floor Flatness and FL Floor Levelness Numbers (Metric); 2014.
- BB. ASTM E1643 - Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs; 2024.
- CC. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs; 2017 (Reapproved 2023).
- DD. COE CRD-C 513 - Handbook for Concrete and Cement Corps of Engineers Specifications for Rubber Waterstops; 1974.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data: Submit manufacturers' data on manufactured products showing compliance with specified requirements and installation instructions.
 - 1. For underslab vapor retarders provide the following:
 - a. Preparation instruction and recommendations.
 - b. Storage and handling requirements and recommendations.
 - c. Installation methods.
 - d. Independent laboratory test results showing compliance with ASTM & ACI standards.
- C. Mix Design: Submit proposed concrete mix design.
 - 1. Indicate proposed mix design complies with requirements of ACI SPEC-301, Section 4 - Concrete Mixtures.
 - 2. Indicate proposed mix design complies with fiber reinforcing manufacturer's written recommendations.
 - 3. Indicate proposed mix design complies with admixture manufacturer's written recommendations.
- D. Samples: Submit samples of underslab vapor retarder to be used.
- E. Test Reports: Submit report for each test or series of tests specified.

1.05 QUALITY ASSURANCE

- A. Perform work of this section in accordance with ACI SPEC-301 and ACI CODE-318.
- B. Follow recommendations of ACI PRC-305 when concreting during hot weather.
- C. Follow recommendations of ACI PRC-306 when concreting during cold weather.

- D. Preinstallation Meeting: Convene a preinstallation meeting two weeks before start of installation of underslab vapor retarders. Require attendance of parties directly affecting work of this section, including Contractor, Architect and Installer. Review installation, protection, and coordination with other work.

PART 2 PRODUCTS

2.01 FORMWORK

- A. Comply with requirements of Section 03 1000.

2.02 REINFORCEMENT MATERIALS

- A. Comply with requirements of Section 03 2000.

2.03 CONCRETE MATERIALS

- A. Cement: ASTM C150/C150M, Type I - Normal Portland type.
 - 1. Acquire cement for entire project from same source.
- B. Fine and Coarse Aggregates: ASTM C33/C33M.
 - 1. Acquire aggregates for entire project from same source.
- C. Lightweight Aggregate: ASTM C330/C330M.
- D. Water: ASTM C1602/C1602M; clean, potable, and not detrimental to concrete.

2.04 ADMIXTURES

- A. Do not use chemicals that will result in soluble chloride ions in excess of 0.1 percent by weight of cement.
- B. Air Entrainment Admixture: ASTM C260/C260M.
- C. High Range Water Reducing and Retarding Admixture: ASTM C494/C494M Type G.
- D. High Range Water Reducing Admixture: ASTM C494/C494M Type F.
- E. Water Reducing and Accelerating Admixture: ASTM C494/C494M Type E.
- F. Water Reducing and Retarding Admixture: ASTM C494/C494M Type D.
- G. Accelerating Admixture: ASTM C494/C494M Type C.
- H. Retarding Admixture: ASTM C494/C494M Type B.
- I. Water Reducing Admixture: ASTM C494/C494M Type A.
- J. Shrinkage Reducing Admixture:

2.05 ACCESSORY MATERIALS

- A. Underslab Vapor Retarder:
 - 1. Sheet Material: ASTM E1745, Class A; stated by manufacturer as suitable for installation in contact with soil or granular fill under concrete slabs. Single-ply polyethylene is prohibited.
 - 2. Accessory Products: Vapor retarder manufacturer's recommended tape, adhesive, mastic, prefabricated boots, etc., for sealing seams and penetrations.
 - 3. Products:
 - a. Henry Company; Moistop Ultra 15: www.henry.com/#sle.
 - b. Inteplast Group; Barrier-Bac VB-350: www.barrierbac.com/#sle.
 - c. ISI Building Products; Viper VaporCheck II 15-mil (Class A): www.isibp.com/#sle.
 - d. Poly-America; Husky Yellow Guard Class A 15-mil Vapor Barrier: www.yellowguard.com/#sle.
 - e. Stego Industries, LLC; Stego Wrap 15-mil: www.stegoindustries.com/#sle.
 - f. Tex-Trude, LP; Xtreme Vapor Barrier (15-mil): www.tex-trude.com/#sle.
 - g. W. R. Meadows, Inc; PERMINATOR Class A - 15 mils (0.38 mm): www.wrmeadows.com/#sle.

- B. Non-Shrink Cementitious Grout: Premixed compound consisting of nonmetallic aggregate, cement, water reducing and plasticizing agents.
 - 1. Grout: Comply with ASTM C1107/C1107M.
 - 2. Minimum Compressive Strength at 48 Hours, ASTM C109/C109M: 2,000 pounds per square inch.
 - 3. Minimum Compressive Strength at 28 Days, ASTM C109/C109M: 7,000 pounds per square inch.

2.06 BONDING AND JOINTING PRODUCTS

- A. Waterstops: Rubber, complying with COE CRD-C 513.
- B. Slab Isolation Joint Filler: 1/2-inch thick, height equal to slab thickness, with removable top section forming 1/2-inch deep sealant pocket after removal.
 - 1. Material: ASTM D1751, cellulose fiber.

2.07 CURING MATERIALS

- A. Moisture-Retaining Sheet: ASTM C171.
- B. Water: Potable, not detrimental to concrete.

2.08 CONCRETE MIX DESIGN

- A. Proportioning Normal Weight Concrete: Comply with ACI PRC-211.1 recommendations.
- B. Concrete Strength: Establish required average strength for concrete on the basis of field experience or trial mixtures, as specified in ACI SPEC-301.
 - 1. For trial mixtures method, employ independent testing agency acceptable to Architect for preparing and reporting proposed mix designs.
- C. Admixtures: Add acceptable admixtures as recommended in ACI PRC-211.1 and at rates recommended or required by manufacturer.
- D. Fiber Reinforcement: Add to mix at rate of 1.5 pounds per cubic yard, or as recommended by manufacturer for specific project conditions.
- E. Normal Weight Concrete:
 - 1. Compressive Strength, when tested in accordance with ASTM C39/C39M at 28 days: As indicated on drawings.
 - 2. Water-Cement Ratio: Maximum 40 percent by weight.
 - 3. Maximum Aggregate Size: 5/8 inch.

2.09 MIXING

- A. Adding Water: If concrete arrives on-site with slump less than suitable for placement, do not add water that exceeds the maximum water-cement ratio or exceeds the maximum permissible slump.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify lines, levels, and dimensions before proceeding with work of this section.
- B. Examine surfaces and areas to receive underslab vapor retarders. Notify Architect in writing defects of work and other unsatisfactory site conditions that would cause defective installation of vapor retarders. Do not begin installation until acceptable conditions have been corrected. Commencement of work will imply acceptance of substrate.

3.02 PREPARATION

- A. Verify that forms are clean and free of rust before applying release agent.
- B. Coordinate placement of embedded items with erection of concrete formwork and placement of form accessories.

- C. Where new concrete is to be bonded to previously placed concrete, prepare existing surface by cleaning and applying bonding agent in accordance with bonding agent manufacturer's instructions.
- D. Interior Slabs on Grade: Install vapor retarder under interior slabs on grade. Comply with ASTM E1643. Lap joints minimum 6 inches. Seal joints, seams and penetrations watertight with manufacturer's recommended products and follow manufacturer's written instructions. Repair damaged vapor retarder before covering.

3.03 INSTALLING UNDERSLAB VAPOR RETARDER

- A. Install reinforced vapor retarders in accordance with manufacturer's instructions and ASTM E1643 at concrete slabs.
- B. Install vapor retarders continuously under all concrete slab-on-grade locations. Ensure there are no discontinuities in vapor retarder at seams and penetrations.
- C. Install vapor retarders in largest practical widths.
- D. Ensure surface beneath vapor retarder is smooth with no sharp projections.
- E. Lap vapor retarder over footings and seal to foundation walls.
- F. Lap vapor retarder 6 inches and seal seams per manufacturer's recommendations with manufacturer's tape. Ensure vapor retarder surfaces to receive mastic tape are clean and dry.
- G. Immediately repair holes in vapor retarder with manufacturer's self-adhesive repair tape or mastic.
- H. Seal around pipes and other penetrations in vapor retarder with pipe boots or manufacturer's mastic in accordance with manufacturer's instructions.

3.04 INSTALLING REINFORCEMENT AND OTHER EMBEDDED ITEMS

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

3.05 PLACING CONCRETE

- A. Place concrete in accordance with ACI PRC-304.
- B. Place concrete for floor slabs in accordance with ACI PRC-302.1.
- C. Notify Architect not less than 24 hours prior to commencement of placement operations.
- D. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.
- E. Ensure reinforcement, inserts, waterstops, embedded parts, and formed construction joint devices will not be disturbed during concrete placement.
- F. Place concrete continuously without construction (cold) joints wherever possible; where construction joints are necessary, before next placement prepare joint surface by removing laitance and exposing the sand and sound surface mortar, by sandblasting or high-pressure water jetting.
- G. Finish floors level and flat, unless otherwise indicated, within the tolerances specified below.

3.06 SLAB JOINTING

- A. Locate joints as indicated on drawings.
- B. Anchor joint fillers and devices to prevent movement during concrete placement.
- C. Isolation Joints: Use preformed joint filler with removable top section for joint sealant, total height equal to thickness of slab, set flush with top of slab.

1. Install wherever necessary to separate slab from other building members, including columns, walls, equipment foundations, footings, stairs, manholes, sumps, and drains.
- D. Saw Cut Contraction Joints: Saw cut joints before concrete begins to cool, within 4 to 12 hours after placing; use 3/16 inch thick blade and cut at least 1 inch deep but not less than one quarter (1/4) the depth of the slab.

3.07 SEPARATE FLOOR TOPPINGS

- A. Prior to placing floor topping, roughen substrate concrete surface and remove deleterious material. Broom and vacuum clean.

3.08 FLOOR FLATNESS AND LEVELNESS TOLERANCES

- A. An independent testing agency, as specified in Section 01 4000, will inspect finished slabs for compliance with specified tolerances.
- B. Minimum F(F) Floor Flatness and F(L) Floor Levelness Values:
 1. Exposed to View and Foot Traffic: F(F) of 20; F(L) of 15, on-grade only.
 2. Under Thick-Bed Tile: F(F) of 20; F(L) of 15, on-grade only.
 3. Under Carpeting: F(F) of 25; F(L) of 20, on-grade only.
 4. Under Thin Resilient Flooring and Thinset Tile: F(F) of 35; F(L) of 25, on-grade only.
- C. Measure F(F) Floor Flatness and F(L) Floor Levelness in accordance with ASTM E1155/E1155M (ASTM E1155M), within 48 hours after slab installation; report both composite overall values and local values for each measured section.
- D. Correct the slab surface if composite overall value is less than specified and if local value is less than two-thirds of specified value or less than F(F) 13/F(L) 10.
- E. Correct defects by grinding or by removal and replacement of the defective work. Areas requiring corrective work will be identified. Re-measure corrected areas by the same process.

3.09 CONCRETE FINISHING

- A. Repair surface defects, including tie holes, immediately after removing formwork.
- B. Unexposed Form Finish: Rub down or chip off fins or other raised areas 1/4 inch or more in height.
- C. Exposed Form Finish: Rub down or chip off and smooth fins or other raised areas 1/4 inch or more in height. Provide finish as follows:
 1. Smooth Rubbed Finish: Wet concrete and rub with carborundum brick or other abrasive, not more than 24 hours after form removal.
 2. Grout Cleaned Finish: Wet areas to be cleaned and apply grout mixture by brush or spray; scrub immediately to remove excess grout. After drying, rub vigorously with clean burlap, and keep moist for 36 hours.
 3. Cork Floated Finish: Immediately after form removal, apply grout with trowel or firm rubber float; compress grout with low-speed grinder, and apply final texture with cork float.
- D. Concrete Slabs: Finish to requirements of ACI PRC-302.1 and as follows:
 1. Surfaces to Receive Thick Floor Coverings: "Wood float" as described in ACI PRC-302.1; thick floor coverings include quarry tile, ceramic tile, and Portland cement terrazzo with full bed setting system.
 2. Surfaces to Receive Thin Floor Coverings: "Steel trowel" as described in ACI PRC-302.1; thin floor coverings include carpeting, resilient flooring, seamless flooring, resinous matrix terrazzo, thin set quarry tile, and thin set ceramic tile.
 3. Decorative Exposed Surfaces: Trowel as described in ACI PRC-302.1; take measures necessary to avoid black-burnish marks; decorative exposed surfaces include surfaces to be stained or dyed, pigmented concrete, surfaces to receive liquid hardeners, surfaces to receive dry-shake hardeners, surfaces to be polished, and all other exposed slab surfaces.

- E. In areas with floor drains, maintain floor elevation at walls; pitch surfaces uniformly to drains at 1:100 nominal.

3.10 CURING AND PROTECTION

- A. Comply with requirements of ACI PRC-308. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
- B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
 - 1. Normal concrete: Not less than seven days.
- C. Formed Surfaces: Cure by moist curing with forms in place for full curing period.
- D. Surfaces Not in Contact with Forms:
 - 1. Initial Curing: Start as soon as free water has disappeared and before surface is dry. Keep continuously moist for not less than three days by water ponding, water-saturated sand, water-fog spray, or saturated burlap.
 - 2. Final Curing: Begin after initial curing but before surface is dry.

3.11 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field quality control tests, as specified in Section 01 4000 - Quality Requirements.
- B. Provide free access to concrete operations at project site and cooperate with appointed firm.
- C. Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of concrete operations.
- D. Tests of concrete and concrete materials may be performed at any time to ensure compliance with specified requirements.
- E. Compressive Strength Tests: ASTM C39/C39M, for each test, mold and cure three concrete test cylinders. Obtain test samples for every 100 cubic yards or less of each class of concrete placed.
- F. Take one additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.
- G. Perform one slump test for each set of test cylinders taken, following procedures of ASTM C143/C143M.
- H. Slab Testing: Cooperate with manufacturer of specified moisture vapor reducing admixture (MVRA) to allow access for sampling and testing concrete for compliance with warranty requirements.
- I. Notify Architect or Independent testing agency for inspection of vapor retarder installation prior to covering. Provide 48 hour notice.

3.12 DEFECTIVE CONCRETE

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

3.13 PROTECTION

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

END OF SECTION

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**SECTION 03 3511
CONCRETE FLOOR FINISHES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Liquid densifiers and hardeners.
- B. Dry shake hardeners.
- C. Satin-gloss sealer.
- D. Penetrating sealers.
- E. Polished concrete.

1.02 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the work with concrete floor placement and concrete floor curing.

1.03 SUBMITTALS

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

1.04 QUALITY ASSURANCE

- A. For slabs indicated to receive concrete polishing system, do not proceed with concrete polishing unless manufacturer's representative and specialized equipment is present for every day of placement.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in manufacturer's sealed packaging, including application instructions.

1.06 FIELD CONDITIONS

- A. Maintain light level equivalent to a minimum 200 W light source at 8 feet above the floor surface over each 20 foot square area of floor being finished.
- B. Maintain ambient temperature of 50 degrees F minimum.

1.07 WARRANTY

- A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.
- B. Finish Warranty: Provide five-year manufacturer warranty against excessive degradation of finish. Include provision for replacement of units with excessive fading, chalking, or flaking.

PART 2 PRODUCTS

2.01 APPLICATIONS

- A. Densifier and Hardener:
 - 1. Use at the following locations: SC1, SC2, SC3, SC4.
- B. Satin/low gloss Clear Coating:
 - 1. Use at the following locations: SC2, SC3.
- C. All materials must comply with VOC-Content-Restricted product requirements of Section 01 6116.

2.02 DENSIFIERS AND HARDENERS

- A. Liquid densifier and hardener: Penetrating chemical compound that reacts with concrete, filling the pores, hardening, and dustproofing.
 - 1. Composition: Lithium silicate.
 - a. Products:
 - b. PROSOCO, Inc; Consolideck LSCS: www.prosoco.com/consolideck/#sle.
 - 1) To be utilized if if Type 1 (ASTM C150) concrete is used
 - 2) To be utilized at SC1, SC2, SC3 locations
 - c. PROSOCO, Inc; Consolideck BD1: www.prosoco.com/consolideck/#sle.
 - 1) To be utilized if if Type 1L (ASTM C595) concrete is used
 - 2) To be utilized at SC1, SC2, SC3 locations
 - d. Substitutions: See Section 01 6000 - Product Requirements.
 - 2. Composition: Magnesium fluoro-silicate
 - 3. Products:
 - a. Sikagard -300 HD WB: www.usa.sika.com
 - 1) To be utilized at SC4 locations
 - b. Substitutions: See Section 01 6000-Product Requirements.
- B. Dry Shake Hardener: Premixed dry powder for spreading on and working into concrete surface prior to set.
 - 1. Composition: Metallic, iron aggregate.
 - a. Products:
 - 1) Master Builders Solutions; Mastercoat 200: www.master-builders-solutions.com/en-us/#sle.
 - (a) To be utilized at SC4 locations
 - 2) Substitutions: See Section 01 6000 - Product Requirements.

2.03 COATINGS

- A. Penetrating sealer: Transparent, nonyellowing, water- or solvent-based coating.
 - 1. Products
 - a. At SC2 locations: PROSOCO, Inc; Saltguard WB: www.prosoco.com/consolideck/#sle.
 - b. SC3 locations: PROSOCO, Inc; Concrete Protector SB: www.prosoco.com/consolideck/#sle.
 - 1) Substitutions: See Section 01 6000-Product Requirements.

2.04 POLISHED CONCRETE SYSTEM

- A. Description: Materials, equipment, and procedures designed and furnished by single manufacturer to produce densely polished concrete of specified sheen.
- B. Application: Polished concrete in rooms: Circulation 801, Circulation 803, Lactation 806, Circulation 807, Toilet 804, Toilet 805, Women's 808 and Men's 809.
- C. Finish: as scheduled in drawings
- D. Level of Sheen: Level 2 Satin

PART 3 EXECUTION

3.01 EXAMINATION

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

3.02 GENERAL

- A. Apply materials in accordance with manufacturer's instructions.

3.03 COATING APPLICATION

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

3.04 CONCRETE POLISHING

- A. Execute using materials, equipment, and procedures specified by manufacturer, using manufacturer approved installer.

END OF SECTION

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SECTION 03 4113
PRECAST CONCRETE HOLLOW CORE PLANKS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Precast floor and roof planks.
- B. Connection plates with brackets and hangers.
- C. Grouting plank joint keys.

1.02 REFERENCE STANDARDS

- A. ACI CODE-318 - Building Code Requirements for Structural Concrete and Commentary; 2019 (Reapproved 2022).
- B. ACI SPEC-301 - Specifications for Concrete Construction; 2020.
- C. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.
- D. ASTM A416/A416M - Standard Specification for Low-Relaxation, Seven-Wire Steel Strand for Prestressed Concrete; 2024.
- E. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2024.
- F. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification; 2021, with Errata (2023).
- G. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2025.
- H. AWS D1.4/D1.4M - Structural Welding Code - Steel Reinforcing Bars; 2018, with Amendment (2020).
- I. PCI MNL-116 - Manual for Quality Control for Plants and Production of Structural Precast Concrete Products; 2021.
- J. PCI MNL-120 - PCI Design Handbook; 2017, with Errata (2021).
- K. PCI MNL-123 - Connections Manual: Design and Typical Details of Connections for Precast and Prestressed Concrete; 1988.
- L. PCI MNL-124 - Design for Fire Resistance of Precast Prestressed Concrete; 2011.
- M. PCI MNL-126 - PCI Manual for the Design of Hollow Core Slabs and Walls; 2015.
- N. PCI MNL-135 - Tolerance Manual for Precast and Prestressed Concrete Construction; 2000.
- O. PCI (CERT) - PCI Plant Certification; Current Edition.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene one week before starting work of this section.
 - 1. Discuss anchor and weld plate locations, sleeve locations, and cautions regarding cutting or core drilling.

1.04 PERFORMANCE REQUIREMENTS

- A. Design planks in accordance with the requirements of PCI MNL-120, PCI MNL-124, PCI MNL-126, ACI 301, and ACI 318.
- B. Design connections in accordance with PCI MNL-123.
- C. Design components including, but not limited to, weld plates, inserts, anchor rods, welding, hangers, and lifting hardware, to withstand dead loads and design loads in the configuration indicated on the Drawings and as follows:
 - 1. Design components to accommodate construction tolerances, deflection of other building structural members and clearances of intended openings.

2. Grouted keys: Capable of transmitting horizontal shear force of 2,000 pounds per linear foot.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Indicate standard component configuration, design loads, deflections, and cambers.
- C. Design Data:
 1. Submit structural design calculations including loadings and stresses of precast concrete hollow core units, headers, connections, deflections, and chambers. Calculations shall be certified by a Professional Engineer licensed in the State in which the Project is located.
 2. Calculations shall indicate compliance with performance requirements and design criteria.
- D. Submit documentation that the topping mix design provided under 03 3000 - Cast-in-Place Concrete, has been coordinated with, reviewed, and approved by the Precast Concrete Hollow Core Plank supplier.
- E. Shop Drawings: Indicate plank locations, unit identification marks, connection details, edge conditions, bearing requirements, support conditions, dimensions, openings, openings intended to be field cut, and relationship to adjacent materials.
- F. Manufacturer's Installation Instructions: Indicate special procedures, perimeter conditions requiring special attention.
- G. Sustainable Design Reporting: If any ground granulated blast furnace slag, silica fume, rice hull ash, or other waste material is used in mix designs to replace Portland cement, submit the total volume of concrete, mix design(s) used showing the quantity of Portland cement replaced, reports showing successful cylinder testing, and temperature on day of pour if cold weather mix is used.

1.06 QUALITY ASSURANCE

- A. Designer Qualifications: Design precast concrete hollow core planks under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State in which the Project is located.
- B. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.
- C. Erector Qualifications: Company specializing in performing the type of work specified in this section, with minimum five years of documented experience.
- D. Welding Qualifications: Welding processes and welding operators qualified in accordance with AWS D1.1/D1.1M and AWS D1.4/D1.4M and no more than 12 months before start of scheduled welding work.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Lifting or Handling Devices: Capable of supporting member in positions anticipated during manufacture, storage, transportation, and erection.
- B. Mark each member with date of production and final position in structure.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Precast Concrete Hollow Core Planks:
 1. Any manufacturer with PCI Plant Certification.
 2. Substitutions: See Section 01 6000 - Product Requirements.

2.02 PRECAST UNITS

- A. Precast Hollow Core Planks: Comply with PCI MNL-120, PCI MNL-126, PCI MNL-124 ACI CODE-318, and ACI SPEC-301.
 - 1. Design components to withstand dead loads and design loads in the configuration indicated on drawings and as follows:
 - a. Roof Assembly: ____ pounds per square foot live load.
 - b. Floor Assembly: ____ pounds per square foot live load.
 - c. Maximum Allowable Deflection of Roof Planks: 1/180 of span .
 - d. Maximum Allowable Deflection of Floor Planks: 1/240 of span .
 - 2. Design connections in accordance with PCI MNL-123.
 - 3. Design components to accommodate construction tolerances, deflection of other building structural members and clearances of intended openings.

2.03 MATERIALS

- A. Concrete Materials: ACI SPEC-301.
- B. Tensioning Steel Tendons: ASTM A416/A416M, Grade 250 - 250K psi; seven-wire stranded steel cable; low-relaxation type; full length without splices; weldless; uncoated.
- C. Reinforcing Steel: ASTM A615/A615M, Grade 40 (40,000 psi) deformed steel bars.
- D. Non-Shrink Grout: Non-metallic, minimum compressive strength of 10,000 psi at 28 days.
- E. Cement Grout: Minimum compressive strength of 3,000 psi at 28 days.

2.04 ACCESSORIES

- A. Connecting and Supporting Devices: Plates, angles, items cast into concrete, items connected to steel framing members, and inserts: ASTM A36/A36M carbon steel; prime painted.
- B. Core Hole End Plugs: Cardboard insert with stiff concrete fill.
- C. Hanger Tabs: Galvanized steel, designed to fit into grouted key joints, capable of supporting 500 lbs dead load, predrilled to receive hanger.
- D. Bearing Pads: High density plastic, 1/8 inch thick, smooth on one side. Vulcanized elastomeric compound molded to size.
- E. Sill Seal: Compressible glass fiber strips.

2.05 FABRICATION

- A. Weld reinforcing in accordance with AWS D1.4/D1.4M.
- B. Embed anchors, inserts, plates, angles, and other items at locations indicated.
- C. Provide openings required by other sections, at locations indicated.
- D. Cut exposed ends flush.
- E. Plant Finish: Finish members to PCI MNL-116 Commercial Grade.
- F. Plant Finish: PCI MNL-116.
 - 1. Roof Members: Finish B Grade.
 - 2. Floor Members: Finish B Grade.
- G. Connecting and Supporting Steel Devices: Do not paint surfaces in contact with concrete or surfaces requiring field welding.

2.06 FABRICATION TOLERANCES

- A. Comply with PCI MNL-116 and PCI MNL-135, except as specifically amended below.

2.07 SOURCE QUALITY CONTROL

- A. Produce planks in accordance with requirements of PCI MNL-116. Maintain plant records and quality control program during production of precast planks. Make records available upon request.
- B. Inspect and test stressing tendons before delivery for compliance with specified standards.

PART 3 EXECUTION

3.01 EXAMINATION

3.02 PREPARATION

- A. Prepare support devices for the erection procedure and temporary bracing.

3.03 ERECTION

- A. Erect members without damage to structural capacity, shape, or finish. Replace or repair damaged members.
- B. Install bearing pads and sill seal at bearing ends of planks as indicated.
- C. Align and maintain uniform horizontal and end joints, as erection progresses.
- D. Maintain temporary bracing in place until final connection is made. Protect members from staining.
- E. Adjust differential camber between precast members to tolerance before final attachment and grouting.
- F. Adjust differential elevation between precast members to tolerance before final attachment.
- G. Secure units in place. Perform welding in accordance with AWS D1.1/D1.1M.
- H. Grout longitudinal keys as indicated.
- I. Tape seal underside of plank joints to prevent grout leakage.
- J. Make plank-to-plank joints smooth using grout, troweled smooth. Transition differential elevation of adjoining planks with grout to a maximum slope of 1:12.

3.04 TOLERANCES

- A. Erect members level and plumb within allowable tolerances. Comply with PCI MNL-135, except as specifically amended below.
 - 1. Plan Location from Building Grid Datum: Plus or minus 3/4 in.
 - 2. Top Elevation from Building Elevation Datum at Plank Ends: Plus or minus 1/2 inch.
 - 3. Maximum Jog in Alignment of Matching Ends: Plus or minus 1/2 inch.
 - 4. Exposed Joint Dimension: Plus or minus 3/8 inch.
 - 5. Differential Top Elevation As Erected: Plus or minus 3/8 inch.
 - 6. Bearing Length in Span Direction: Plus or minus 3/8 inch.
 - 7. Differential Bottom Elevation of Exposed Planks: Plus or minus 3/16 inch.

3.05 PROTECTION

- A. Protect members from damage caused by field welding or erection operations.

3.06 CLEANING

- A. Clean weld marks, dirt, and blemishes from surface of exposed members.

END OF SECTION

SECTION 03 4500
PRECAST ARCHITECTURAL CONCRETE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Architectural precast concrete wall panels with integral insulation.
- B. Supports, anchors, and attachments.
- C. Grouting under panels.

1.02 REFERENCE STANDARDS

- A. ACI 211.1 - Selecting Proportions for Normal-Density and High Density-Concrete - Guide; 2022.
- A. ACI CODE-318 - Building Code Requirements for Structural Concrete and Commentary; 2019 (Reapproved 2022).
- B. ASHRAE (FUND) - ASHRAE Handbook - Fundamentals; Most Recent Edition Cited by Referring Code or Reference Standard.
- C. ASHRAE Std 90.1 I-P - Energy Standard for Buildings Except Low-Rise Residential Buildings; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- D. ASHRAE Std 90.1 - Energy Standard for Buildings Except Low-Rise Residential Buildings; 2010, Including All Amendments and Errata.
- E. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.
- F. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.
- G. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2021.
- H. ASTM A416/A416M - Standard Specification for Low-Relaxation, Seven-Wire Steel Strand for Prestressed Concrete; 2024.
- I. ASTM A563/A563M - Standard Specification for Carbon and Alloy Steel Nuts (Inch and Metric); 2021a.
- J. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2024.
- K. ASTM A706/A706M - Standard Specification for Deformed and Plain Low-Alloy Steel Bars for Concrete Reinforcement; 2024.
- L. ASTM A775/A775M - Standard Specification for Epoxy-Coated Steel Reinforcing Bars; 2022.
- M. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2024.
- N. ASTM C31/C31M - Standard Practice for Making and Curing Concrete Test Specimens in the Field; 2026.
- O. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2024a.
- P. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic-Cement Concrete; 2020.
- Q. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar; 2025.
- R. ASTM C150/C150M - Standard Specification for Portland Cement; 2024.
- S. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete; 2024.
- T. ASTM C404 - Standard Specification for Aggregates for Masonry Grout; 2024.
- U. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete; 2024.

- V. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; 2023.
- W. ASTM C979/C979M - Standard Specification for Pigments for Integrally Colored Concrete; 2024.
- X. ASTM C1602/C1602M - Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete; 2022.
- Y. ASTM D3963/D3963M - Standard Specification for Fabrication and Jobsite Handling of Epoxy-Coated Steel Reinforcing Bars; 2021.
- Z. ASTM E164 - Standard Practice for Contact Ultrasonic Testing of Weldments; 2024.
- AA. ASTM E709 - Standard Guide for Magnetic Particle Testing; 2021.
- BB. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2025.
- CC. AWS D1.4/D1.4M - Structural Welding Code - Steel Reinforcing Bars; 2018, with Amendment (2020).
- DD. PCI MNL-116 - Manual for Quality Control for Plants and Production of Structural Precast Concrete Products; 2021.
- EE. PCI MNL-117 - Manual for Quality Control for Plants and Production of Architectural Precast Concrete Products; 2013.
- FF. PCI MNL-120 - PCI Design Handbook; 2017, with Errata (2021).
- GG. PCI MNL-122 - Architectural Precast Concrete; 2007.
- HH. PCI MNL-123 - Connections Manual: Design and Typical Details of Connections for Precast and Prestressed Concrete; 1988.
- II. PCI MNL-135 - Tolerance Manual for Precast and Prestressed Concrete Construction; 2000.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene one week prior to commencing work of this section.

1.04 PERFORMANCE REQUIREMENTS

- A. Design units including but not limited to weld plates, inserts, anchor rods, welding, hangers, and lifting hardware, to withstand design loads as calculated in accordance with current applicable code, and erection forces.
- B. Design units to withstand static loads and anticipated dynamic loading, including positive and negative wind loads, seismic loads, thermal movement loads, and erection forces.
- C. Calculate structural properties of units in accordance with ACI 318.
- D. Design connections and lifting hardware to occur in areas hidden from sight below slabs, at ceiling space, etcetera, to eliminate visible patching.
- E. Design units to accommodate construction tolerances, deflection of building structural members, and clearances of intended openings.
- F. Design component connections to accommodate building movement and thermal movement. Provide adjustment to accommodate misalignment of structure without unit distortion or damage.
- G. Design panels to accommodate mechanical ductwork cast penetrations.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate layout, elevations, shapes, unit locations, configuration, unit identification marks, reinforcement, connection details, support items, location of lifting devices, dimensions, openings, and relationship to adjacent materials. Indicate joints, reveals, and extent and location of each surface finish. Indicate details at building corners. Provide erection drawings.

1. Include mechanical and electrical device locations and penetrations.
 2. Indicate type, size, and length of welded connections by AWS standard symbols.
 3. Indicate locations of and detail hardware and anchorage devices to be embedded into or attached to structure or other construction with relationship to structure.
 4. Schedule loose hardware and anchorage devices to be installed by others; Include in schedule: identification marks, item descriptions, and total quantities.
 5. Indicate sections and details showing quantities and position of reinforcing steel and related items including special reinforcement.
 6. Include structural design calculations.
- C. Design Mixtures: For each precast concrete mixture.
- D. Prior to submittal of shop drawings to Architect, field verify and coordinate existing conditions impacting this work and include applicable field information on shop drawings.
- E. Prior to submittal of shop drawings to Architect, shop drawings to be reviewed by and coordinated with the mechanical and electrical contractors for specific location and size of penetrations, openings, blockouts and cast-in devices.
- F. Samples: Submit two 12 by 12 inch in size, illustrating each surface finish, color and texture.
- G. Integrally Insulated Panel System Design Data:
1. Thermal Resistance: Submit calculations complying with ASHRAE Std 90.1 I-P, isothermal planes method, and demonstrating thermal resistance of integrally insulated panel system.
 2. Dew Point: Submit calculations complying with ASHRAE (FUND). Demonstrate condensation prevention, prevention of frost or ice formation on panels surfaces, and inner wall condensation potential of _____ ounce per day per square foot or less.
 3. Thermal Bowing and Crack Mitigation: Submit drawing details and written procedures for mitigation and repair of bowing and cracking in insulated concrete panels without full-thickness concrete sections or metallic connectors between wythes.
- H. Sustainable Design Reporting: If any silica fume, rice hull ash, or other waste material is used in mix designs to replace Portland cement, submit the total volume of concrete, mix design(s) used showing the quantity of Portland cement replaced, reports showing successful cylinder testing, and temperature on day of pour if cold weather mix is used.
- I. Maintenance Data: Indicate surface cleaning instructions.
- J. Patching and Repair: Provide Manufacturer's concrete repair and patching requirements.
- K. Design Data:
1. Submit structural design calculations including loadings and stresses of precast concrete, connections, and anchorage. Calculations shall be certified by a Professional Engineer licensed in the State in which the Project is located.
 2. Calculations shall indicate compliance with performance requirements and design criteria.
 3. Indicate location, type, magnitude, and direction of loads imposed on the building structure from precast concrete.

1.06 QUALITY ASSURANCE

- A. Perform the work of this section in accordance with PCI MNL-120, PCI MNL-122, PCI MNL-123, and ACI 318. Perform welding in accordance with AWS D1.1/D1.1M.
- B. Design Engineer Qualifications: Design precast concrete units under direct supervision of a Professional Engineer experienced in design of precast concrete and licensed in the State in which the Project is located.
- C. Fabricator Qualifications: Fabricator shall be experienced in producing architectural precast concrete units similar to those indicated for this project, have a record of successful in-service performance, and comply with the following requirements:

1. Plant having at least 5 years of experience in production of precast concrete of the type required.
 2. Participates in PCI's Plant Certification program at the time of bidding and is designated a PCI-certified plant for Category AC and Group C, Category C3.
 3. Assumes responsibility for engineering architectural precast concrete units to comply with performance requirements. This responsibility includes preparation of shop (erection) drawings and comprehensive engineering analysis by a qualified professional engineer.
- D. Precast Concrete Erector Qualifications: Company experienced in installing precast of the type specified in this section, with not less than three years of experience.
1. Certified and designated, prior to beginning work at project site, by PCI's Certificate of Compliance to erect Category A (Architectural Systems) and Category S2 (Complex Structural Systems).
- E. Quality Control Standards: For manufacturing procedures and testing requirements, quality control recommendations, and dimensional tolerances for types of units required, comply with PCI MNL-135 and most stringent provisions of PCI MNL-116 and PCI MNL-117.
- F. Welder Qualifications: Welding processes and welding operators qualified in accordance with AWS D1.1/D1.1M and AWS D1.4/D1.4M and no more than 12 months before start of scheduled welding work.

1.07 MOCK-UPS

- A. Provide one mock-up of each type of precast specified, 12 feet long by 8 feet wide, with lifting device, and attachment points, and finish in accordance with approved sample.
- B. Include mock-up panel with typical window, insulated panel, and all sealant conditions (openings, panel-to-panel, etc.).
- C. Locate where directed.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Handling: Lift and support precast units only from support points.
- B. Blocking and Lateral Support During Transport and Storage: Use materials that are clean, non-staining, and non-harmful to exposed surfaces. Provide temporary lateral support to prevent bowing and warping.
- C. Protect units to prevent staining, chipping, or spalling of concrete.
- D. Mark units with date of production in location that will be concealed after installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Architectural Precast Concrete:
 1. Wells Concrete Products: www.wellsconcrete.com.
 2. Gage Brothers Concrete: gagebrothers.com.
 3. Molin Concrete Products Company: www.molin.com.
 4. Taracon Precast www.taraconprecast.com
 5. Substitutions: See Section 01 6000 - Product Requirements.

2.02 PRECAST UNITS

- A. Precast Architectural Concrete Units: Comply with PCI MNL-120, PCI MNL-122, PCI MNL-123, PCI MNL-135, and ACI 318.
 1. Design Loads: Static loads, anticipated dynamic loading, including positive and negative wind loads, seismic loads, thermal movement loads, and erection forces as defined by applicable code.
 2. Calculate structural properties of units in accordance with ACI CODE-318.

3. Accommodate construction tolerances, deflection of building structural members, and clearances of intended openings.
 4. Provide connections that accommodate building movement and thermal movement and adjust to misalignment of structure without unit distortion or damage.
- B. Total Unit Thickness: See Drawings.
- C. Exterior Finish Type: Ensure exposed-to-view finish surfaces of precast units are uniform in color and appearance.
1. Colors:
 - a. Color 1:
 - 1) Lehigh Type III-700
 - 2) Red Flint Gravel 1/2".
 - 3) Empire Concrete Sand.
 - 4) #0774 Brown 3%.
 2. Finishes: See Drawings for Locations
 - a. Sandblast.
- D. Backside (interior) finish to be equivalent to steel hard-trowel finish in appearance with minimal imperfections capable of accepting specified architectural coating. Surface shall be smooth with no holes or chatter marks.

2.03 REINFORCEMENT

- A. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi) or ASTM A706/A706M Grade 60 (60,000 psi) (weldable).
1. Deformed billet-steel bars.
 2. Unfinished.
- B. Steel Welded Wire Reinforcement (WWR): Deformed type, ASTM A1064/A1064M, unfinished.
1. Form: Flat Sheets.
- C. Tensioning Steel Tendons: ASTM A416/A416M, Grade 250 or 270; seven-wire stranded steel cable; low-relaxation type; full length without splices; uncoated.

2.04 CONCRETE MATERIALS

- A. Cement: ASTM C150/C150M, Type I or III.
- B. Blended Hydraulic Cement: ASTM C595/C595M, Type IL - Portland-Limestone.
- C. Normal weight Aggregates: Except as modified by PCI MNL-117, ASTM C33/C33M, with coarse aggregates complying with Class 5S.
- D. Color Additives: Pure, concentrated mineral pigments specifically intended for mixing into concrete and complying with ASTM C979/C979M.
- E. Water: ASTM C1602/C1602M; clean, potable, and not detrimental to concrete, color stability, or embedded steel items and complying with chemical limits of PCI MNL-117.
- F. Air Entrainment Admixture: ASTM C260/C260M, certified by manufacturer to be compatible with other required admixtures..
- G. Water Reducing, Retarding, Accelerating Admixtures: ASTM C494/C494M, certified by manufacturer to be compatible with other admixtures and to not contain calcium chloride, or more than 0.15 percent chloride ions or other salts by weight of admixture..
- H. Grout:
1. Cement grout: Grout shall be a mixture of cement, ASTM C150/C150M, sand, ASTM C144 or ASTM C404, and water, ASTM C1602/C1602M, and the consistency shall be such that joints can be completely filled without seepage over adjacent surfaces.
 - a. Minimum 28-day compressive strength: 3,000 psi.

2.05 REVEAL AND ACCENT STRIPS

- A. Material: Non-staining, non-reactive.
- B. Profile(s): As indicated on drawings.

2.06 SUPPORT DEVICES

- A. Connecting and Support Devices; Anchors, Inserts, Attachment Plates: ASTM A36/A36M steel; hot-dip galvanized in accordance with ASTM A153/A153M.
 - 1. Clean surfaces of rust, scale, grease, and foreign matter.
 - 2. Prime painted at nongalvanized surfaces, except where surfaces will be in direct contact with concrete, or will require field welding.
 - 3. Hot-dip galvanized where surfaces will be left exposed or located below grade.
- B. Bolts, Nuts, and Washers: ASTM A307 heavy hex bolts, Type A, hot-dip galvanized, with matching ASTM A563/A563M nuts and matching washers.
- C. Primer: Zinc rich type.

2.07 INSULATION

- A. Integral Insulation of 3" thickness
 - 1. Insulation: Rigid 3" extruded polystyrene (XR) board insulation; ASTM C578, Type VII.
 - a. Insulation below grade in final condition to be moisture resistant.
 - b. Substitutions: See 01 6000 - Product Requirements
- B. Wythe Connectors: Non-conductive connectors, as required to adequately tie precast concrete panel wythes together and achieve required thermal performance.

2.08 CONCRETE MIXTURES

- A. Concrete Mixtures:
 - 1. Compressive Strength (28 Days): 5000 psi minimum.
 - 2. Air Content: 5 to 7 percent in accordance with ACI 301.
- B. Limit water-soluble chloride ions to the maximum percentage by weight of cement permitted by ACI 318 or PCI MNL-117 when tested in accordance with ASTM C1218/C1218M.

2.09 FABRICATION

- A. Fabricate in compliance with PCI MNL-117 and PCI MNL-135.
- B. Maintain plant records and quality control program during production of precast units. Make records available upon request.
- C. Use rigid molds, constructed to maintain precast unit uniform in shape, size, and finish.
- D. Use form liners in accordance with manufacturer's instructions.
- E. Maintain consistent quality during manufacture.
- F. Fabricate connecting devices, plates, angles, items fit to steel framing members, inserts, bolts, and accessories. Fabricate to permit initial placement and final attachment.
- G. Embed reinforcing steel, anchors, inserts plates, angles, hangers, lifting hardware, grout sleeves, and other cast-in items.
- H. Cast rigid insulation into units. Cut drainage channels in exterior face of insulation to route moisture to exterior. Position weep drains to suit. Maintain drainage channels clear.
- I. Locate hoisting devices to permit removal after erection.
- J. Cure units to develop concrete quality, and to minimize appearance blemishes such as non-uniformity, staining, or surface cracking.
- K. Minor patching in plant is acceptable, providing structural adequacy and appearance of units is not impaired.
- L. Provide cast openings with a dimension larger than 8 inches where occurs at precast.

- M. All reinforcing steel shall have minimum cover as required by code and shall be accurately located as indicated on the approved shop drawings. Metal chairs, with or without coatings, shall not be permitted in the finished face.
- N. Perform welding in accordance with AWS D1.1/D1.1M.

2.10 FABRICATION TOLERANCES

- A. Comply with PCI MNL-117 and PCI MNL-135, except as specifically amended below.
 - 1. Maximum Variation From Nominal Face Dimensions: Plus or minus 3/32 in.
 - 2. Maximum Variation From Square or Designated Skew: Plus or minus 1/8 inch in 10 feet.
 - 3. Maximum Variation from Thickness: Plus or minus 1/8 in.
 - 4. Maximum Misalignment of Anchors, Inserts, Openings: Plus or minus 1/8 inch.
 - 5. Maximum Bowing of Members: Plus or minus length/360, maximum 1 inch.

2.11 ACCESSORIES

- A. Sealant: As specified in Section 07 9201.
- B. Cold Galvanizing Product:
 - 1. ZRC Cold Galvanizing Compound, ZRC Worldwide: www.zrcworldwide.com.
 - 2. Substitutions: See Section 01 6000 - Product Requirements.
- C. Welding Materials: AWS D1.1/D1.1M; compatible with materials being welded.
- D. Cast-in conduit and back boxes:
 - 1. Provide for all exterior devices, receptacles, light fixtures, cameras, security devices, etc.
 - 2. Provide cast-in conduit from door frame to building interior to serve cabling for security related devices and electrified hardware.
 - 3. Coordinate with Electrical and Security.

2.12 SOURCE QUALITY CONTROL

- A. Provide testing of concrete mix.
- B. Take three concrete test cylinders for every 75 cu yd of concrete placed; make and cure in accordance with ASTM C31/C31M.
- C. Take one slump tests for every three test cylinders in accordance with ASTM C143/C143M.
- D. Take one air entrainment test cylinders for each set of exterior concrete test cylinders taken.
- E. Take water absorption test in accordance with PCI MNL-117.
- F. Provide quality control according to PCI certification requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that building structure, anchors, devices, and openings are ready to receive work of this section.

3.02 PREPARATION

- A. Provide for erection procedures and induced loads during erection. Maintain temporary bracing in place until final support is provided.
- B. Furnish loose connection hardware and anchorage items to be embedded in or attached to other construction before starting that Work. Provide locations, setting diagrams, templates, instructions, and directions, as required, for installation.
- C. Do not install precast concrete units until supporting cast-in-place concrete has attained minimum allowable design compressive strength, and until supporting steel or other structure is structurally ready to receive loads from precast concrete units.

3.03 ERECTION

- A. Erect units without damage to shape or finish. Replace or repair damaged panels.

- B. Erect units level and plumb within allowable tolerances.
- C. Align and maintain uniform horizontal and vertical joints as erection progresses.
- D. Perform welding in accordance with AWS D1.1/D1.1M.
- E. Touch-up field welds and scratched or damaged primed painted surfaces. At galvanized surfaces, touch-up with cold galvanizing product according to manufacturer's recommendations.
- F. Set vertical units dry, without grout, attaining joint dimension with lead or plastic spacers. Pack grout to base of unit.
- G. Exposed Joint Dimension: 3/4 inch. Adjust units so that joint dimensions are within tolerances.
- H. Seal perimeter and intermediate joints in accordance with Section 07 9201.

3.04 TOLERANCES

- A. Erect members level and plumb within allowable tolerances. Comply with PCI MNL-135, except as specifically amended below.
 - 1. Plan Location from Building Grid Datum: Plus or minus 3/8 in.
 - 2. Top Elevation from Nominal Top Elevation: Plus or minus 3/8 inch.
 - 3. Maximum Plumb Variation Over Height of Structure or 100 ft (whichever is less): Plus or minus 1/2 inch.
 - 4. Exposed Joint Dimension: Plus or minus 3/16 inch.
 - 5. Maximum Jog in Alignment of Matching Faces or Edges: Plus or minus 3/16 inch.
 - 6. Differential Bowing or Camber as Erected Between Similar Adjacent Members: Plus or minus 3/16 inch.

3.05 CLEANING

- A. Clean weld marks, dirt, or blemishes from surface of exposed members.

3.06 PROTECTION OF FINISHED WORK

- A. Protect members from damage caused by field welding or erection operations. Provide non-combustible shields during welding operations.

3.07 FIELD QUALITY CONTROL

- A. Owner's representative will review precast installation in accordance with Section 01 4000.
- B. Special Inspections:
 - 1. Periodic inspection for erection of loadbearing precast concrete members.
 - a. Verify compliance of member configuration, connections and welding with Contract Documents and ACI 318.
 - b. Welded Connections: Visually inspect all field-welded connections. Perform dye penetrant or magnetic particle testing per ASTM E165/E165M or ASTM E709 on 100 percent of complete and partial penetration welds greater than 5/16 inch, and perform dye penetrant or magnetic particle testing per on 25 percent of complete and partial penetration welds 5/16 inch or less.

3.08 DEFECTIVE PRECAST CONCRETE

- A. Defective Precast Concrete: Precast concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.
- B. Determination of defective precast concrete, requiring repair or replacement, will be by the Architect.
- C. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Architect for each individual area.
 - 1. All patching, fill, touch-up, repair or replacement scope shall be per Manufacturer requirements for the indicated task.

- D. Proposed repairs shall not impair appearance, structural adequacy, serviceability, durability of members.

END OF SECTION

**SECTION 04 2000
UNIT MASONRY**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Concrete block.
- B. Clay facing brick.
- C. Mortar and grout.
- D. Reinforcement and anchorage.
- E. Flashings.
- F. Accessories.

1.02 REFERENCE STANDARDS

- A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.
- B. ASTM A580/A580M - Standard Specification for Stainless Steel Wire; 2023.
- C. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2024.
- D. ASTM A666/A666M - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2024.
- E. ASTM A951/A951M - Standard Specification for Steel Wire for Masonry Joint Reinforcement; 2022.
- F. ASTM B370 - Standard Specification for Copper Sheet and Strip for Building Construction; 2022.
- G. ASTM C67/C67M - Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile; 2023.
- H. ASTM C90 - Standard Specification for Dry-Cast Loadbearing Concrete Masonry Units; 2024a.
- I. ASTM C129 - Standard Specification for Dry-Cast Nonloadbearing Concrete Masonry Units; 2025.
- J. ASTM C140/C140M - Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units; 2025.
- K. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar; 2025.
- L. ASTM C150/C150M - Standard Specification for Portland Cement; 2024.
- M. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes; 2024.
- N. ASTM C216 - Standard Specification for Facing Brick (Solid Masonry Units Made from Clay or Shale); 2024.
- O. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2025a.
- P. ASTM C404 - Standard Specification for Aggregates for Masonry Grout; 2024.
- Q. ASTM C476 - Standard Specification for Grout for Masonry; 2023.
- R. ASTM C780 - Standard Test Methods for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry; 2025a.
- S. ASTM C1072 - Standard Test Methods for Measurement of Masonry Flexural Bond Strength; 2022.
- T. ASTM C1714/C1714M - Standard Specification for Preblended Dry Mortar Mix for Unit Masonry; 2019a.

- U. BIA Technical Notes No. 7 - Water Penetration Resistance – Design and Detailing; 2017.
- V. BIA Technical Notes No. 13 - Ceramic Glazed Brick Exterior Walls; 2017.
- W. BIA Technical Notes No. 28B - Brick Veneer/Cold-Formed Steel Framed Walls; 2025.
- X. BIA Technical Notes No. 46 - Maintenance of Brick Masonry; 2017.
- Y. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures; 2022, with Errata (2024).

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Submittals shall be reviewed and returned prior to preconstruction testing, the preinstallation meeting, and mock-up construction
- B. Preinstallation Meeting: Convene a preinstallation meeting per the requirements of Section 01 7000 before starting work of this section.
 - 1. Meeting shall occur on the same day as a construction meeting.
 - 2. Attendance by the Construction Manager, installing contractor, material suppliers, Owner, Owner's testing laboratory, Architect, The Owner's Consultant, and the Owner's Representative is required.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data for the following:
 - 1. Joint reinforcement
 - 2. Anchors
 - 3. Ties
 - 4. Flashing membrane
 - 5. Flashing lap sealant
 - 6. Termination bar
 - 7. Termination bar fasteners
 - 8. Weeps
 - 9. Cavity drainage material
 - 10. Masonry cleaner
- C. Shop Drawings: Indicate pertinent dimensions, materials, anchorage, size and type of fasteners, and accessories for brickwork support system.
 - 1. Stainless steel drip edge.
 - 2. Curtain wall stainless steel drip pan flashing in isometric and showing lap splices
 - 3. Mockup: Submit plan and elevation with corresponding detail callouts, dimensions, and all materials and products noted, including those specified in other sections. Elevation to include a graduated cut-away of materials to show the layering of wall system materials.
- D. Samples: Submit stack of six samples of each facing brick unit specified with artificial mortar joint to illustrate color, texture, and extremes of color range.
- E. Samples: Submit sample board of face brick color blend.
- F. Manufacturer's Certificate: Certify that masonry units meet or exceed specified requirements.
- G. Test Reports:
 - 1. Pre-construction testing results must be approved in writing by the responsible designer prior to masonry work occurring at the site.
 - 2. Clay brick masonry: Test results by the Owner's testing laboratory for one set of 10 of each type of clay brick masonry according to ASTM C67 test method for the characteristics of: Compressive strength, absorption, saturation coefficient, initial rate of absorption (IRA), and efflorescence.
 - 3. CMU

- a. Manufacturer's test results for each type and size of CMU according to ASTM C140 test method for the characteristics of: Compressive strength, absorption, and density.
 - b. Assemblages.
- 4. During construction, submit Owner's testing laboratory's test results as specified in "Quality Assurance" and Section 01 4500.
- H. Contractor's Reports:
 - 1. Construction procedures for hot and cold weather where likely encountered due to the anticipated construction schedule.
 - 2. Heated enclosure safety check reports on a weekly basis to the Architect and Owner's Representative when heated enclosures are in use.
- I. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.
 - 2. Provide one (1) full pallet of each facing brick specified.
- J. Provide Manufacturer's letter of compatibility for each of the products specified in this section that come in direct contact with adjacent materials specified in other sections, including but not limited to: 07 1300, 07 2700, 07 9201, and 08 4413

1.05 QUALITY ASSURANCE

- A. Work not specifically noted on the Drawings or in the specifications shall be in accordance with the current recommendations of:
 - 1. Masonry Standards Joint Committee (MSJC)
 - 2. Brick Industry Association
 - 3. National Concrete Masonry Association
- B. Installer Qualifications: Company specializing in performing work of the type specified and with at least five years of documented experience with projects of similar size and complexity.
 - 1. Documented experience shall be comparable masonry projects with similar scope and type of unit masonry.
 - 2. A competent foreman shall be in charge of the Work at all times. The same foreman shall be in charge from start to completion of the Project.
 - 3. Personnel employed by the company shall be skilled in the masonry work process, handling of this specific unit masonry, and operations indicated.
- C. Obtain materials from the same source throughout.
- D. Pre-installation meeting
 - 1. Schedule a pre-installation meeting a minimum of two (2) weeks prior to the commencement of masonry work.
 - 2. Attendance by the Construction Manager, installing contractor, material supplier, Owner, Owner's Representative, Owner's testing laboratory, Enclosure Commissioning Agent, and Architect is required.
 - 3. Meeting agenda: Construction schedule and sequence, mock-up construction, product delivery and storage, material compatibility, site restrictions, coordination of testing and observation, and other project specific topics.

1.06 TESTING

- A. Clay brick masonry units
 - 1. ASTM C67, Absorption and saturation coefficient: Test one set of 10 brick for each different brick used, for every 100,000 units or each manufacturer's run; whichever is less.
 - 2. Initial rate of absorption (IRA): Field test using eye dropper and 12 drops of water in a circle the size of a quarter. Field test daily during hot weather; weekly otherwise. If water is absorbed within one minute, brick must be pre-wetted before laying.
- B. Clay brick masonry assemblages
 - 1. Flexural bond, ASTM C1072

- a. Pre-construction: Test three specimens of six bricks each for each type of mortar and clay brick masonry unit. Mix mortar and construct specimens in the testing facility where the specimens will be tested and using the materials that will be used in construction.
 - b. Construction: Test three specimens of six bricks each for each type of mortar and clay brick masonry unit, twice during the first week of masonry construction and once every 5,000 square feet of wall area or floor level; whichever is greater. Mix mortar and construction specimens in the field, left to cure undistributed and exposed to similar weather conditions as the project.
2. Water permeance, ASTM
 - a. Pre-construction: Test specimen of veneer wythe of a minimum size 5 feet x 5 feet. Mockup may be utilized if sufficient masonry surface is available.
 - b. Construction: Test select wall area(s) at the direction of the Architect and the Owner's Representative.
3. CMU: One set of six units tested for each type and size during the first week of masonry construction. Follow with testing of 6 units from each lot of 10,000 units; 12 from each of lot between 10,000 and 100,000; test 6 units for each 50,000 from lots above 100,000 units.
4. CMU assemblages: ASTM C1314, Compressive strength
 - a. Pre-construction: One set of 3 prisms for each weight classification of CMU and mortar type. Mix mortar and grout, and fabricate test prisms in the testing facility where the test will occur. Fabricate according to ASTM C1314 and using the materials that will be used in construction. Test at 28 days.
 - 1) Where actual construction is partially grouted, two sets of prisms shall be made: one grouted and the other non-grouted.
 - b. Construction: One set of 3 prisms for each weight classification of CMU and mortar type, for every 5,000 square feet of wall. Test at 28 days.
 - 1) Where actual construction is partially grouted, two sets of prisms shall be made: one grouted and the other non-grouted.

1.07 MOCK-UPS

- A. Submittals for all exterior wall materials and adjacent systems must be approved prior to the scheduled mock-up construction.
- B. The purpose of the mockup is to illustrate construction and workmanship including unit installation and color, facing brick color blending, mortar color, mortar joint tooling, vapor retarder and air barrier installation and details, veneer anchor installation, through-wall flashing with sheet metal and end dams, joint sealant and backer rod installation, mortar control device, vents, and continuous rope weeps for approval by Architect and Owner's Consultant.
- C. Construct a mockup of concrete foundation, specified backup material, air and vapor barriers, one masonry expansion joint, head joints, mortar control device, veneer anchors, insulation, through-wall flashing and accessories, rope weeps, approved face brick blend, and approved mortar color.
- D. Include an inside and outside building corner, wall base-to-foundation waterproofing detail, wall-to-roof system detail, representative curtain wall opening details, roof edge details, through-wall flashing lapping, and all wall system components shown in layers including the back-up wall. Interior finishes are not required.
 1. Construct and cure concrete foundation ready to receive mockup.
 2. Construct with field personnel that will be installing the materials during the project.
 3. Construct with masonry units from the same production run as the project.
 4. Return corners 16 - 24 inches, extending 18 inches above the lintel.
- E. Size: Minimum 4 ft wide on one side of the corner by 2 ft wide and 3 ft high. Construct of a size to show layers of materials adequately for review and testing.

- F. Location: As approved by the Owner prior to construction
- G. Coordinate mockup material delivery, construction, and testing with the masonry observer, testing agency, and field personnel installing the materials during the project for the vapor retarder, air barrier, veneer anchors, through-wall flashing and accessories, vents, and mortar control device.
- H. Coordinate with the Owner's consultant for full-time masonry observation of the mockup construction, including waterproofing, air barrier, through-wall flashing and masonry installations.
- I. Mock-up shall be construction as part of the pre-installation meeting for masonry, air barrier, and through-wall flashings. The concrete foundation, back-up wall, waterproofing and air barrier shall be placed and cured prior to the meeting. The Contractor shall provide written notice that they are completely prepared for the meeting and have all specified mock-up materials and products on site.
- J. When accepted, the mockup shall become the project standard for quality of work, methods of installation, and appearance. Leave mockup in place until masonry work is complete and has been accepted.
- K. Re-observation and re-testing and associated costs due to non-conformance with the Project requirements required for the mock-up shall be the responsibility of the Contractor.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Masonry units shall be delivered and handled, strapped or tied together on pallets or other suitable cartons, to prevent chipping and breakage. Units shall be covered from wetting by waterproof tarp.
- B. Keep masonry units, accessories, and reinforcing dry, clean and free of scale, rust, ice, or other harmful coatings.
- C. Store masonry units and packaged materials off ground and protected from wetting by capillary action, rain or snow, and protected from mud, dust, or other materials and contaminants.

1.09 PROJECT CONDITIONS

- A. Hot and Cold Weather Requirements: According to MSJC Specification for Masonry Structures (TMS 602). Additionally, when ambient temperature:
 - 1. Exceeds 90° F: Fog spray newly construction masonry until damp, at least three times a day for 72 hours after completing masonry work.
 - 2. At or above 40° F during the day and will drop below 40° F at night: Cover area of work to maintain a minimum of 40° F.
 - 3. Below 40° F or will drop below 40° F within 48 hours: Do not lay masonry units, tuck point mortar joints, wash down or wet surfaces without a heated enclosure set-up and operational. The temperature of the enclosure shall be maintained above 40° F for a minimum of 48 hours after completing any of this Work. The heat source must be on both sides of the Work in new construction or additions.
 - 4. Below 40° F: Maintain area of work, masonry materials, equipment, and mortar batching area in a heated enclosure prior to and during the Work. Do not heat water or components for mortar or grout to above 140° F.
 - 5. Masonry must be cured a minimum of 14 days and warmed to 40° F prior to cleaning. Maintain the heated enclosure after cleaning for 48 hours, including safety checks.
- B. Heated enclosure
 - 1. Monitor carbon monoxide levels. Immediately correct the environment when carbon monoxide is beyond a safe level for workers.

2. Periodically conduct safety checks of the enclosure and contents and continuous, safe operation of the heat source during overnight hours on work days and during daytime hours on non-work days, weekends, and holidays. Include two checks overnight and three checks during the daytime, at equally spaced intervals. Report the date, time, inside and outside temperatures, weather conditions, and status of the site for each safety check.

PART 2 PRODUCTS

2.01 CONCRETE MASONRY UNITS

- A. Concrete Block: Comply with referenced standards and as follows:
 1. Size: Standard units with nominal face dimensions of 16 by 8 inches and nominal depth of 8 inches.
 2. All CMU used at the jambs, sills, and heads of openings shall be free of chips and be flush, level, and true.
 3. Special Shapes: Provide nonstandard blocks configured for corners, lintels, headers, control joint edges, and other detailed conditions.
 4. Nonloadbearing Units: ASTM C129.
 - a. Hollow block, as indicated.

2.02 BRICK UNITS

- A. Requirements for all Brick Units:
 1. Initial rate of absorption: Minimum 5 grams/min/bedding face and maximum 20 grams/min/bedding face.
 2. Rated "not effloresced"
 3. ASTM C67, freezing and thawing testing
- B. Type 1: Field Brick
 1. Manufacturer: Sioux City Brick; www.siouxcitybrick.com
 2. Contact: Brady Sloan, 952-292-6323; bradysloan@twincitybrick.com
 3. Product Name: Black Hills
 4. Size: Modular
 5. Texture: Velour
 6. Source: Sergeant Bluff, Iowa Plant
 7. Grade: SW to meet ASTM C216
 8. No substitutions permitted.
- C. Type 2: Accent Brick
 1. Manufacturer: Sioux City Brick; www.siouxcitybrick.com
 2. Contact: Brady Sloan, 952-292-6323; bradysloan@twincitybrick.com
 3. Product Name: Midtown Ironspot Velour
 4. Size: Modular
 5. Texture: Velour
 6. Source: Sergeant Bluff, Iowa Plant
 7. Grade: SW to meet ASTM C216
 8. No substitutions permitted.

2.03 MORTAR AND GROUT MATERIALS

- A. Portland Cement: ASTM C150/C150M, Type I.
- B. Mortar Aggregate: ASTM C144.
- C. Grout Aggregate: ASTM C404.
- D. Water: Clean and potable.
- E. Integral Water Repellent Admixture for Mortar: Polymeric liquid admixture added to mortar at the time of manufacture.

1. Use only in combination with masonry units manufactured with integral water repellent admixture.
 2. Use only water repellent admixture for mortar from the same manufacturer as water repellent admixture in masonry units.
 3. Meet or exceed performance specified for water repellent admixture used in masonry units.
- F. Packaged Dry Material for Mortar for Unit Masonry: Premixed Portland cement, hydrated lime, and sand; complying with ASTM C1714/C1714M and capable of producing mortar of the specified strength in accordance with ASTM C270 with the addition of water only.
1. Color: Mineral pigments added as required to produce approved color sample.

2.04 REINFORCEMENT AND ANCHORAGE

- A. Reinforcing Steel: Type specified in Section 03 2000; size as indicated on drawings; uncoated finish.
- B. Joint Reinforcement: Use ladder type joint reinforcement where vertical reinforcement is involved and truss type elsewhere, unless otherwise indicated.
- C. Single Wythe Joint Reinforcement: ASTM A951/A951M.
1. Type: Ladder.
 2. Material: stainless steel complying with ASTM A580/A580M Type 304.
 3. Size: 0.1483 inch side rods with 0.1483 inch cross rods; width as required to provide not less than 5/8 inch of mortar coverage on each exposure.
- D. Veneer Anchors: Stainless steel Type 304, adjustable brick replacement anchors with brass expansion sleeve anchors.

2.05 FLASHINGS

- A. Flashing: Full sheet of stainless steel, Type 304, 2 mil, laminated with polymer or fiberglass fabric on one side
1. Multi-Flash SS with premanufactured corners and end dams, manufactured by York Manufacturing, Inc., Sanford, Maine, www.yorkmfg.com
 2. R-Guard SS Thru-wall with premanufactured corners and end dams, manufactured by PROSOCO, Inc; manufacturer's representative is Tri-G Products, Inc, Anoka, MN; www.prosoco.com
 3. Wall Guardian Stainless Steel TWF, manufactured by STS Coatings, Inc; Comfort, TX, www.stscoatings.com
- B. Flashing: Full sheet of copper weighing 5 oz / sq ft, laminated with non-asphaltic polymer or fiberglass fabric on both sides.
1. Multi-Flash 500 with premanufactured corners and end dams, manufactured by York Manufacturing, Inc, www.yorkmfg.com
 2. Copper Sealtite 2000, manufactured by Advanced Building Products, Inc.; Springvale, Maine, www.advancedflashing.com
- C. Flashing lap sealant: As recommended by flashing membrane manufacturer.
1. UniverSeal US-100, polyether sealant manufactured by York Manufacturing, Sanford, Maine; www.yorkmfg.com
 2. MasterSeal NP 150, polyether sealant, for use with York flashing, manufactured by BASF Construction Chemicals, Shakopee, Minnesota; www.master-builders-solutions.basf.us
 3. Sealtite Sealant, acrylic urethane sealant, manufactured by Advanced Building Products, Inc.; Springvale, Maine; www.advancedflashing.com
 4. R-Guard FastFlash, silyl-terminated-polymer sealant, manufactured by PROSOCO, Inc; manufacture's representative is Tri-G Products, Inc, Anoka, Minnesota; www.prosoco.com
 5. GreatSeal LT-100 Liquid Tape, polyether sealant, manufactured by STS Coatings, Inc; Comfort, Texas; www.stscoatings.com

- D. Flashing splice material: As recommended by the flashing manufacturer.
 - 1. York 304 self-adhering stainless steel, 6 inch wide, manufactured by York Manufacturing, Inc., Sanford, Maine; www.yorkmfg.com
- E. Termination Bars: Stainless steel
 - 1. 0.060 inch thick (1/16 inch) or 16 gauge by 1 inch with pre-drilled holes 6 inches on center, holes shall be no more than 2 inches from ends of termination bar.
 - 2. Fasteners: Drive nail anchor, stainless steel nail with an alloy body, 1/4 inch diameter by min 1-1/2 inch long.
 - a. ZamacNailin, manufactured by Powers Fasteners, Brewster, New York; www.powers.com
 - b. Nail-in-Anchor, manufactured by Fastenal, Winona, Minnesota; www.fastenal.com
- F. Sheet Metal Drip Edge: ASTM A167, Type 304, 0.018 inch thick (26 gauge) stainless steel, soft temper, mill finish, extend a minimum 3/8 inch beyond face of exterior wall with a hemmed edge.
 - 1. Drip Edge Flashing, FS1012, manufactured by MASONPRO, Inc, Northville, Michigan; www.masonpro.com
- G. Curtain wall sill drip tray flashing: ASTM A240, Type 304, 0.048 thick (18 gauge), radius = .048 inches, pre-fabricated with fully welded and ground corners.
 - 1. Maximum 3/8 inch high upturned leg for continuous back dam, 2-1/2 inch high down turned leg to function as a continuous termination bar for the sub-sill flashing, and preformed end dams at each corner.
 - 2. Contractor to verify depth of drip tray flashing and coordinate with the curtain wall sill framing.
 - 3. Down turned leg: holes for fasteners at 12 inches on center, a maximum of 2 inches on center from the ends and 1/2 inch on center from the bottom edge, and flanges on each end terminate at the sub-sill flashing end dam location.
- H. Lap Sealants and Tapes: As recommended by flashing manufacturer; compatible with membrane and adhesives.

2.06 ACCESSORIES

- A. Joint Filler: Closed cell polyethylene; oversized 50 percent to joint width; self expanding; in maximum lengths available.
 - 1. Manufacturers:
 - a. Hohmann & Barnard, Inc: www.h-b.com/#sle.
 - b. WIRE-BOND: www.wirebond.com/#sle.
 - c. Substitutions: See Section 01 6000 - Product Requirements.
- B. Mortar Control Device: High density polyethylene or nylon, 90% open woven mesh, dovetail notched shape, verify thickness for cavity size.
 - 1. Mortar Net manufactured by Mortar Net USA Ltd., Burns Harbor, Indiana; www.mortarnet.com
 - 2. Mortar Trap, manufactured by Hohmann & Barnard, Inc.; Hauppauge, New York; www.h-b.com
 - 3. Cavity Net DT (#3611), manufactured by Wire-Bond, Charlotte, North Carolina; www.wirebond.com
- C. Rope Weeps: 3/8 inch diameter 100% cotton fiber rope, including core, lengths as required for installation requirements
 - 1. Nylon rope is not allowed
- D. Vents:
 - 1. Type: Polyester mesh.
 - 2. Color(s): As selected by Architect from manufacturer's full range.
 - 3. Manufacturers:

- a. Mortar Break Weep Vents, manufactured by Advanced Building Products, Inc.; Springvale, Maine; www.advancedflashings.com
 - b. Mortar Trap Weep Vents, manufactured by Hohmann & Barnard, Inc.; Hauppauge, New York; www.h-b.com
 - c.
 - d. Substitutions: See Section 01 6000 - Product Requirements.
- E. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials.
 - 1. Use sparingly and only where required.
 - 2. Minimum 14 day setting time required for new mortar prior to use.
 - 3. Protect roof membrane as necessary in the area of cleaning to prevent cleaner from contacting the roof membrane.
 - 4. Use one of the following as recommended by the brick manufacturer:
 - a. Manufacturer: PROSOCO, Inc, Manufacturer's representative is Tri-G Products, Inc., Anoka, Minnesota; www.prosoco.com
 - 1) Sure Klean No. 600
 - 2) VanaTrol
 - b. Manufacturer: Diedrich Technologies, division of Hohmann & Barnard, Inc.; Schenectady, New York; www.diedrichtechnologies.com
 - 1) 202 New Masonry Detergent
 - 2) 202V Vana-Stop
 - 3) 200 Lime-Solv

2.07 MORTAR AND GROUT MIXING

- A. Mortar for Unit Masonry: ASTM C270, using the Proportion Specification.
 - 1. Interior, non-loadbearing masonry: Type O.
- B. Colored Mortar: Proportion selected pigments and other ingredients to match Architect's sample, without exceeding manufacturer's recommended pigment-to-cement ratio.
- C. Grout: ASTM C476; consistency required to fill completely volumes indicated for grouting; fine grout for spaces with smallest horizontal dimension of 2 inches or less; coarse grout for spaces with smallest horizontal dimension greater than 2 inches.
- D. Admixtures: Add to mixture at manufacturer's recommended rate and in accordance with manufacturer's instructions; mix uniformly.
- E. Mixing: Use mechanical batch mixer and comply with referenced standards.

PART 3 EXECUTION

3.01 EXAMINATION

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

3.02 PROTECTION

- A. Brace walls as necessary during construction.
- B. Protect exposed masonry with wind breaks when wind velocities exceed 15 mph.
- C. Protect exterior veneer against staining.
- D. Cover top of walls continuously with non-staining weighted waterproof coverings when work is not in progress and before precipitation.
- E. Protect trees, shrubs, lawns, and other features remaining as a portion of final landscaping.
- F. Protect surrounding surfaces from damage by covering, masking, sealing, or other means of protection. Immediately remove mortar which contacts surfaces which are not to receive mortar.

- G. Protect all through-wall flashing installations from damage during construction, including at the brick ledge.
- H. Provide 19 mm (3/4 inch) plywood over 25 mm (1 inch) expanded polystyrene insulation and loose EPDM for protection of the existing roof membrane a minimum of 3.6 m (12 ft) from adjacent walls, on traffic paths, and under staging equipment.
- I. Provide EPDM membrane over newly installed roof for directing the runoff from the masonry cleaning process. Direct the runoff to the roof drains with a temporary downspout.
- J. Immediately report any damage to the Owner, Owner's Representative, and Architect.

3.03 PREPARATION

- A. Beginning of installation means acceptance of existing surfaces and conditions.
- B. Protect elements surrounding the Work of this section from damage or disfiguration.

3.04 WETTING BRICK

- A. IRA greater than 1 gram / sq. in/min.: Wet brick with clean water 24 hours prior to placement until units are nearly saturated. Permit units to surface dry before laying.
- B. During cold weather, sprinkle units with warm or hot water and protect from freezing as specified in in "Project Conditions".

3.05 COLD AND HOT WEATHER REQUIREMENTS

- A. Refer to Part 1, Project Conditions or applicable building code, whichever is more stringent.

3.06 COURSING

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

3.07 PLACING AND BONDING

- A. Place scaffold to lay face brick from face side.
- B. Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.
- C. Lay hollow masonry units with face shell bedding on head and bed joints.
- D. Buttering corners of joints or excessive furrowing of mortar joints is not permitted.
- E. Remove excess mortar and mortar smears as work progresses.
- F. Remove excess mortar with water repellent admixture promptly. Do not use acids, sandblasting or high pressure cleaning methods.
- G. Interlock intersections and external corners, except for units laid in stack bond.
- H. Do not install units that are cracked, broken, or chipped in excess of ASTM C216 allowances for face brick.
- I. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.

- J. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.
- K. Isolate masonry partitions from vertical structural framing members with a control joint as indicated.
- L. Isolate top joint of masonry partitions from horizontal structural framing members and slabs or decks with compressible joint filler.
- M. Mix units for exposed unit masonry from several pallets or cubes as they are placed to produce uniform blend of colors and textures.
- N. Stopping and resuming work:
 - 1. Rack back one half unit length in each course.
 - 2. Do not tooth unless specifically allowed.
 - 3. Join fresh masonry to set or partially set masonry by removing loose units and mortar. Brush clean and lightly wet exposed surfaces of set masonry prior to laying fresh masonry.

3.08 WEEPS/CAVITY VENTS

- A. Install weeps in cavity walls at 16 inches on center horizontally on top of through-wall flashing above shelf angles and lintels and at bottom of walls.
- B. Install rope weeps in the following manner:
 - 1. Install at 16 inches on center.
 - 2. Extend past the masonry veneer, run through the head joint to the cavity, run a maximum of 16 inches horizontally in the cavity, and to and be tied to the brick ties or terminated
 - 3. Interlace successive rope wicks.
 - 4. Place weeps at the corners of all flashing end dams.
 - 5. Trim rope weeps approximately

3.09 CAVITY MORTAR CONTROL

- A. Do not permit mortar to drop or accumulate into cavity air space or to plug weep/cavity vents.
- B. Install cavity mortar diverter at base of cavity and at other flashing locations as recommended by manufacturer to prevent mortar droppings from blocking weep/cavity vents.

3.10 REINFORCEMENT AND ANCHORAGE - GENERAL, SINGLE WYTHE MASONRY, AND CAVITY WALL MASONRY

- A. Set joint reinforcement in full bed of mortar.
- B. Unless otherwise indicated on drawings or specified under specific wall type, install horizontal joint reinforcement 16 inches on center.
- C. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches each side of opening.
- D. Place continuous joint reinforcement in first and second joint below top of walls.
- E. Embed longitudinal wires of joint reinforcement in mortar joint with at least 5/8 inch mortar cover on each side.
- F. Lap joint reinforcement ends minimum 6 inches.
- G. Fasten anchors to structural framing and embed in masonry joints as masonry is laid. Unless otherwise indicated on drawings or closer spacing is indicated under specific wall type, space anchors at maximum of 16 inches horizontally and 16 inches vertically.
 - 1. Brick ties shall start a maximum of 8 inches horizontally and 9 inches vertically from terminations such as brick ledges, lintels, expansion joints, through-wall flashings, window and door openings, corners, or other interruptions.
 - 2. Do not install anchors so they interfere with reglets, termination bars, stainless steel drip tray flanges or other items of this section.

3. All post installed masonry tie anchors shall be sealed air and watertight. Coordinate work with other trades.
- H. Embed ties and anchors in mortar joint and extend into masonry unit a minimum of 1-1/2 inches with at least 3/4 inch mortar cover to the outside face of the anchor.

3.11 MASONRY FLASHINGS

- A. Whether or not specifically indicated, install masonry flashing to divert water to exterior at all locations where downward flow of water will be interrupted.
- B. Through-wall flashings shall begin a minimum of 12 inches above the base course of masonry veneer and 12 inches minimum above the roof membrane.
- C. All flashing edges, termination bars, and fasteners should be cap sealed.
- D. Extend flashings a minimum of 6 inches beyond jambs of openings and a minimum of 4 inches beyond ends of lintels.
- E. Finished through-wall flashing copper membrane shall extend 1/4 inch from the exterior face of the masonry units. If the through-wall flashing system is composite system with copper membrane lapped onto stainless steel sheet metal insert, then the copper membrane can be trimmed flush with the exterior face leaving on the stainless steel insert exposed.
- F. Provide end dams at all flashing discontinuations.
- G. Extend metal flashings through exterior face of masonry and terminate in an angled drip with hemmed edge. Install joint sealer below drip edge to prevent moisture migration under flashing.
- H. Lap end joints of flashings at least 6 inches, minimum, and seal watertight with flashing sealant/adhesive.
- I. Single Layer: located at shelf angles, above doors and louvers, above and below windows, wall-to-foundation waterproofing tie-in, and other specified locations.
 1. Extend flashing membrane 12 inch minimum up vertical wall. Install top edge of flashing set in flashing lap sealant.
 2. Install preformed corners or fold inside and outside through-wall flashing corners. Limit cutting or trimming through-wall flashing membrane. Install additional membrane at outside corner, lapping 6 inches over adjacent pieces. Install a reinforcement piece at the corner between the horizontal and vertical legs. Seal in-between the lap of the additional membrane and reinforcement piece to the through-wall flashing membrane.
 3. Install termination bar over top edge of flashing membrane. Mechanically fasten 6 inches on center. Coat the termination bar and fasteners with flashing lap sealant.
 4. Install flashing membrane 1/2 inch from brick face. Seal the bottom horizontal termination to the sheet metal drip edge with two beads of flashing lap sealant. Seal the sheet metal drip edge to the lintel or brick below with a bead of flashing lap sealant.
 5. Extend the sheet metal drip edge out 3/8 inch from the face of the wall. Lap sheet metal drip edge 4 inches and seal lap.
 6. Install flashing membrane in one piece, wherever possible, to eliminate laps. Where laps must occur, provide minimum 6 inch laps to adjacent flashing pieces. Seal in-between flashing laps and over the cut edge with flashing lap sealant.
 7. Install preformed end dams or turn flashing up 2 inches minimum or one brick course height at terminations to provide folded end dams. Seal end dams with flashing lap sealant. Install flashing lap sealant at adjacent substrate and embed end dam.
 8. Install brick ties at 16 inches on center horizontally, maximum 8 inches from terminations or corners, and cover plates with flashing lap sealant as indicated.
 9. Install and extend rope weeps at end dam corners with tab extension of flashing membrane and through head joints at a maximum of 16 inches on center. Lay approximately 16 inches horizontally along cavity, interlacing with adjacent rope weep, and extend up to and tie to brick ties.
 10. Install vents, mortar control device, and insulation.

11. Install brick over flashing.
- J. Double Layer: Located above roof systems including roof edges, parapets, and steep roofs
1. Fully embed top edge of first (or lower) layer of flashing membrane in flashing lap sealant, with lower edge extending over roof base flashing as shown on the Drawings.
 2. Install in longest lengths possible. Provide minimum 6 inch laps to adjacent flashing pieces. Seal in between flashing laps and over the cut edge with flashing lap sealant.
 3. Install preformed corners or fold inside and outside through-wall flashing corners. Limit cutting or trimming through-wall flashing membrane. Install additional membrane at outside corner, lapping 6 inches over adjacent pieces. Install a reinforcement piece at the corner between the horizontal and vertical legs. Seal in-between the lap of the additional membrane and reinforcement piece to the through-wall flashing membrane.
 4. Fasten the termination bar at 6 inches on center. Coat termination bar and fasteners with flashing lap sealant.
 5. Install preformed end dams or turn flashing up 2 inches minimum or one brick course height at terminations to provide folded end dams. Seal end dams with flashing lap sealant. Install flashing lap sealant at adjacent substrate and embed end dam.
 6. Install brick ties at 16 inches on center horizontally, maximum 8 inches from terminations or corners, and cover plates with flashing lap sealant as indicated.
 7. Install and extend rope weeps at end dam corners with tab extension of flashing membrane and through head joints at a maximum of 16 inches on center. Lay approximately 16 inches horizontally along cavity, interlacing with adjacent rope weep, and extend up to and tie to brick ties.
 8. Install insulation and lay one brick course.
 9. Install sheet metal insert at bed joint indicated on the Drawings, lapping 4 inches minimum and spot adhere laps with flashing lap sealant.
 10. Lay next brick course, install veneer anchor wires and insulation, lay the third brick course and core fill. Allow to cure overnight before proceeding with the second layer.
 11. Fully embed top edge of second (or upper) layer of flashing membrane in flashing lap sealant.
 12. Install flashing membrane 1/2 inch from brick face. Seal the bottom horizontal termination to the sheet metal drip edge with two beads of flashing lap sealant. Seal the sheet metal drip edge to the brick below with a bead of flashing lap sealant.
 13. Extend the sheet metal drip edge out 3/8 inch from the face of the wall. Lap sheet metal drip edge 4 inches and seal lap.
 14. Provide minimum 6 inch laps to adjacent flashing pieces. Seal in-between flashing laps and over the cut edge with flashing lap sealant.
 15. Install preformed corners or fold and reinforce inside and outside corners as described above.
 16. Fasten and coat the termination bar as described above.
 17. Provide preformed or folded end dams as described above.
 18. Install veneer anchors, rope weeps, vents, mortar control device, and insulation as described above.
 19. Install brick over second layer of flashing membrane.
 20. Provide temporary 45-mil EPDM flashing extending up from existing flashing to one brick course below new sheet metal reglet. Bond to wall and to existing EPDM flashing.
 21. Install new sheet metal counterflashing over temporary EPDM flashing, as detailed. Lap intersecting counter flashings, except fascia counter flashings, minimum 3 inches, and securely fasten with pop rivets or screws and seal with sealant.

3.12 STAINLESS STEEL DRIP TRAY AND RELATED FLASHINGS

- A. At curtain wall openings, install stainless steel drip tray flashing in continuous contact with the top of the backer wall to allow for transfer of curtain wall dead load.

- B. Install drip tray flashing in continuous contact with the top of the backer wall to allow for transfer of curtain wall dead load.
- C. Coat vertical face of sub-sill flashing with flashing lap sealant prior to setting the pan flashing. Fasten down turned leg of pan flashing with through-wall flashing termination bar fasteners. Cap seal head fasteners.
- D. Apply a continuous bead of flashing lap sealant to the perimeter of the down turned leg bottom edge and flanges. Seal pan flashing in contact with exposed concrete block or concrete surfaces.
- E. Curtain wall openings that require splice joints must be air and watertight. Silicone sealants and splice tape materials installed must be compatible and bond with sealant used for the curtain wall primary sealant joint.

3.13 LINTELS

- A. Install loose steel lintels over openings.

3.14 GROUTED COMPONENTS

- A. Lap splices minimum 24 bar diameters.
- B. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch of dimensioned position.
- C. Place and consolidate grout fill without displacing reinforcing.
- D. At bearing locations, fill masonry cores with grout for a minimum 12 inches either side of opening.
- E. Grouted CMU must be troweled smooth and without voids, including adjacent mortar joints.

3.15 CONTROL AND EXPANSION JOINTS

- A. Do not continue horizontal joint reinforcement through control or expansion joints.
- B. Size control joints as indicated on drawings; if not indicated, 3/4 inch wide and deep.
- C. Expansion joints in clay brick masonry: Open joint full depth of the exterior veneer.
 - 1. Provide vertical expansion joints as shown in the Drawings
 - 2. Provide horizontal expansion joints below shelf angles and roof edges.
 - 3. Install compressible joint filler, backer rod, and joint sealant.
- D. Control joints in CMU:
 - 1. Install preformed control joint device in continuous lengths. Seal butt and corner joints in accordance with manufacturer's instructions.
 - 2. Install backer rod and joint sealant.
- E. Maintain clear expansion and control joints during construction until installing detailed joint materials.

3.16 BUILT-IN WORK

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

3.17 TOLERANCES

- A. Install masonry within the site tolerances found in TMS 402/602.
- B. Maximum Variation from Alignment of Columns: 1/4 inch.

- C. Maximum Variation From Unit to Adjacent Unit: 1/16 inch.
- D. Maximum Variation from Plane of Wall: 1/4 inch in 10 ft and 1/2 inch in 20 ft or more.
- E. Maximum Variation from Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more.
- F. Maximum Variation from Level Coursing: 1/8 inch in 3 ft and 1/4 inch in 10 ft; 1/2 inch in 30 ft.
- G. Maximum Variation of Mortar Joint Thickness: Head joint, minus 1/4 inch, plus 3/8 inch.
- H. Maximum Variation of Mortar Joint Thickness: Bed Joint, +/- 1/8 inch, maximum joint thickness 1/2 inch
- I. Maximum Variation from Cross Sectional Thickness of Walls: 1/4 inch.
- J. Variation in cavity width: - 1/4 inch, + 3/8 inch
- K. Tolerances at curtain wall surround, if different from above:
 - 1. Maximum variation from plane of wall: 1/8 inch in 8 ft: 1/4 inch in 40 ft; non-cumulative
 - 2. Maximum variation from plumb: 1/8 inch in 10 ft: 1/4 inch in 40 ft; non-cumulative.
 - 3. Maximum variation from level coursing: 1/8 inch in 10 ft: 1/4 inch in 40 ft; non-cumulative.
 - 4. Maximum variation of joint thickness: 1/8 inch in 3 ft.

3.18 CUTTING AND FITTING

- A. If cutting is required, use motor-driven saw designed to cut masonry with clean, sharp, unchipped edges.
- B. Install with cut surfaces and edges concealed.
- C. Obtain approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

3.19 FIELD QUALITY CONTROL

- A. All materials, which are subject to definite specification requirements, may be sampled, tested, and inspected at any time prior to, or during, installation of the Work.
- B. Construction Observation
 - 1. The Owner's consultant will conduct full-time observation of the through-wall flashing installation.
 - 2. The construction observation will be paid for by the Owner, however, any additional construction observation required for the re-testing and the work will be performed by the Owner's consultant and all additional construction observation costs shall be deducted from the Contract sum by Change Order.
- C. Testing during construction
 - 1. The brick masonry, CMU, and mortar aggregate ratio testing and mortar compression testing will be paid for by the Owner. However, when initial tests find non-compliance with the Contract Documents, all re-testing will be performed by the Owner's testing laboratory and paid for by the Contractor by deducting from the Contract Sum by Change Order.
- D. An independent testing agency will perform field quality control tests, as specified in Section 01 4000 - Quality Requirements.

3.20 CLEANING

- A. Remove excess mortar, smears, and mortar droppings.
- B. Dry brush surfaces after mortar has set at the end of each work day and after final pointing.
- C. Replace defective mortar. Match adjacent work.
- D. Clean soiled surfaces with cleaning solution.
- E. Use non-metallic tools in cleaning operations. Sandblasting, wet aggregate blasting, or use of other abrasive materials will not be allowed.

- F. Clean a 4 ft by 4 ft test panel of each type of masonry material prior to beginning full scale cleaning operation to determine Effectiveness of cleaning compound and manufacturer's cleaning procedures. Review test panel with Owner and Architect prior to proceeding.
- G. Clean masonry in an orderly manner, making sure that all surfaces are clean and a uniform appearance is obtained.
- H. Provide an adequate water supply during the cleaning process to assure a thorough pre-soaking and rinsing of the surfaces.
- I. Protect adjacent non-masonry surfaces, including trees, shrubs, plantings, lawn, glass, and metal and painted surfaces, from exposure to cleaning compounds. Use polyethylene sheet to cover and seal window glass and frames.
- J. Be aware of wind drift onto auto and pedestrian traffic.
- K. Remove mortar from surfaces not specified to receive mortar, such as walls, windows, curbs, sidewalks, etc.

END OF SECTION

**SECTION 04 7200
CAST STONE MASONRY**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Architectural cast stone.
- B. Units required are indicated on drawings as "cast stone".
- C. Units required are:
 - 1. Exterior wall units, including sills and wall base.
 - 2. Other items indicated on drawings.

1.02 REFERENCE STANDARDS

- A. ACI CODE-318 - Building Code Requirements for Structural Concrete and Commentary; 2019 (Reapproved 2022).
- B. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2024.
- C. ASTM A767/A767M - Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement; 2024.
- D. ASTM A775/A775M - Standard Specification for Epoxy-Coated Steel Reinforcing Bars; 2022.
- E. ASTM A884/A884M - Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Reinforcement; 2025.
- F. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2024.
- G. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2024a.
- H. ASTM C150/C150M - Standard Specification for Portland Cement; 2024.
- I. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2025a.
- J. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete; 2024.
- K. ASTM C1364 - Standard Specification for Architectural Cast Stone; 2023, with Editorial Revision (2024).

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Test results of cast stone components made previously by the manufacturer.
- C. Shop Drawings: Include elevations, dimensions, layouts, profiles, cross sections, reinforcement, exposed faces, arrangement of joints, anchoring methods, anchors, and piece numbers.
- D. Mortar Color Selection Samples.
- E. Verification Samples: Pieces of actual cast stone components not less than 6 inches square, illustrating range of color and texture to be anticipated in components furnished for the project.
- F. Manufacturer's Qualification Data: Documentation showing compliance with specified requirements.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications:
 - 1. A firm with a minimum of 10 years experience producing cast stone of types required for project.
 - 2. Adequate plant capacity to furnish quality, sizes, and quantity of cast stone required without delaying progress of the work.

1.05 MOCK-UPS

- A. Provide full size cast stone components for installation in mock-up of exterior wall.
- B. See Section 01 4000 - Quality Requirements and Section 04 2000 Unit Masonry for additional requirements.
- C. Mock-up may not remain as part of the completed work.
- D. Remove mock-up not incorporated into the work and dispose of debris.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver cast stone components secured to shipping pallets and protected from damage and discoloration. Protect corners from damage.
- B. Number each piece individually to match shop drawings and schedule.
- C. Store cast stone components and installation materials in accordance with manufacturer's instructions.
- D. Store cast stone components on pallets with nonstaining, waterproof covers. Ventilate under covers to prevent condensation. Prevent contact with dirt.
- E. Protect cast stone components during handling and installation to prevent chipping, cracking, or other damage.
- F. Store mortar materials where contamination can be avoided.
- G. Schedule and coordinate production and delivery of cast stone components with unit masonry work to optimize on-site inventory and to avoid delaying the work.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Architectural Cast Stone:
 - 1. Marcstone; www.marcstone.com.
 - 2. American Artstone; www.american-artstone.com.
 - 3. Architectural Cast Stone; www.acscaststone.com.
 - 4. Stoneworks; www.stoneworksap.com
 - 5. Substitutions: See Section 01 6000 - Product Requirements.

2.02 ARCHITECTURAL CAST STONE

- A. Cast Stone: Architectural concrete product manufactured to simulate appearance of natural limestone, complying with ASTM C1364.
 - 1. Compressive Strength: As specified in ASTM C1364; calculate strength of pieces to be field cut at 80 percent of uncut piece.
 - 2. Freeze-Thaw Resistance: Demonstrated by laboratory testing in accordance with ASTM C1364.
 - 3. Surface Texture: Fine grained texture, with no bugholes, air voids, or other surface blemishes visible from distance of 20 feet.
 - 4. Color: Match Basis of Design, Stoneworks #5494.
 - 5. Remove cement film from exposed surfaces before packaging for shipment.
- B. Shapes: Provide shapes indicated on drawings.
 - 1. Variation from Any Dimension, Including Bow, Camber, and Twist: Maximum of plus/minus 1/8 inch or length divided by 360, whichever is greater, but not more than 1/4 inch.
 - 2. Unless otherwise indicated on drawings, provide:
 - a. Wash or slope of 1:12 on exterior horizontal surfaces.
 - b. Drips on projecting components, wherever possible.
 - c. Raised fillets at back of sills and at ends to be built in.

- C. Reinforcement: Provide reinforcement as required to withstand handling and structural stresses; comply with ACI CODE-318.

2.03 MATERIALS

- A. Portland Cement: ASTM C150/C150M.
 - 1. For Mortar: Type I or II, except Type III may be used in cold weather.
- B. Coarse Aggregate: ASTM C33/C33M, except for gradation; granite, quartz, or limestone.
- C. Fine Aggregate: ASTM C33/C33M, except for gradation; natural or manufactured sands.
- D. Admixtures: ASTM C494/C494M.
- E. Water: Potable.
- F. Reinforcing Bars: ASTM A615/A615M, Grade 40 (40,000 psi), deformed bars, epoxy coated.
 - 1. Galvanized in accordance with ASTM A767/A767M, Class I.
 - 2. Epoxy coated in accordance with ASTM A775/A775M.
- G. Steel Welded Wire Reinforcement: ASTM A1064/A1064M, galvanized or ASTM A884/A884M, epoxy coated.
- H. Embedded Anchors, Dowels, and Inserts: Type 304 stainless steel, of type and size as required for conditions.
- I. Mortar: Portland cement-lime, as specified in Section 04 0511 ; do not use masonry cement.
- J. Cleaner: General-purpose cleaner designed for removing mortar and grout stains, efflorescence, and other construction stains from new masonry surfaces without discoloring or damaging masonry surfaces; approved for intended use by cast stone manufacturer and by cleaner manufacturer for use on cast stone and adjacent masonry materials.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine construction to receive cast stone components. Notify Architect if construction is not acceptable.
- B. Do not begin installation until unacceptable conditions have been corrected.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install cast stone components in conjunction with masonry, complying with requirements of Section 04 2000.
- C. Mechanically anchor cast stone wall base. Set window sills in mortar.
- D. Setting:
 - 1. Drench cast stone components with clear, running water immediately before installation.
 - 2. Set units in a full bed of mortar unless otherwise indicated.
 - 3. Fill vertical joints with mortar.
 - 4. Fill dowel holes and anchor slots completely with mortar or non-shrink grout.

3.03 TOLERANCES

- A. Joints: Make all joints 3/8 inch, except as otherwise detailed.
 - 1. Rake mortar joints 3/4 inch for pointing.
 - 2. Remove excess mortar from face of stone before pointing joints.
 - 3. Point joints with mortar in layers 3/8 inch thick and tool to a slight concave profile.
 - 4. Leave the following joints open for sealant:
 - a. Head joints in top courses, including copings, parapets, cornices, sills, and steps.
 - b. Joints in projecting units.
 - c. Joints between rigidly anchored units, including soffits, panels, and column covers.

- d. Joints below lugged sills and stair treads.
 - e. Joints below ledge and relieving angles.
 - f. Joints labeled "expansion joint".
- B. Installation Tolerances:
 - 1. Variation from Plumb: Not more than 1/8 inch in 10 feet or 1/4 inch in 20 feet or more.
 - 2. Variation from Level: Not more than 1/8 inch in 10 feet or 1/4 inch in 20 feet, or 3/8 inch maximum.
 - 3. Variation in Joint Width: Not more than 1/8 inch in 36 inches or 1/4 of nominal joint width, whichever is less.
 - 4. Variation in Plane Between Adjacent Surfaces (Lipping): Not more than 1/16 inch difference between planes of adjacent units or adjacent surfaces indicated to be flush with units.

3.04 REPAIR

- A. Repair chips and other surface damage noticeable when viewed in direct daylight at 10 feet.
- B. Repair with matching touch-up material provided by the manufacturer and in accordance with manufacturer's instructions.
- C. Repair methods and results subject to Architect 's approval.

3.05 CLEANING

- A. Keep cast stone components clean as work progresses.
- B. See Section 01 7419 - Construction Waste Management and Disposal, for additional requirements.

3.06 PROTECTION

- A. Protect completed work from damage.
- B. Clean, repair, or restore damaged or mortar-splashed work to condition of new work.

END OF SECTION

**SECTION 05 1200
STRUCTURAL STEEL FRAMING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Structural steel framing members.
- B. Base plates, shear stud connectors and _____.
- C. Grouting under base plates.

1.02 RELATED REQUIREMENTS

- A. Section 05 2100 - Steel Joist Framing.
- B. Section 05 3100 - Steel Decking: Support framing for small openings in deck.
- C. Section 05 5000 - Metal Fabrications: Steel fabrications affecting structural steel work.

1.03 REFERENCE STANDARDS

- A. AISC (MAN) - Steel Construction Manual; 2023, with Errata (2025).
- B. AISC 303 - Code of Standard Practice for Steel Buildings and Bridges; 2022, with Errata (2025).
- C. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.
- D. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2024.
- E. ASTM A108 - Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished; 2024.
- F. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2024.
- G. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.
- H. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2021.
- I. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2023.
- J. ASTM A563/A563M - Standard Specification for Carbon and Alloy Steel Nuts (Inch and Metric); 2021a.
- K. ASTM A572/A572M - Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel; 2021, with Editorial Revision.
- L. ASTM A992/A992M - Standard Specification for Structural Steel Shapes; 2022.
- M. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable; 2024.
- N. ASTM C1107/C1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink); 2020.
- O. ASTM E164 - Standard Practice for Contact Ultrasonic Testing of Weldments; 2024.
- P. ASTM E709 - Standard Guide for Magnetic Particle Testing; 2021.
- Q. ASTM F436/F436M - Standard Specification for Hardened Steel Washers Inch and Metric Dimensions; 2024.
- R. ASTM F1554 - Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength; 2020.

- S. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi, 144 ksi, and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength; 2025.
- T. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; 2020.
- U. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification; 2021, with Errata (2023).
- V. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2025.
- W. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel AC172; 2019, with Editorial Revision (2025).
- X. RCSC (HSBOLT) - Specification for Structural Joints Using High-Strength Bolts; Research Council on Structural Connections; 2020.
- Y. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); 2002 (Ed. 2004).
- Z. SSPC-SP 2 - Hand Tool Cleaning; 2024.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings:
 - 1. Indicate profiles, sizes, spacing, locations of structural members, openings, attachments, and fasteners.
 - 2. Connections.
 - 3. Indicate cambers and loads.
 - 4. Indicate welded connections with AWS A2.4 welding symbols. Indicate net weld lengths.
- C. Manufacturer's Mill Certificate: Certify that products meet or exceed specified requirements.
- D. Welders' Qualification Statement: Welders' certificates in accordance with AWS B2.1/B2.1M and dated no more than 12 months before start of scheduled welding work.

1.05 QUALITY ASSURANCE

- A. Fabricate structural steel members in accordance with AISC (MAN) "Steel Construction Manual."
- B. Structural steel members designated as architecturally-exposed structural steel (AESS) to also comply with Section 05 1213.
- C. Maintain one copy of each document on site.
- D. Fabricator: Company specializing in performing the work of this section with minimum _____ years of documented experience.
- E. Fabricator Qualifications: A qualified steel fabricator that is accredited by the International Accreditation Service (IAS) Fabricator Inspection Program for Structural Steel in accordance with IAS AC172.
- F. Design connections not detailed on drawings under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State in which the Project is located.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Steel Angles and Plates: ASTM A36/A36M.
- B. Steel W Shapes and Tees: ASTM A992/A992M.
- C. Rolled Steel Structural Shapes: ASTM A992/A992M.

- D. Steel Plates and Bars: ASTM A572/A572M, Grade 50 (345) high-strength, columbium-vanadium steel.
- E. Cold-Formed Structural Tubing: ASTM A500/A500M, Grade B.
- F. Pipe: ASTM A53/A53M, Grade B, Finish black.
- G. Structural Bolts and Nuts: Carbon steel, ASTM A307, Grade A and galvanized in compliance with ASTM A153/A153M Class C.
- H. High-Strength Structural Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1, with matching compatible ASTM A563/A563M nuts and ASTM F436/F436M washers.
- I. Tension Control Bolts: Twist-off type; ASTM F3125/F3125M.
- J. Unheaded Anchor Rods: ASTM F1554, Grade 36, plain, with matching ASTM A563/A563M nuts and ASTM F436/F436M Type 1 washers.
- K. Headed Anchor Rods: ASTM F1554 Grade 36, plain.
- L. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.
- M. Grout: ASTM C1107/C1107M; Non-shrink; premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents.
 - 1. Minimum Compressive Strength at 48 Hours: 2,000 pounds per square inch.
 - 2. Minimum Compressive Strength at 28 Days: 7,000 pounds per square inch.
- N. Shop and Touch-Up Primer: Fabricator's standard, complying with VOC limitations of authorities having jurisdiction.

2.02 FABRICATION

- A. Shop fabricate to greatest extent possible.
- B. Develop required camber for members.

2.03 FINISH

- A. Prepare structural component surfaces in accordance with SSPC-SP 2.
- B. Shop prime structural steel members. Do not prime surfaces that will be fireproofed, field welded, in contact with concrete, or high strength bolted.

2.04 SOURCE QUALITY CONTROL

- A. Provide shop testing and analysis of structural steel.
- B. High-Strength Bolts: Provide testing and verification of shop-bolted connections in accordance with RCSC (HSBOLT) "Specification for Structural Joints Using High-Strength Bolts," testing at least 10 percent of bolts at each connection.
- C. Welded Connections: Visually inspect all shop-welded connections and test at least 15 percent of welds using one of the following:
 - 1. Ultrasonic testing performed in accordance with ASTM E164.
 - 2. Magnetic particle inspection performed in accordance with ASTM E709.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that conditions are appropriate for erection of structural steel and that the work may properly proceed.

3.02 ERECTION

- A. Erect structural steel in compliance with AISC 303.
- B. Allow for erection loads and provide sufficient temporary bracing to maintain structure in safe condition, plumb, and in true alignment until completion of erection and installation of permanent bracing.

- C. Field weld components indicated on shop drawings.
- D. Use carbon steel bolts only for temporary bracing during construction, unless otherwise specifically permitted on drawings. Install high-strength bolts in accordance with RCSC (HSBOLT) "Specification for Structural Joints Using High-Strength Bolts".
- E. Do not field cut or alter structural members without approval of Architect.
- F. After erection, prime welds, abrasions, and surfaces not shop primed, except surfaces to be in contact with concrete.
- G. Grout solidly between column plates and bearing surfaces, complying with manufacturer's instructions for nonshrink grout. Trowel grouted surfaces smooth, splaying neatly to 45 degrees.

3.03 TOLERANCES

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

3.04 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field quality control tests, as specified in Section 01 4000 - Quality Requirements.
- B. High-Strength Bolts: Provide testing and verification of field-bolted connections in accordance with RCSC (HSBOLT) "Specification for Structural Joints Using High-Strength Bolts," testing at least 10 percent of bolts at each connection.
- C. Welded Connections: Visually inspect all field-welded connections and test at least 25 percent of welds using one of the following:
 - 1. Ultrasonic testing performed in accordance with ASTM E164.
 - 2. Magnetic particle inspection performed in accordance with ASTM E709.

END OF SECTION

**SECTION 05 2100
STEEL JOIST FRAMING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Open web steel joists and shear stud connectors, with bridging, attached seats and anchors.
- B. Loose bearing members, such as plates or angles, and anchor bolts for site placement.
- C. Supplementary framing for roof openings greater than 18 inches.

1.02 RELATED REQUIREMENTS

- A. Section 05 1200 - Structural Steel Framing: Grouting base plates and bearing plates. Superstructure framing.
- B. Section 05 1200 - Structural Steel Framing: Superstructure framing.
- C. Section 05 3100 - Steel Decking: Bearing plates and angles.
- D. Section 05 3100 - Steel Decking: Support framing for openings less than 18 inches in decking.
- E. Section 05 5000 - Metal Fabrications: Non-framing steel fabrications attached to joists.

1.03 REFERENCE STANDARDS

- A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.
- B. ASTM A108 - Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished; 2024.
- C. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.
- D. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2021.
- E. ASTM A563/A563M - Standard Specification for Carbon and Alloy Steel Nuts (Inch and Metric); 2021a.
- F. ASTM E709 - Standard Guide for Magnetic Particle Testing; 2021.
- G. ASTM F436/F436M - Standard Specification for Hardened Steel Washers Inch and Metric Dimensions; 2024.
- H. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi, 144 ksi, and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength; 2025.
- I. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification; 2021, with Errata (2023).
- J. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2025.
- K. RCSC (HSBOLT) - Specification for Structural Joints Using High-Strength Bolts; Research Council on Structural Connections; 2020.
- L. SJI 100 - Standard Specifications for K-Series, LH-Series, and DLH-Series Open Web Steel Joists, and for Joist Girders; 2020.
- M. SJI Technical Digest No. 9 - Handling and Erection of Steel Joists and Joist Girders; 2025.
- N. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer; 1999 (Ed. 2004).
- O. SSPC-SP 2 - Hand Tool Cleaning; 2024.

1.04 SUBMITTALS

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

- B. Shop Drawings: Indicate standard designations, joist coding, configurations, sizes, spacings, cambers, locations of joists, joist leg extensions, bridging, connections, and attachments.
- C. Welders' Qualification Statement: Welders' certificates in accordance with AWS B2.1/B2.1M and dated no more than 12 months before start of scheduled welding work.

1.05 QUALITY ASSURANCE

- A. Design connections not detailed on drawings under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State in which the Project is located.
- B. Perform Work, including that for headers and other supplementary framing, in accordance with SJI 100 Standard Specifications Load Tables and SJI Technical Digest No. 9.
- C. Manufacturer Qualifications: Company specializing in performing the work of this section with minimum 5 years documented experience.
- D. Welder Qualifications: Welding processes and welding operators qualified in accordance with AWS D1.1/D1.1M and dated no more than 12 months before start of scheduled welding work.
- E. Erector Qualifications: Company specializing in performing the work of this section with minimum 5 years documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Transport, handle, store, and protect products to SJI requirements.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Steel Joists:
 - 1. Canam Group Inc: www.canam-steeljoists.ws
 - 2. New Millennium Building Systems: www.newmill.com/#sle.
 - 3. Nucor-Vulcraft Group: www.vulcraft.com/#sle.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.

2.02 MATERIALS

- A. Open Web Joists: SJI Type K Joists:
 - 1. Provide bottom chord extensions as indicated.
 - 2. Minimum End Bearing on Steel Supports: Comply with referenced SJI standard.
 - 3. Minimum End Bearing on Concrete or Masonry Supports: Comply with referenced SJI standard.
 - 4. Finish: Shop primed.
- B. Open Web Joists: SJI 100 Type LH Joists:
 - 1. Provide bottom chord extensions as indicated.
 - 2. Minimum End Bearing on Steel Supports: Comply with referenced SJI standards.
 - 3. Minimum End Bearing on Masonry or Concrete Supports: Comply with referenced SJI standards.
 - 4. Finish: Shop primed.
- C. Open Web Joists: SJI 100 Type DLH Joists:
 - 1. Provide bottom chord extensions as indicated.
 - 2. Minimum End Bearing on Steel Supports: Comply with referenced SJI standards.
 - 3. Minimum End Bearing on Masonry or Concrete Supports: Comply with referenced SJI standards.
 - 4. Finish: Shop primed.
- D. Anchor Bolts, Nuts and Washers: ASTM A307 hot-dip galvanized per ASTM A153/A153M Class C.

- E. High-Strength Structural Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1, with matching compatible ASTM A563/A563M nuts and ASTM F436/F436M washers.
- F. Shear Stud Connectors: Made from ASTM A108 Grade 1015 bars.
- G. Structural Steel For Supplementary Framing and Joist Leg Extensions: ASTM A36/A36M.
- H. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.
- I. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

2.03 FINISH

- A. Shop prime joists .
 - 1. Do not prime surfaces that will be fireproofed.
 - 2. Galvanize steel ledge angles.
- B. Prepare surfaces to be finished in accordance with SSPC-SP 2.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions prior to beginning work.

3.02 ERECTION

- A. Erect joists with correct bearing on supports.
- B. Allow for erection loads. Provide sufficient temporary bracing to maintain framing safe, plumb, and in true alignment.
- C. Coordinate the placement of anchors for securing loose bearing members furnished as part of the work of this section.
- D. After joist alignment and installation of framing, field weld joist seats to steel bearing surfaces.
- E. Position and field weld joist chord extensions and wall attachments as detailed.
- F. Install supplementary framing for floor and roof openings greater than 18 inches.
- G. Do not permit erection of decking until joists are braced, bridged, and secured or until completion of erection and installation of permanent bridging and bracing.
- H. Do not field cut or alter structural members without approval of joist manufacturer.
- I. After erection, prime welds, damaged shop primer, damaged galvanizing, and surfaces not shop primed , except surfaces specified not to be primed.

3.03 TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch.
- B. Maximum Offset From True Alignment: 1/4 inch.

3.04 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field quality control tests, as specified in Section 01 4000 - Quality Requirements.
- B. High-Strength Bolts: Provide testing and verification of field-bolted connections in accordance with RCSC (HSBOLT) "Specification for Structural Joints Using High-Strength Bolts", testing at least 100 percent of bolts at each connection.
- C. Welded Connections: Visually inspect all field-welded connections and test at least 100 percent of welds using one of the following:
 - 1. Ultrasonic testing performed in accordance with ASTM E164.
 - 2. Magnetic particle inspection performed in accordance with ASTM E709.

END OF SECTION

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SECTION 05 3100 STEEL DECKING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Acoustical roof deck.
- B. Roof deck.
- C. Supplementary framing for openings up to and including 18 inches.
- D. Bearing plates and angles.
- E. Acoustical insulation in roof deck flutes.

1.02 RELATED REQUIREMENTS

- A. Section 05 1200 - Structural Steel Framing: Support framing for openings larger than 18 inches.

1.03 REFERENCE STANDARDS

- A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.
- B. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2024.
- C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.
- D. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2023.
- E. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification; 2021, with Errata (2023).
- F. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2025.
- G. AWS D1.3/D1.3M - Structural Welding Code - Sheet Steel; 2018, with Errata (2022).
- H. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel AC172; 2019, with Editorial Revision (2025).
- I. ICC-ES AC43 - Acceptance Criteria for Steel Deck Roof and Floor Systems; 2022.
- J. SDI (DM) - Publication No.30, Design Manual for Composite Decks, Form Decks, and Roof Decks; 2007.
- K. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer; 1999 (Ed. 2004).
- L. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); 2002 (Ed. 2004).

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittals procedures.
- B. Product Data: Provide deck profile characteristics, dimensions, structural properties, and finishes.
- C. Shop Drawings: Indicate deck plan, support locations, projections, openings, reinforcement, pertinent details, and accessories.
- D. Certificates: Certify that products furnished meet or exceed specified requirements.
- E. Submit manufacturer's installation instructions.
- F. Welders' Qualification Statement: Welders' certificates in accordance with AWS B2.1/B2.1M and dated no more than 12 months before start of scheduled welding work.

1.05 QUALITY ASSURANCE

- A. Design deck layout, spans, fastening, and joints under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State in which the Project is located.
- B. Welder Qualifications: Welding processes and welding operators qualified in accordance with AWS D1.1/D1.1M and AWS D1.3/D1.3M and dated no more than 12 months before start of scheduled welding work.
- C. Fabricator Qualifications: A qualified steel fabricator that is accredited by the International Accreditation Service (IAS) Fabricator Inspection Program for Structural Steel in accordance with IAS AC172.
- D. Installer Qualifications: Company specializing in performing the work of this Section with minimum 3 years of experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Cut plastic wrap to encourage ventilation.
- B. Separate sheets and store deck on dry wood sleepers; slope for positive drainage.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Steel Deck:
 - 1. Canam Steel Corporation; ____: www.canam-steeljoists.ws.
 - 2. Nucor-Vulcraft Group; ____: www.vulcraft.com/#sle.
 - 3. Substitutions: See Section 01 6000 - Product Requirements.

2.02 STEEL DECK

- A. All Deck Types: Select and design metal deck in accordance with SDI Design Manual.
 - 1. Calculate to structural working stress design and structural properties specified.
 - 2. Maximum Vertical Deflection of Roof Deck: 1/240 of span.
- B. Acoustical Roof Deck: Non-composite type, steel sheet with plain vertical flute faces perforated with 1/8 inch diameter holes staggered 3/8 inch on center:
 - 1. Galvanized Steel Sheet: ASTM A653/A653M, Structural Steel (SS) Grade 50/340, Class 1, 2, or 4, with G60/Z180 galvanized coating.
 - 2. Minimum Base Metal Thickness: 22 gauge, 0.0299 inch.
 - 3. Nominal Height: 1-1/2 inch.
 - 4. Formed Sheet Width: 36 inch.
 - 5. Side Joints: Lapped, mechanically fastened.
 - 6. End Joints: Lapped, mechanically fastened.
- C. Roof Deck: Non-composite type, fluted steel sheet:
 - 1. Galvanized Steel Sheet: ASTM A653/A653M, Structural Steel (SS) Grade 50/340, Class 1, 2, or 4, with G60/Z180 galvanized coating.
 - 2. Minimum Base Metal Thickness: 22 gauge, 0.0299 inch.
 - 3. Nominal Height: 1-1/2 inch.
 - 4. Formed Sheet Width: 36 inch.
 - 5. Side Joints: Lapped, mechanically fastened.
 - 6. End Joints: Lapped, mechanically fastened.

2.03 ACCESSORY MATERIALS

- A. Bearing Plates and Angles: ASTM A36/A36M steel, galvanized per ASTM A123/A123M.
- B. Welding Materials: AWS D1.1/D1.1M.
- C. Fasteners: Galvanized hardened steel, self tapping.

- D. Mechanical Fasteners: Steel; hex washer head, self-drilling, self-tapping.
 - 1. Design Requirements for Sidelap Connections: Provide number and type of fasteners that comply with the applicable requirements of SDI (DM) design method for roof deck and floor deck applications and ICC-ES AC43.
 - 2. Fasteners for Steel Roof Decks Protected with Waterproofing Membrane: ASTM B633, SC1, Type III zinc electroplate.
- E. Weld Washers: Mild steel, uncoated, 3/4 inch outside diameter, 1/8 inch thick.
- F. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.
- G. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, complying with VOC limitations of authorities having jurisdiction.
- H. Acoustical Insulation: Glass fiber type, minimum 1.1 lb/cu ft density; profiled to suit deck.

2.04 FABRICATED DECK ACCESSORIES

- A. Sheet Metal Deck Accessories: Metal closure strips, wet concrete stops, and cover plates, 22 gauge, 0.0299 inch thick sheet steel; of profile and size as indicated; finished same as deck.
- B. Cant Strips: Formed sheet steel, ____ gauge, ____ inch minimum thickness, 45 degree slope, 3-1/2 inch nominal width and height, flange for attachment.
- C. Roof Sump Pans: Formed sheet steel, 14 gauge, 0.0747 inch minimum thickness, flat bottom, sloped sides, recessed 1-1/2 inches below roof deck surface, bearing flange 3 inches wide, sealed watertight.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions prior to beginning work.

3.02 INSTALLATION

- A. Erect metal deck in accordance with SDI Design Manual and manufacturer's instructions. Align and level.
- B. On concrete and masonry surfaces provide minimum 4 inch bearing.
- C. On steel supports provide minimum 1-1/2 inch bearing.
- D. At mechanically fastened male/female side laps fasten at 24 inches on center maximum.
- E. Drive mechanical sidelap connectors completely through adjacent lapped sheets; positively engage adjacent sheets with minimum three-thread penetration.
- F. Weld deck in accordance with AWS D1.3/D1.3M.
- G. Place metal cant strips in position and fusion weld.
- H. Position roof drain pans with flange bearing on top surface of deck. Fusion weld at each deck flute.
- I. Immediately after welding deck and other metal components in position, coat welds, burned areas, and damaged surface coating, with touch-up primer.

END OF SECTION

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**SECTION 05 4000
COLD-FORMED METAL FRAMING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Formed steel stud exterior wall and load-bearing interior wall framing.
- B. Formed steel joist, purlin, and slotted channel framing and bridging.

1.02 REFERENCE STANDARDS

- A. AISI S100 - North American Specification for the Design of Cold-Formed Steel Structural Members; 2016, with Supplement (2020).
- B. AISI S240 - North American Standard for Cold-Formed Steel Structural Framing; 2015, with Errata (2020).
- C. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures; Most Recent Edition Cited by Referring Code or Reference Standard.
- D. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.
- E. ASTM A563/A563M - Standard Specification for Carbon and Alloy Steel Nuts (Inch and Metric); 2021a.
- F. ASTM A780/A780M - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings; 2020.
- G. ASTM A1003/A1003M - Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members; 2015.
- H. ASTM C955 - Standard Specification for Cold-Formed Steel Structural Framing Members; 2024.
- I. ASTM C1007 - Standard Specification for Installation of Load Bearing (Transverse and Axial) Steel Studs and Related Accessories; 2020 (Reapproved 2024).
- J. AWS D1.3/D1.3M - Structural Welding Code - Sheet Steel; 2018, with Errata (2022).
- K. ICC (IBC) - International Building Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate with work of other sections that is to be installed in or adjacent to metal framing systems, including but not limited to structural anchors, cladding anchors, utilities, insulation, and firestopping.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data on cold-formed steel structural framing members; include material descriptions and base steel thickness.
- C. Product Data: Provide manufacturer's data on factory-made connectors, showing compliance with requirements.
- D. Shop Drawings: Indicate component details, framed openings, bearing, anchorage, loading, welds, and type and location of fasteners, and accessories or items required of related work.
 - 1. Indicate stud and joist layout, base-metal thickness and size.
 - 2. Describe method for securing studs to tracks and for welded framing connections.
- E. Design Data:
 - 1. Design calculations for loadings and stresses of framing, connections and anchorage; signed by a Professional Engineer licensed in the State in which the Project is located.

- F. Manufacturer's Installation Instructions: Indicate special procedures, conditions requiring special attention.

1.05 QUALITY ASSURANCE

- A. Designer Qualifications: Design framing system under direct supervision of a Professional Engineer experienced in designing this work and licensed in the State in which the Project is located.
- B. Manufacturer Qualifications: Company specializing in manufacturing the types of products specified in this section, and with minimum three years of experience.
- C. Welder Qualifications: Welding processes and welding operators qualified in accordance with AWS D1.1/D1.1M and AWS D1.3/D1.3M and dated no more than 12 months before start of scheduled welding work.
- D. Installer Qualifications: Company specializing in performing the work of this section with minimum three years experience.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Structural Framing:
 - 1. CEMCO: www.cemcosteel.com/#sle.
 - 2. ClarkDietrich: www.clarkdietrich.com/#sle.
 - 3. MarinoWARE: www.marinoware.com/#sle.
 - 4. SCAFCO Corporation: www.scafco.com/#sle.
 - 5. The Steel Network, Inc: www.SteelNetwork.com/#sle.
 - 6. Substitutions: See Section 01 6000 - Product Requirements.
- B. Connectors:
 - 1. Same manufacturer as metal framing.

2.02 PERFORMANCE REQUIREMENTS

- A. Comply with requirements for Contractor's design-related professional design services indicated in Section 01 4000 - Quality Requirements.
- B. Design Requirements: Design cold-formed framing systems, components, connectors, and anchorage to structure to withstand specified design loads in compliance with ICC (IBC), ASCE 7, AISI S100, and AISI S240.

2.03 COLD-FORMED STEEL FRAMING, GENERAL

- A. Provide primary and secondary framing members, connections, bridging, bracing, plates, gussets, clips, fittings, reinforcement, fastenings, and anchorage to structure as required to provide a complete framing system.
- B. Steel Sheet: Complying with the requirements of ASTM A1003/A1003M, Structural Grade, Type H, metallic coated.
 - 1. Structural Grade: As required to meet design criteria.
 - 2. Corrosion Protection:
 - a. G90 (Z275): Walls with brick veneer, stone cladding, metal panels or similar.
 - b. G60 (Z180): Other walls and framing.

2.04 FRAMING COMPONENTS

- A. Wall Studs and Track Sections: AISI S240; C-shaped or "Sigma"-shaped studs, punched with stiffened flanges; U-shaped track sections, un-punched, with straight flanges, in matching nominal width and compatible height.
 - 1. Stud Base-Metal Thickness and Depth: As required to meet specified performance levels. Minimums as noted on Drawings.

2. Stud Flange Width: As required to meet specified performance levels. 1-5/8 inches minimum.
3. Minimum Track Base-Metal Thickness: Matching base-metal thickness of studs.
- B. Headers and Jambs: AISI S240. Provide headers and jambs, un-punched, with stiffened flanges.
 1. Thickness and Depth: As required to meet specified performance levels. Minimums as noted on Drawings.
- C. Joists and Purlins: AISI S240; manufactured C-shaped sections with stiffened flanges.
 1. Thickness and Depth: As required to meet specified performance levels. Minimums as noted on Drawings.

2.05 FRAMING CONNECTORS

- A. Performance Requirements: Provide connections in compliance with requirements of AISI S240.
- B. Steel Sheet: Complying with the requirements ASTM A1003/A1003M, Structural Grade, Type H, metallic coated, and factory punched holes and slots.
 1. Structural Grade: As required to meet design criteria.
 2. Corrosion Protection: G90 (Z275) in accordance with AISI S240.
 3. Minimum 16 gauge, 0.06 inch thickness.
- C. Structural Performance: Maintain load and movement capacity required by applicable building code and specified performance levels.
- D. Movement Connections: Provide mechanical anchorage devices that accommodate movement while maintaining structural performance of framing. Provide movement connections where indicated on drawings.
- E. Provide non-movement devices for tie-down to foundation, floor-to-floor tie-down, roof-to-wall tie-down, joist hangers, gusset plates, and stiffeners.
- F. Bridging Connections: Provide mechanical load-transferring devices that accommodate wind load torsion and weak axis buckling induced by axial compression loads. Provide bridging connectors as required to meet specified performance levels.

2.06 FASTENERS

- A. Self-Drilling, Self-Tapping Screws, Bolts, Nuts and Washers: Hot-dip galvanized per ASTM A153/A153M.
- B. Anchorage Devices: Powder actuated, or as noted on Drawings.

2.07 ACCESSORIES

- A. Bracing, Furring, Bridging: Formed sheet steel, thickness determined for conditions encountered; finish to match framing components.
- B. Galvanizing Repair: Touch up bare steel with zinc-rich paint in compliance with ASTM A780/A780M.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate surfaces are ready to receive work.
- B. Verify field measurements and adjust installation as required.

3.02 INSTALLATION - GENERAL

- A. Install structural members and connections in compliance with ASTM C1007.

3.03 INSTALLATION OF STUDS

- A. Install components in accordance with manufacturers' instructions and ASTM C1007 requirements.
- B. [MNANG DULUTH PROJECTS] Any field operations producing sparks require a burning permit. Permit may be obtained through the Base Fire Department at 218-788-7434.
- C. [MNANG ST PAUL PROJECTS] Any field operations producing sparks require a burning permit. Permit may be obtained through the Base Fire Department at 612-713-2272 or through Civil Engineering at 612-713-2227.
- D. Construct corners using minimum of three studs. Install minimum double studs at wall openings, door and window jambs.
- E. Install load-bearing studs full length in one piece. Splicing of studs is not permitted.
- F. Install load-bearing studs; brace, and reinforce to develop full strength and achieve design requirements.
- G. Coordinate placement of insulation in multiple stud spaces made inaccessible after erection.
- H. Install intermediate studs above and below openings to align with wall stud spacing.
- I. Attach cross studs to studs for attachment of fixtures anchored to walls.
- J. Install framing between studs for attachment of mechanical and electrical items, and to prevent stud rotation.
- K. Touch-up field welds and damaged corrosion-protected surfaces zinc-rich paint in compliance with ASTM A780/A780M.

3.04 INSTALLATION OF JOISTS AND PURLINS

- A. Install framing components in accordance with manufacturer's instructions.
- B. [MNANG DULUTH PROJECTS] Any field operations producing sparks require a burning permit. Permit may be obtained through the Base Fire Department at 218-788-7434.
- C. [MNANG ST PAUL PROJECTS] Any field operations producing sparks require a burning permit. Permit may be obtained through the Base Fire Department at 612-713-2272 or through Civil Engineering at 612-713-2227.
- D. Make provisions for erection stresses. Provide temporary alignment and bracing.
- E. Set floor and ceiling joists parallel and level, with lateral bracing and bridging.
- F. Provide web stiffeners at reaction points and where indicated on Drawings.
- G. Touch-up field welds and damaged primed surfaces.

3.05 TOLERANCES

- A. Maximum Variation from True Position: 1/4 inch.
- B. Maximum Variation of any Member from Plane: 1/4 inch.

END OF SECTION

**SECTION 05 5000
METAL FABRICATIONS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Shop fabricated steel items.
- B. Safety Chain

1.02 REFERENCE STANDARDS

- A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.
- B. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2024.
- C. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2024.
- D. ASTM A501/A501M - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing; 2021.
- E. ASTM A666/A666M - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2024.
- F. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; 2020.
- G. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification; 2021, with Errata (2023).
- H. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2025.
- I. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer; 1999 (Ed. 2004).
- J. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); 2002 (Ed. 2004).

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.

PART 2 PRODUCTS

2.01 MATERIALS - STEEL

- A. Steel Sections: ASTM A36/A36M.
- B. Steel Tubing: ASTM A501/A501M hot-formed structural tubing.
- C. Pipe: ASTM A53/A53M, Grade B Schedule 40, black finish.
- D. Stainless Steel, General: ASTM A666/A666M, Type 304.
- E. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.
- F. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.
- G. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

2.02 FABRICATION

- A. Fit and shop assemble items in largest practical sections, for delivery to site.
- B. Fabricate items with joints tightly fitted and secured.

- C. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
- D. Furnish components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.03 FABRICATED ITEMS

- A. Bollards: Steel pipe, concrete filled, crowned cap, as detailed; prime paint finish.
- B. Ledge Angles, Shelf Angles, Channels, and Plates Not Attached to Structural Framing: For support of metal decking and masonry; galvanized finish.
- C. Lintels: As detailed; galvanized finish.
- D. Cast Iron Trench Castings
 - 1. Cast Iron Trench Castings:
 - a. Material: Cast iron; ASTM A48/A48M, Class 35 B (heavy duty).
- E. Stainless Steel Wall Panels: Stainless steel, wall-mounted splash guard panel.
 - 1. Material: Stainless steel.
 - 2. Size: As indicated on drawings.
 - 3. Accessories: Manufacturer's standard stainless steel fasteners.
 - a. Mechanically mount per manufacturer's instructions for wall construction conditions.
 - b. Caulk around penetrations in stainless steel panel to prevent moisture from getting behind the panels.

2.04 SAFETY CHAINS

- A. Basis of Design: Speciality Dock Parts: Dual Chain Dock Safety Barrier.
- B. Strengthened dual/double steel security chain assembly capable of resisting OSHA standard for withstanding 200 pounds of force.
- C. High visibility yellow chain.
- D. Provide manufacturers standard anchors, receivers, turn-buckles and clips.
- E. Chain shall anchor to opening jamb.

2.05 FINISHES - STEEL

- A. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
- B. Prime Painting: One coat.
- C. Stainless Steel Finish: No. 4 Satin Finish.

2.06 FABRICATION TOLERANCES

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

PART 3 EXECUTION

3.01 EXAMINATION

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

3.02 INSTALLATION

- A. Install items plumb and level, accurately fitted, free from distortion or defects.

- B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- C. Obtain approval prior to site cutting or making adjustments not scheduled.

3.03 TOLERANCES

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

END OF SECTION

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SECTION 05 5100 METAL STAIRS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Stairs with concrete treads.
- B. Structural steel stair framing and supports.
- C. Handrails and guards.

1.02 REFERENCE STANDARDS

- A. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.
- B. AISC 207 - Standard for Certification Programs; 2025.
- C. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.
- D. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2024.
- E. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.
- F. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2023.
- G. ASTM A501/A501M - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing; 2021.
- H. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi, 144 ksi, and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength; 2025.
- I. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; 2020.
- J. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2025.
- K. ICC (IBC) - International Building Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- L. NAAMM AMP 510 - Metal Stairs Manual; 1992.
- M. NAAMM MBG 531 - Metal Bar Grating Manual; 2024.
- N. NAAMM MBG 532 - Heavy Duty Metal Bar Grating Manual; 2024.
- O. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer; 1999 (Ed. 2004).
- P. SSPC-SP 2 - Hand Tool Cleaning; 2024.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories.
 - 1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.
 - 2. Include the design engineer's seal and signature on each sheet of shop drawings.
- C. Design Data: As required by authorities having jurisdiction.
- D. Fabricator's Qualification Statement: Provide documentation showing steel fabricator is certified under AISC 207.

1.04 QUALITY ASSURANCE

- A. Structural Designer Qualifications: Professional Structural Engineer experienced in design of this work and licensed in the State in which the Project is located, or personnel under direct supervision of such an engineer.
- B. Fabricator Qualifications:
 - 1. A company specializing in manufacturing products specified in this section, with not less than ten years of documented experience.

PART 2 PRODUCTS

2.01 METAL STAIRS - GENERAL

- A. Metal Stairs: Provide stairs of the design specified, complete with landing platforms, vertical and horizontal supports, railings, and guards, fabricated accurately for anchorage to each other and to building structure.
 - 1. Regulatory Requirements: Provide stairs and railings that comply with most stringent requirements of local, state, and federal regulations; where requirements of Contract Documents exceed those of regulations, comply with Contract Documents.
 - 2. Handrails: Comply with applicable accessibility requirements of ADA Standards.
 - 3. Structural Design: Provide complete stair and railing assemblies that comply with the applicable local code.
 - 4. Dimensions: As indicated on drawings.
 - 5. Shop assemble components; disassemble into largest practical sections suitable for transport and access to site.
 - 6. No sharp or rough areas on exposed travel surfaces and surfaces accessible to touch.
 - 7. Separate dissimilar metals using paint or permanent tape.
- B. Metal Jointing and Finish Quality Levels:
 - 1. Commercial: Exposed joints as inconspicuous as possible, whether welded or mechanical; underside of stair not covered by soffit IS considered exposed to view.
 - a. Welded Joints: Intermittently welded on back side, filled with body putty, and sanded smooth and flush.
 - b. Welds Exposed to View: Ground smooth and flush.
 - c. Mechanical Joints: Butted tight, flush, and hairline.
 - d. Bolts Exposed to View: Countersunk flat or oval head bolts; no exposed nuts.
 - e. Exposed Edges and Corners: Eased to small uniform radius.
 - f. Metal Surfaces to be Painted: Sanded or ground smooth, suitable for satin or matte finish.
- C. Fasteners: Same material or compatible with materials being fastened; type consistent with design and specified quality level.
- D. Anchors and Related Components: Same material and finish as item to be anchored, except where specifically indicated otherwise; provide all anchors and fasteners required.

2.02 METAL STAIRS WITH CONCRETE TREADS

- A. Jointing and Finish Quality Level: Commercial, as defined above.
- B. Risers: Closed.
- C. Treads: Metal pan with field-installed concrete fill.
 - 1. Concrete Depth: 1-1/2 inches, minimum.
 - 2. Tread Pan Material: Steel sheet.
 - 3. Tread Pan Thickness: As required by design; 14 gauge, 0.075 inch minimum.
 - 4. Concrete Reinforcement: Welded wire mesh.
 - 5. Concrete Finish: For resilient floor covering.
- D. Risers: Same material and thickness as tread pans.

1. Nosing Depth: Not more than 1-1/2 inch overhang.
2. Nosing Return: Flush with top of concrete fill, not more than 1/2 inch wide.
- E. Stringers: Rolled steel channels.
 1. Stringer Depth: 10 inches.
 2. End Closure: Sheet steel of same thickness as risers welded across ends.
- F. Railings: Steel pipe railings.

2.03 HANDRAILS AND GUARDS

- A. Wall-Mounted Rails: Round pipe or tube rails unless otherwise indicated.
 1. Outside Diameter: 1-1/4 inch, minimum, to 1-1/2 inches, maximum.
- B. Guards:
 1. Top Rails: Round pipe or tube rails unless otherwise indicated.
 - a. Outside Diameter: 1-1/4 inch, minimum, to 1-1/2 inches, maximum.
 2. Infill at Pipe Railings: Pipe or tube rails sloped parallel to stair.
 - a. Outside Diameter: 1 inch.
 - b. Material: Steel pipe or tube, round.
 - c. Vertical Spacing: Maximum 4 inches on center.
 - d. Jointing: Welded and ground smooth and flush.
 3. End and Intermediate Posts: Same material and size as top rails.
 - a. Horizontal Spacing: As indicated on drawings.
 - b. Mounting: Welded to top surface of stringer.

2.04 MATERIALS

- A. Steel Sections: ASTM A36/A36M.
- B. Steel Tubing: ASTM A500/A500M or ASTM A501/A501M structural tubing, round and shapes as indicated.
- C. Pipe: ASTM A53/A53M Grade B Schedule 40, black finish.
- D. Gratings: Bar gratings that comply with NAAMM MBG 531 or NAAMM MBG 532, whichever applies based on bar sizes.
- E. Concrete Fill: See Section 03 3000.
- F. Concrete Reinforcement: Mesh type as detailed, galvanized.

2.05 ACCESSORIES

- A. Steel Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1, and galvanized to ASTM A153/A153M where connecting galvanized components.
- B. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.
- C. Shop and Touch-Up Primer: SSPC-Paint 15, and comply with VOC limitations of authorities having jurisdiction.

2.06 SHOP FINISHING

- A. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
- B. Do not prime surfaces in direct contact with concrete or where field welding is required.
- C. Prime Painting: Use specified shop- and touch-up primer.
 1. Preparation of Steel: In accordance with SSPC-SP 2 Hand Tool Cleaning.
 2. Number of Coats: One.

PART 3 EXECUTION

3.01 EXAMINATION

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

3.02 PREPARATION

- A. When field welding is required, clean and strip primed steel items to bare metal.
- B. Supply items required to be cast into concrete and embedded in masonry with setting templates.

3.03 INSTALLATION

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

3.04 TOLERANCES

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

END OF SECTION

SECTION 05 5133 METAL LADDERS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Shop-fabricated metal ship ladders.

1.02 REFERENCE STANDARDS

- A. ANSI A14.3 - American National Standard for Ladders -- Fixed -- Safety Requirements; 2008 (Reaffirmed 2018).
- B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.
- C. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2021.
- D. ASTM A501/A501M - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing; 2021.
- E. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi, 144 ksi, and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength; 2025.
- F. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; 2020.
- G. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification; 2021, with Errata (2023).
- H. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2025.
- I. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel AC172; 2019, with Editorial Revision (2025).
- J. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer; 1999 (Ed. 2004).
- K. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); 2002 (Ed. 2004).
- L. SSPC-SP 2 - Hand Tool Cleaning; 2024.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings:
 - 1. Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.
 - 2. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.
- C. Welders' Qualification Statement: Welders' certificates in accordance with AWS B2.1/B2.1M and dated no more than 12 months before start of scheduled welding work.
- D. Designer's Qualification Statement. Provide documentation of Professional Structural Engineer's licensure.
- E. Fabricator's Qualification Statement: Provide documentation showing steel fabricator is accredited under IAS AC172.

1.04 QUALITY ASSURANCE

- A. Design work of this section under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State in which the Project is located.

PART 2 PRODUCTS

2.01 MATERIALS - STEEL

- A. Steel Sections: ASTM A36/A36M.
- B. Steel Tubing: ASTM A501/A501M hot-formed structural tubing.
- C. Mechanical Fasteners: Same material or compatible with materials being fastened; type consistent with design and specified quality level.
- D. Bolts, Nuts, and Washers: ASTM A307, plain.
- E. Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1, plain.
- F. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.
- G. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.
- H. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

2.02 FABRICATION

- A. Fit and shop assemble items in largest practical sections, for delivery to site.
- B. Fabricate items with joints tightly fitted and secured.
- C. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
- D. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.03 FABRICATED SHIP LADDERS

- A. Ship Ladders: Steel; in compliance with ANSI A14.3; with mounting brackets and attachments; galvanized finish. See drawings for dimensions

2.04 FINISHES - STEEL

- A. Prepare surfaces to be primed in accordance with SSPC-SP2.
- B. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
- C. Prime Painting: One coat.

2.05 FABRICATION TOLERANCES

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

PART 3 EXECUTION

3.01 EXAMINATION

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

3.02 PREPARATION

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

3.03 INSTALLATION

- A. Install items plumb and level, accurately fitted, free from distortion or defects.
- B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- C. Obtain approval prior to site cutting or making adjustments not scheduled.

3.04 TOLERANCES

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

END OF SECTION

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**SECTION 06 1000
ROUGH CARPENTRY**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Nonstructural dimension lumber framing.
- B. Roof-mounted curbs.
- C. Roofing nailers.
- D. Roofing cant strips.
- E. Preservative treated wood materials.
- F. Fire retardant treated wood materials.
- G. Communications and electrical room mounting boards.
- H. Concealed wood blocking, nailers, and supports.

1.02 REFERENCE STANDARDS

- A. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2021.
- B. ASTM A563/A563M - Standard Specification for Carbon and Alloy Steel Nuts (Inch and Metric); 2021a.
- C. ASTM D2898 - Standard Practice for Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing; 2010 (Reapproved 2024).
- D. ASTM D3498 - Standard Specification for Adhesives for Field-Gluing Wood Structural Panels (Plywood or Oriented Strand Board) to Wood Based Floor System Framing; 2019a.
- E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2024.
- F. AWC (WFCM) - Wood Frame Construction Manual for One- and Two-Family Dwellings; 2024, with Errata.
- G. AWPA U1 - Use Category System: User Specification for Treated Wood; 2025.
- H. PS 1 - Structural Plywood; 2023.
- I. PS 20 - American Softwood Lumber Standard; 2025.

1.03 SUBMITTALS

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

1.04 DELIVERY, STORAGE, AND HANDLING

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

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
 - 1. Species: Spruce-Pine-Fir unless otherwise indicated. See structural Drawings.

2. If no species is specified, provide species graded by the agency specified; if no grading agency is specified, provide lumber graded by grading agency meeting the specified requirements.
3. Grading Agency: Grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee at www.alsc.org, and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.

B. Lumber fabricated from old growth timber is not permitted.

2.02 DIMENSION LUMBER FOR CONCEALED APPLICATIONS

- A. Sizes: Nominal sizes as indicated on drawings, S4S.
- B. Moisture Content: S-dry or MC19.
- C. Stud Framing (2 by 2 through 2 by 6):
 1. Grade: No. 2.
- D. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
 1. Lumber: S4S, No. 2 or Standard Grade.
 2. Boards: Standard or No. 3.

2.03 CONSTRUCTION PANELS

- A. Subfloor/Underlayment Combination: PS 1 or PS 2 type, rated Single Floor.
 1. Bond Classification: Exposure 1.
 2. Span Rating: 24.
 3. Performance Category: 23/32 PERF CAT.
 4. Edges: Tongue and groove.
 5. Products:
 - a. Boise Cascade Wood Products, LLC.; Sturd-I-Floor: www.bc.com/wood.
 - b. Substitutions: See Section 01 6000 - Product Requirements.
- B. Underlayment: APA Underlayment; plywood, Exposure 2, 1/4 inch thick. Fully sanded faces at resilient flooring.
- C. Wall Sheathing, For shear walls and non-rated walls: Plywood, PS 1, Grade C-D, Exposure I.
- D. Communications and Electrical Room Mounting Boards: PS 1 A-D plywood, or medium density fiberboard; 3/4 inch thick; flame spread index of 25 or less, smoke developed index of 450 or less, when tested in accordance with ASTM E84.

2.04 ACCESSORIES

- A. Fasteners and Anchors:
 1. Metal and Finish: Stainless steel for high humidity and preservative-treated wood locations, unfinished steel elsewhere.
 2. Bolts: Steel bolts complying with ASTM A307, Grade A; with ASTM A563/A563M hex nuts and where indicated, flat washer. Provide galvanized where exposed to the weather.
- B. Subfloor Adhesives: Gap-filling construction adhesive for bonding wood structural panels to wood-based floor system framing; complying with ASTM D3498.

2.05 FACTORY WOOD TREATMENT

- A. Treated Lumber and Plywood: Comply with requirements of AWWA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.
 1. Preservative-Treated Wood: Provide lumber and plywood marked or stamped by an ALSC-accredited testing agency, certifying level and type of treatment in accordance with AWWA standards.
- B. Fire Retardant Treatment:

1. Exterior Type: AWP A U1, Category UCFB, Commodity Specification H, chemically treated and pressure impregnated; capable of providing a maximum flame spread index of 25 when tested in accordance with ASTM E84, with no evidence of significant combustion when test is extended for an additional 20 minutes both before and after accelerated weathering test performed in accordance with ASTM D2898.
 - a. Kiln dry wood after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood.
 - b. Do not use treated wood in direct contact with the ground.
 2. Interior Type A: AWP A U1, Use Category UCFA, Commodity Specification H, low temperature (low hygroscopic) type, chemically treated and pressure impregnated; capable of providing a maximum flame spread index of 25 when tested in accordance with ASTM E84, with no evidence of significant combustion when test is extended for an additional 20 minutes.
 - a. Kiln dry wood after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood.
 - b. Treat rough carpentry items as indicated .
 - c. Do not use treated wood in applications exposed to weather or where the wood may become wet.
- C. Preservative Treatment:
1. Preservative Pressure Treatment of Lumber Above Grade: AWP A U1, Use Category UC3B, Commodity Specification A using waterborne preservative.
 - a. Kiln dry lumber after treatment to maximum moisture content of 19 percent.
 - b. Treat lumber exposed to weather.
 - c. Treat lumber in contact with masonry or concrete.

PART 3 EXECUTION

3.01 PREPARATION

- A. Coordinate installation of rough carpentry members specified in other sections.

3.02 INSTALLATION - GENERAL

- A. Select material sizes to minimize waste.
- B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.
- C. Where treated wood is used on interior, provide temporary ventilation during and immediately after installation sufficient to remove indoor air contaminants.

3.03 FRAMING INSTALLATION

- A. Set structural members level, plumb, and true to line. Discard pieces with defects that would lower required strength or result in unacceptable appearance of exposed members.
- B. Make provisions for temporary construction loads, and provide temporary bracing sufficient to maintain structure in true alignment and safe condition until completion of erection and installation of permanent bracing.
- C. Install structural members full length without splices unless otherwise specifically detailed.
- D. Comply with member sizes, spacing, and configurations indicated, and fastener size and spacing indicated, but not less than required by applicable codes and AWC (WFCM) Wood Frame Construction Manual.
- E. Construct double joist headers at floor and ceiling openings and under wall stud partitions that are parallel to floor joists; use metal joist hangers unless otherwise detailed.
- F. Provide bridging at joists in excess of 8 feet span as detailed. Fit solid blocking at ends of members.
- G. Frame wall openings with two or more studs at each jamb; support headers on cripple studs.

3.04 BLOCKING, NAILERS, AND SUPPORTS

- A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.
- B. In framed assemblies that have concealed spaces, provide solid wood fireblocking as required by applicable local code, to close concealed draft openings between floors and between top story and roof/attic space; other material acceptable to authorities having jurisdiction may be used in lieu of solid wood blocking.
- C. In metal stud walls, provide continuous blocking around door and window openings for anchorage of frames, securely attached to stud framing.
- D. In walls, provide blocking attached to studs as backing and support for wall-mounted items, unless item can be securely fastened to two or more studs or other method of support is explicitly indicated.
- E. Where ceiling-mounting is indicated, provide blocking and supplementary supports above ceiling, unless other method of support is explicitly indicated.
- F. Provide the following specific nonstructural framing and blocking:
 - 1. Cabinets and shelf supports.
 - 2. Wall brackets.
 - 3. Handrails.
 - 4. Grab bars.
 - 5. Towel and bath accessories.
 - 6. Wall-mounted door stops.
 - 7. Tack boards and marker boards.
 - 8. Wall paneling and trim.
 - 9. Joints of rigid wall coverings that occur between studs.

3.05 INSTALLATION OF CONSTRUCTION PANELS

- A. Underlayment: Secure to subflooring with nails and glue.
 - 1. Place building paper between floor underlayment and subflooring.
- B. Wall Sheathing: Secure with long dimension perpendicular to wall studs, with ends over firm bearing and staggered, using nails, screws, or staples.
- C. Communications and Electrical Room Mounting Boards: Secure with screws to studs with edges over firm bearing; space fasteners at maximum 24 inches on center on all edges and into studs in field of board.
 - 1. At fire-rated walls, install board over wall board indicated as part of the fire-rated assembly.
 - 2. Where boards are indicated as full floor-to-ceiling height, install with long edge of board parallel to studs.
 - 3. Install adjacent boards without gaps.
 - 4. Size: 48 by 96 inches, installed horizontally at ceiling height.

3.06 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements for additional requirements.

3.07 CLEANING

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

- C. Prevent sawdust and wood shavings from entering the storm drainage system.

END OF SECTION

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SECTION 06 1005
ROOF-RELATED ROUGH CARPENTRY

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Roof-related wood blocking
 - 2. Sheet metal bent plates
 - 3. Steel angles
- B. Related Sections:
 - 1. Section 07 5300 – Elastomeric Membrane Roofing
 - 2. Section 07 6205 – Roof-Related Sheet Metal Flashings

1.02 SUBMITTALS

- A. Product Data: FRX fire-retardant treated wood

1.03 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workers who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the Work of this Section.
- B. Codes and Standards: In addition to complying with the pertinent codes and regulations of governmental agencies having jurisdiction, unless otherwise specifically directed or permitted by the Architect/Engineer, comply with the following:
 - 1. Product Use Manual of the Western Wood Products Association for selection and use of products included in that manual.
 - 2. Plywood Specification and Grade Guide of the APA-The Engineered Wood Association.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to the site, insofar as practicable, in manufacturer's original containers and bearing the trademarks and names thereof. Grademark stamped on all standard yard dimension lumber or certified for compliance. Plywood grade stamped.
- B. Carefully stack lumber and plywood to prevent warping. Keep dry.

1.05 PROJECT CONDITIONS

- A. Existing Conditions:
 - 1. Examine the areas and conditions under which work of this Section will be installed. Correct conditions detrimental to the proper and timely completion of the Work. Do not proceed until given conditions have been corrected.
 - 2. Replace existing wood members intended for reuse that are in unsatisfactory condition with equivalent products.
- B. Environmental Requirements: Wind velocity and temperature limitations shall be based on Contractor's ability to apply materials in the specified manner.
- C. Protection: Provide appropriate protection on roof-related traffic, staging, and storage areas. As a minimum, protection shall consist of 45-mil EPDM, 1" extruded polystyrene insulation, and 3/4" plywood ballasted with sandbags. Remove protection materials upon completion of the work.

PART 2 PRODUCTS

2.01 GENERAL

- A. Application: Roof construction, including equipment curbs, building or roof system joints, blocking, backing, and parapet or roof edge construction
 - 1. Fire treated where wood is 48" or more above the roof deck
 - 2. Non-preservative treated for all other applications

2.02 LUMBER

- A. Non-preservative treated, standard light framing grade, sound and thoroughly seasoned with less than 19 percent moisture content at the time of installation and at time roofing is installed.
 - 1. Douglas Fir
 - 2. Eastern Pine
 - 3. No. 3 Southern Pine
 - 4. No. 2 Western Hemlock
 - 5. Spruce-Pine-Fir

2.03 PLYWOOD

- A. C-D Exposure 1 or better, APA Rated sheathing, non-preservative treated, meeting U.S. Products Standard PS1 or Performance Standard PRP-108 for Soft Wood Plywood Construction and Industrial, with less than 19 percent moisture content at time of installation and at the time roofing is installed.

2.04 FIRE-RETARDANT-TREATED MATERIALS

- A. FRX fire retardant treated lumber and plywood: Products with flame spread index of 25 or less when tested per ASTM E84, and with no evidence of significant progressive combustion when test is extended additional 20 minutes, and with flame front not extending more than 10.5 feet beyond centerline of burners at any time during test.
 - 1. Use treatment that does not promote corrosion of metal fasteners.
- B. Kiln-dry lumber after treatment to maximum moisture content of 19 percent.
- C. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.

2.05 FASTENERS

- A. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A153 unless indicated otherwise.
- B. Fire-retardant treated wood: Provide nails, timber rivets, wood screws, and lag screws hot-dip galvanized to comply with ASTM A153, Series 300 stainless steel, silicon bronze, or copper. Fastener types other than those listed above may be mechanically-deposited zinc-coated steel complying with ASTM B695, Class 55 minimum.
- C. Series 300 stainless steel fasteners required for fastening into existing treated wood
- D. Lag screws: Zinc or long-life coated, 3/8" diameter with 1-1/2" penetration into blocking
- E. Lumber to lumber: Cement coated or annular thread nails with minimum 1-1/4" penetration into adjoining member
- F. Plywood to Lumber:
 - 1. Nails: Ring shank or annular thread nails with minimum 1-1/4" penetration into adjoining member
 - 2. Screws: Minimum #14 flat head countersunk wood screws, zinc or long-life coated steel or Series 300 stainless steel, with minimum 1-1/4" penetration

- G. Lumber or plywood to concrete or masonry: Tapcon or Gripcon anchors, minimum 1/4" diameter with 1" penetration, minimum 300 lb. per anchor installed withdrawal resistance. Other corrosion resistant drilled-in type masonry anchors may be used if equivalent in pull-out strength.
- H. Lumber or plywood to steel deck: Minimum #14 sheet metal screw, zinc plated; through 5/8" diameter steel washers for lumber
- I. Sheet metal angle or bent plate to lumber: Minimum #14 flat head wood screws, zinc plated steel or stainless steel, with minimum 1-1/4" penetration
- J. Sheet metal angle or bent plate to steel deck: Self-drilling screw fastener, size 12 - 24 by 7/8, HWH Tek's/4 manufactured by ITW Buildex

2.06 MISCELLANEOUS

- A. Sheet metal bent plate: 12-gauge galvanized steel bent plate, size as shown on the Drawings
- B. Steel angles: ASTM A36, gauge, thickness, and length of each leg as shown on the Drawings

PART 3 EXECUTION

3.01 REMOVAL OF EXISTING

- A. Removed materials need not be salvaged unless specifically required for reuse. Some existing wood members may be reused at the option of the Contractor as indicated on the Drawings, if in acceptable condition when reinstalled to receive new materials.

3.02 PREPARATION

- A. Grout, shim, patch, or fill existing construction as necessary to properly install wood members.
- B. Inspect fastening of existing wood members left in place for conformance to requirements specified herein. Fastening found not in conformance shall be upgraded to meet these requirements.
- C. Reset or replace existing fasteners for materials exposed but left in place that are loose, deformed, damaged, or corroded.
- D. Perimeter wood blocking installation shall, as a minimum, be in accordance with recommendations of Factory Mutual Loss Prevention Data Sheet 1-49, Perimeter Flashing.

3.03 WOOD BLOCKING

- A. Vertical wood studs, wood blocking, and plywood over 48" in height above the roof deck shall be constructed with fire-treated wood. Attachment of fire-treated wood requires stainless steel nails, screws, and masonry fasteners compatible with fire-treated materials.
- B. When constructing wood curbs with multiple vertical blocking and plywood members, provide staggered joints for all layers and minimum 12" laps.
- C. Lumber or Plywood to Lumber:
 - 1. Maximum spacing of 12" on-center, staggered across face of piece and located within 3" of each end of piece. Maximum spacing of 6" on-center, 8' each way from outside corners for roof edge blocking.
 - 2. Heads shall be flush with wood surface and nail shall penetrate adjoining piece minimum 1-1/4 inch.
 - 3. Minimum 100 lb. per nail installed withdrawal resistance.

- D. Lumber or Plywood to Concrete or Masonry:
 - 1. Spacing as shown on Drawings or maximum 3' on-center when not specified, staggered. Maximum 18" on-center, 8' each way from outside corners for roof edge blocking.
 - 2. Countersink head flush with surface but no more than 1/3 the thickness of the fastened piece.
 - 3. Minimum 300 lb. per anchor withdrawal resistance or number of fasteners increased accordingly from that specified, minimum penetration of 1 inch.
- E. Lumber or Plywood to Steel Deck:
 - 1. Verify the presence of conduit below the steel deck prior to installation.
 - 2. Spacing as shown on the Drawings or maximum 18" on-center for screws when not specified, and staggered if lumber is more than 5" wide. Maximum 9" on-center, 8' each way from outside corners for roof edge blocking.
 - 3. Countersink head flush with surface but not more than 1/3 the thickness of the fastened piece.
 - 4. Minimum 150 lb. per anchor withdrawal resistance or number of fasteners increased accordingly from that specified, minimum penetration of 1-1/2 inches.

3.04 FIELD QUALITY CONTROL

- A. Construction Observation: The Owner may retain the services of an independent agency for testing and construction observation. Notify Owner's construction observer whenever work is to be done in sufficient time to arrange observation and testing. The Contractor shall not commence Work until the Owner's construction observer is present.
- B. Alignment and elevation of installed wood shall be checked by Contractor and may be checked by Architect/Engineer.
- C. Withdrawal tests of installed fasteners may be required if attachment is in question.

3.05 CLEANING

- A. Keep the premises in a neat, safe, and orderly condition, free from an accumulation of sawdust, cut ends, and debris at all times during execution of this Work.

END OF SECTION

SECTION 06 4100
ARCHITECTURAL WOOD CASEWORK

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Specially fabricated cabinet units.
- B. Countertops.
- C. Hardware.

1.02 REFERENCE STANDARDS

- A. ANSI A135.4 - Basic Hardboard; 2012 (Reaffirmed 2020).
- B. ANSI A208.1 - American National Standard for Particleboard; 2022.
- C. ANSI A208.2 - Medium Density Fiberboard (MDF) for Interior Applications; 2022.
- D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2024.
- E. BHMA A156.9 - Cabinet Hardware; 2020.
- F. ISFA 2-01 - Classification and Standards for Solid Surfacing Material; 2013.
- G. NEMA LD 3 - High-Pressure Decorative Laminates; 2005.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene a preinstallation meeting not less than one week before starting work of this section; require attendance by all affected installers.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.
 - 1. Scale of Drawings: 1-1/2 inch to 1 foot, minimum.
- C. Product Data: Provide data for hardware accessories.
- D. Verification Samples: For each finish product specified, minimum size 4 inches square, representing actual product, color, and patterns.

1.05 QUALITY ASSURANCE

- A. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Protect units from moisture damage.
- B. Store products in fabricator's unopened packaging until ready for installation.
- C. Protect items provided by this section, including finished surfaces and hardware items during handling and installation. For metal surfaces, use polyethylene film or other protective material standard with the manufacturer.
- D. Store casework in the area of installation. If necessary, prior to installation, temporarily store in another area, meeting the environmental requirements.

1.07 FIELD CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2 PRODUCTS

2.01 CABINETS

- A. Plastic Laminate Faced Cabinets: Custom grade.
- B. Cabinets:
 - 1. Finish - Exposed Exterior Surfaces: Decorative laminate.
 - 2. Finish - Exposed Interior Surfaces: Decorative laminate.
 - 3. Finish - Concealed Surfaces: Manufacturer's option.
 - 4. Door and Drawer Front Edge Profiles: Square edge with thin applied band.
 - 5. Casework Construction Type: Type A - Frameless.
 - 6. Interface Style for Cabinet and Door: Style 1 - Overlay; flush overlay.
 - 7. Adjustable Shelf Loading: 40 psf.

2.02 WOOD-BASED COMPONENTS

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

2.03 PANEL CORE MATERIALS

- A. Comply with product requirements in Section 01 6000.
- B. Comply with product requirements in Section 01 8113 .
 - 1. Newly installed composite wood must meet the California Air Resources Board ATCM for formaldehyde requirements for ultra-low-emitting formaldehyde (ULEF) resins or no added formaldehyde resins.
- C. Particleboard: Composite panel composed of cellulosic particles, additives, and bonding system; comply with ANSI A208.1.
 - 1. Grade: M-2; moisture resistance: MR10.
 - 2. Panel Thickness: 3/4 inch minimum.
 - 3. Products:
 - a. ARAUCO; Ultra VESTA Particleboard (NAUF): na.arauco.com.
 - b. Columbia Forest Products; Particleboard Core (PBC): www.columbiaforestproducts.com.
 - c. Uniboard; NU Green 2: www.uniboard.com.
 - d. Substitutions: See Section 01 6000 - Product Requirements.
- D. Medium Density Fiberboard (MDF): Composite panel composed of cellulosic fibers, additives, and bonding system; cured under heat and pressure; comply with ANSI A208.2.
 - 1. Grade: 115; moisture resistance: MR10.
 - 2. Panel Thickness: 3/4 inch or 1 inch.
 - 3. Products:
 - a. ARAUCO; Trupan VESTA Medium Density Fiberboard (NAUF): na.arauco.com.
 - b. Roseberg Forest Products; Arreis Medium Density Fiberboard NAF: www.roseburg.com.
 - c. Uniboard; NU Green MR50 NAF MDF: www.uniboard.com.
 - d. Substitutions: See Section 01 6000 - Product Requirements.
- E. Basic Hardboard: Panel manufactured from inter-felted lignocellulosic fibers consolidated under heat and pressure; comply with ANSI A135.4.
 - 1. Class: Tempered.
 - 2. Surface: Smooth one side (S1S).
 - 3. Nominal Thickness: 1/2 inch.

2.04 LAMINATE MATERIALS

- A. Manufacturers:
 - 1. Formica Corporation: www.formica.com/#sle.
 - 2. Panolam Industries International, Inc: www.panolam.com/#sle.

3. Wilsonart LLC: www.wilsonart.com/#sle.
 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. High Pressure Decorative Laminate (HPDL): NEMA LD 3, types as recommended for specific applications.
- C. Chemical-Resistant Plastic Laminate: Provide products that resist the following chemicals with not more than Moderate Effect when tested in accordance with NEMA LD 3.
- D. Provide specific types as indicated.
1. Horizontal Surfaces: HGS, 0.048 inch nominal thickness, colors as indicated, finish as indicated.
 2. Vertical Surfaces: VGS, 0.028 inch nominal thickness, colors as indicated, finish as indicated.
 3. Cabinet Liner: CLS, 0.020 inch nominal thickness, white color, textured low gloss finish.
 4. Laminate Backer: BKL, 0.020 inch nominal thickness, undecorated; for application to concealed backside of panels faced with high pressure decorative laminate.

2.05 SOLID PHENOLIC PANELS

- A. Panels: Phenolic resin impregnated wood-based product core with melamine impregnated decorative surface papers and transparent protective topcoat; NEMA LD 3 Compact Laminate, Grade CGS.
- B. Finish: Matte.
- C. Surface Color and Pattern: As selected by Architect from manufacturer's standard line.
- D. Manufacturers:
1. Formica Corporation: www.formica.com/#sle.
 2. Wilsonart LLC: www.wilsonart.com/#sle.
 3. Substitutions: See 01 6000 - Product Requirements.

2.06 COUNTERTOPS

- A. Solid Surface Countertops: See Section 06 6100 .
- B. Plastic Laminate Countertops: High-pressure decorative laminate (HPDL) sheet bonded to substrate.
1. Laminate Sheet: NEMA LD 3, Grade HGS, 0.048 inch nominal thickness.
 - a. Wear Resistance: In addition to specified grade, comply with NEMA LD 3 High Wear Grade requirements for wear resistance.
 - b. Finish: Matte or suede, gloss rating of 5 to 20.
 - c. Surface Color and Pattern: As indicated on drawings.
 2. Exposed Edge Treatment: Molded rubber edge with T-spline, sized to completely cover edge of panel.
 - a. Color: To coordinate with countertop laminate, unless noted otherwise on drawings.
 3. Back and End Splashes: Same material, same construction.
 - a. Back Splashes: Integral with cove.
 4. Fabricate in accordance with manufacturer's standard requirements.
- C. Chemical-Resistant Plastic Laminate Countertops: Chemical-resistant high-pressure decorative laminate (HPDL) sheet bonded to substrate.
1. Wear Resistance: In addition to specified grade, comply with NEMA LD 3 High Wear Grade requirements for wear resistance.
 2. Finish: Matte or suede, gloss rating of 5 to 20.
 3. Surface Color and Pattern: As indicated on drawings.

2.07 ACCESSORIES

- A. Adhesive: Type recommended by fabricator to suit application.
1. Comply with low-VOC content requirements in Section 01 6116.

- B. Joint Sealant: Mildew-resistant silicone sealant, clear.
- C. Plastic Edge Banding: Extruded PVC, convex shaped; smooth finish; self locking serrated tongue; of width to match component thickness.
 - 1. Color: To match adjacent laminate color.
 - 2. Use at Use at all exposed edges.
- D. Vinyl Countertop Edge: PVC anchor type tee-molding edging in width to match thickness of countertop, color to match laminate, used at locations with laminate countertops.
- E. Fasteners: Size and type to suit application.
- F. Bolts, Nuts, Washers, Lags, Pins, and Screws: Of size and type to suit application; galvanized or chrome-plated finish in concealed locations and stainless steel or chrome-plated finish in exposed locations.
- G. Concealed Joint Fasteners: Threaded steel.
- H. Grommets: Standard plastic, painted metal, or rubber grommets for cut-outs, in color to match adjacent surface.
- I. Tackable Panel: Fine grained, homogeneous natural cork on hardboard.
 - 1. Cork Thickness: 1/8 inch.
 - 2. Color: As selected from manufacturer's full range.
 - 3. Backing: Hardboard, 1/4 inch thick, factory laminated to tack surface.
 - 4. Surface Burning Characteristics: Flame spread index of 25, maximum, and smoke developed index of 450, maximum, when tested in accordance with ASTM E84.

2.08 HARDWARE

- A. Hardware: BHMA A156.9, types as recommended by fabricator for quality grade specified.
- B. Adjustable Shelf Supports: Standard side-mounted system using recessed metal shelf standards or multiple holes for pin supports and coordinated self rests, polished chrome finish, for nominal 1 inch spacing adjustments.
- C. Adjustable Shelf Supports: Standard back-mounted system using surface mounted metal shelf standards and coordinated cantilevered shelf brackets, satin chrome finish, for nominal 1 inch spacing adjustments.
- D. Countertop Support Brackets: Fixed, L-shaped, face-of-stud mounting.
 - 1. Materials: Steel; L-shape cross-section.
 - a. Finish: Manufacturer's standard, factory-applied, powder coat.
 - b. Color: White.
 - c. Height: 18 inches.
 - d. Support Length: 18 inches.
 - e. Width: 1-1/2 inches.
 - 2. Products:
 - a. A&M Hardware, Inc; Heavy-Duty Hybrid Brackets: www.aandmhardware.com/#sle.
 - b. Rakks/Rangine Corporation; EH Series Brackets: www.rakks.com/#sle.
 - c. Substitutions: See Section 01 6000 - Product Requirements.
- E. Drawer and Door Pulls: "U" shaped wire pull, steel with chrome finish, 4 inch centers.
- F. Keyed Cabinet Locks: Keyed cylinder, two keys per lock, master keyed, steel with chrome finish.
- G. Drawer Slides:
 - 1. Type: Full extension with overtravel.
 - 2. Static Load Capacity: Heavy Duty grade, rated up to 200 pounds.
 - 3. Mounting: Side mounted.
 - 4. Stops: Integral type.

- 5. Features: Provide self closing/stay closed type.
- H. Hinges: European style concealed self-closing type, steel with nickel-plated finish.
- I. Folding Wall-Mounted Countertop Support Legs: Full surface-mount continuous piano hinge for wall hung counter, supported by heavy duty aluminum folding support legs.
 - 1. Material: Stainless steel or Aluminum
 - 2. Finish: Manufacturer's standard.
 - 3. Color: Satin, No. 4.
- J. Sliding Glass Door Track Assemblies: Upper and lower track of extruded aluminum track with matching shoe equipped with nylon rollers and lock.
 - 1. Basis of Design: Stylmark 610165.

2.09 FABRICATION - CABINETS

- A. Assembly: Shop assemble cabinets for delivery to site in units easily handled and to permit passage through building openings.
- B. Edging: Fit shelves, doors, and exposed edges with specified edging. Do not use more than one piece for any single length.
- C. Fitting: When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide matching trim for scribing and site cutting.
- D. Plastic Laminate: Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners. Slightly bevel arises. Locate counter butt joints minimum 2 feet from sink cut-outs.
 - 1. Apply laminate backing sheet to reverse side of plastic laminate finished surfaces.
 - 2. Cap exposed plastic laminate finish edges with material of same finish and pattern.
- E. Provide cutouts for plumbing fixtures. Verify locations of cutouts from on-site dimensions. Prime paint cut edges.

2.10 FABRICATION - LAMINATE COUNTERTOPS

- A. Plastic Laminate Countertops: High-pressure decorative laminate (HPDL) sheet bonded to substrate.
 - 1. Join lengths of tops using best method recommended by manufacturer.
 - 2. Fabricate to overhang fronts and ends of cabinets 1 inch except where top butts against cabinet or wall.
 - 3. Prepare all cutouts accurately to size; replace tops having improperly dimensioned or unnecessary cutouts or fixture holes.
- B. Provide back/end splash wherever counter edge abuts vertical surface unless otherwise indicated.
 - 1. Provide integral back splash where indicated in drawings.
 - 2. Secure end splash to countertop with concealed fasteners and with contact surfaces set in waterproof glue.
 - 3. Height: 4 inches, unless otherwise indicated.

2.11 FABRICATION - SOLID SURFACING COUNTERTOPS

- A. Refer to Section 06 6100 - Cast Polymer Fabrications for additional information.
- B. Solid Surfacing Countertops: Solid surfacing sheet or plastic resin casting over continuous substrate.
- C. Flat Sheet Thickness: 1/2 inch, minimum.
- D. Solid Surfacing Sheet and Plastic Resin Castings: Complying with ISFA 2-01 and NEMA LD 3; acrylic or polyester resin, mineral filler, and pigments; homogenous, non-porous and capable of being worked and repaired using standard woodworking tools; no surface coating; color and pattern consistent throughout thickness.

- E. Finish on Exposed Surfaces: Matte, gloss rating of 5 to 20.
- F. Color and Pattern: As indicated on drawings.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify adequacy of backing and support framing.
- B. Verify location and sizes of utility rough-in associated with work of this section.

3.02 INSTALLATION

- A. Set and secure custom cabinets in place, assuring that they are rigid, plumb, and level.
- B. Use fixture attachments in concealed locations for wall mounted components.
- C. Use concealed joint fasteners to align and secure adjoining cabinet units.
- D. Carefully scribe casework abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim for this purpose.
- E. Secure cabinets to floor using appropriate angles and anchorages.
- F. Securely attach countertops to cabinets using concealed fasteners. Make flat surfaces level; shim where required.
 - 1. Attach plastic laminate countertops using screws with minimum penetration into substrate board of 5/8 inch.
- G. Seal joint between back/end splashes and vertical surfaces.

3.03 TOLERANCES

- A. Variation From Horizontal: 1/8 inch in 10 feet, maximum.
- B. Offset From Wall, Countertops: 1/8 inch maximum; 1/16 inch minimum.
- C. Field Joints: 1/8 inch wide, maximum.

3.04 ADJUSTING

- A. Test installed work for rigidity and ability to support loads.
- B. Adjust moving or operating parts to function smoothly and correctly.

3.05 CLEANING

- A. Clean casework, counters, shelves, hardware, fittings, and fixtures.

END OF SECTION

**SECTION 06 6100
CAST POLYMER FABRICATIONS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Solid surfacing fabrications.

1.02 REFERENCE STANDARDS

- A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2024.
- B. ISFA 2-01 - Classification and Standards for Solid Surfacing Material; 2013.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meetings: Review conditions for installation, installation procedures, coordination of related work, and anchorages by others.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's data for fabricated units.
- C. Shop Drawings: For each type of cast polymer, indicate:
 - 1. Plans and Elevations: Include dimensions, thicknesses, and field measurements; indicate location of fabricated units.
 - a. Drawing Scale: 1/4 inch to 1 foot, minimum.
 - 2. Details: Include connections and plumbing system accommodations.
 - a. Drawing Scale: 1-1/2 inches to 1 foot, minimum.
- D. Samples: For each solid surfacing and quartz surfacing type, two samples, 4 inches by 4 inches in size, indicating specified color.
- E. Test Reports: Indicate compliance with reference standard performance requirements.
- F. Manufacturer's Instructions: Indicate installation and handling instructions.
- G. Operation and Maintenance Data: Maintenance instructions, including recommended cleaning procedures and materials.
 - 1. Include instructions for stain removal.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with minimum three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. See Section 01 7419 - Construction Waste Management and Disposal for packaging waste requirements.
- B. Deliver products to project site in original packages, containers, or bundles bearing brand name and identification.
- C. Store products under cover, elevated above grade, and in dry, well-ventilated areas not exposed to heat or sunlight. Protect from moisture damage.
- D. Handle products to prevent damage to edges, ends, or surfaces, and in accordance with manufacturer's written instructions.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Solid Surface Fabrications:
 - 1. Avonite Surfaces; Acrylic Solid Surfaces: www.avonitesurfaces.com/#sle.

2. Dupont; Corian Solid Surface: www.corian.com/#sle.
3. Wilsonart; Solid Surface: www.wilsonart.com/#sle.
4. Substitutions: See Section 01 6000 - Product Requirements.

2.02 REGULATORY REQUIREMENTS

- A. Surface Burning Requirements:
 1. Interior Use: Flame spread index of 25 or less and smoke-development index of 450 or less; Class A interior finish classification when tested in accordance with ASTM E84.

2.03 SOLID SURFACING FABRICATIONS

- A. Solid Surfacing: Densified, homogeneous, nonporous castings fabricated into sheets; composed of acrylic resins, fillers, color chips, and pigment and performance-enhancing additives.
 1. Standard Type: Comply with minimum performance and engineering properties of ISFA 2-01.
 - a. Hardness (Barcol): 50-70.
 - b. Flexural Strength: 4,000 psi (27.58 Mpa).
 - c. Flexural Modulus: 1.00 Mpsi (6,895 Mpa).
 - d. Impact Resistance: Pass at 60 inches (1,525 mm).
 - e. Flatness of Sheets: Less than or equal to 0.063 inch (1.6 mm).
 - f. Fungal Resistance: No growth.
 - g. Cleanability/Stain Resistance: Less than or equal to 52.
 - h. Light resistance: No effect.
 - i. Boiling Water Resistance: No effect.
 - j. High Temperature Resistance: No effect.
- B. Applications: Countertops
 1. Style: As indicated on drawings.
 2. Height: As indicated on drawings.
 3. Thickness: 1/2 inch.
 4. Edge Profile at Horizontal Joints: As indicated on drawings.
 5. Finish on Exposed Surfaces: Matte.
 6. Color: As indicated on drawings.
- C. Applications: Window sills.
 1. Style: As indicated on drawings.
 2. Thickness: 1/2 inch.
 3. Edge Profile at Horizontal Joints: As indicated on drawings.
 4. Finish on Exposed Surfaces: Matte.
 5. Color: As indicated on drawings.

2.04 FABRICATION

- A. Fabricate units with embedded anchors, stiffening ribs, and sufficient strength for handling and placement stresses.
- B. Fabricate cutouts where indicated.
- C. Radius corners and edges with 1/8 inch minimum radius; polish exposed edges.
- D. Provide consistent finish over exposed surfaces matching approved samples.
- E. Fill seams and mold lines; grind smooth and finish to match adjacent cast polymer surfaces.
- F. Fabricate components with joints tightly fitted and secured.
- G. Built-Up Edges: Laminate components where design requirements indicate built-up edges; follow manufacturer's recommended procedures for laminating.
- H. Fabrication Tolerances:

1. Maximum Variation from Specified Thicknesses: 1/16 inch.
2. Maximum Variation from Specified Dimensions: 1/8 inch.

2.05 ACCESSORIES

- A. General: Accessories recommended by cast polymer manufacturer for complete installation.
- B. Fasteners: Threaded fasteners as recommended by cast polymer manufacturer; type and size to suit application:
- C. Connectors: As recommended by cast polymer manufacturer; type and size to suit application:
- D. Adhesives: Type recommended by cast polymer manufacturer for application; not containing formaldehyde or volatile organic compounds.
 1. Where visible in finished work, tint adhesive to match cast polymer exposed surface.
- E. Joint Sealants: Type recommended by cast polymer manufacturer for application.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify field measurements are as indicated on shop drawings.
- B. Verify substrates are prepared to receive cast polymer fabrications.
- C. If substrate preparation is responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- D. Verify mechanical, electrical, and other building components affecting work of this section are placed and ready to receive work of this section.

3.02 PREPARATION

- A. Prepare substrates in accordance with manufacturer's written instructions.

3.03 INSTALLATION

- A. Install anchoring devices in accordance with cast polymer manufacturer's setting templates.
- B. Install cast polymer units in accordance with manufacturer's written instructions.
- C. Align work plumb and level.
- D. Rigidly anchor to substrate to prevent misalignment.
- E. Seal all joints with adjacent surfaces.

3.04 TOLERANCES

- A. Maximum Variation from True Position: 1/4 inch.
- B. Maximum Variation from Plumb: 1/4 inch in 10 feet.
- C. Maximum Variation from Level: 1/4 inch in 10 feet.

3.05 CLEANING

- A. Clean exposed surfaces of installed units in accordance with manufacturer's instructions.
- B. Repair or replace damaged work.

3.06 PROTECTION

- A. Protect installed cast polymer units from subsequent construction operations.

END OF SECTION

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SECTION 07 1300
BELOW-GRADE MEMBRANE WATERPROOFING

PART 1 GENERAL

1.01 SCOPE:

- A. The work under this Section includes all materials, labor, equipment and related incidental services necessary for the complete application of all membrane waterproofing work to the exterior surfaces, exterior face of the foundation walls, and through-wall flashing set in waterproofing, as shown on the Drawings and specified herein.

1.02 APPLICATOR QUALIFICATIONS:

- A. The membrane waterproofing work shall be performed by a single firm experienced and specializing in applying the specified waterproofing. The membrane waterproofing installation firm shall be an approved and trained Applicator of the waterproofing that is installed.
- B. Foreman/Crew Qualifications: The lead foreman shall have a minimum of three (3) years of experience with the specified waterproofing on a minimum of three (3) projects of comparable size and complexity. The lead foreman shall be on site for the duration of the waterproofing installation. The crew shall also have experience with the specified waterproofing.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Shop Drawings (SD): Submit showing all pre-detailing, tie-ins, terminations, pipe penetrations, drain flashing and other detailing required by the project. Shop drawings shall include a construction protection plan. Provide descriptions and drawings of materials and methods to protect waterproofing system from damage by subsequent construction activities.
- C. Product Data (PD): Submit manufacturer's printed instructions for complete installation of waterproofing material, including procedures and materials for priming flashing, splicing and bonding.
- D. Product Data (PD): Submit copies of manufacturer's application instructions for the membrane waterproofing work. Indicate by transmittal form that copies of the Project Specifications and application instructions have been distributed to the membrane waterproofing Applicator. Copies of the manufacturer's instructions, guidelines and shop drawings should be kept on site during installation for reference.
- E. Submit the qualifications and experience of the lead foreman and crew to document the minimum experience requirements are met.
- F. Manufacturer's Review of Waterproofing System: Before delivering waterproofing materials to the Project site, submit a written statement signed by the Contractor, waterproofing Applicator and manufacturer's representative stating that the A/E's Project Drawings and Specifications have been reviewed by the manufacturer's regional manager, and that the representative is in agreement that the selected materials and system for waterproofing are proper and adequate for the application shown.
- G. Provide Manufacturer's letter of compatibility for each of the products specified in this section that come in direct contact with adjacent materials specified in other sections, including but not limited to: 04 2000, 07 2700, 07 9201, and 08 4413.

1.04 QUALITY ASSURANCE

- A. Pre-Installation Meeting. The membrane waterproofing Applicator shall meet with the manufacturer's representative, Contractor, Architect, and Owner's representatives at the Project site to review the membrane waterproofing procedures, acceptance of surfaces, special details and coordination of other trades.
 - 1. Refer to Section 01 7000 - Execution and Closeout Requirements.

2. All submittals shall be reviewed and returned prior to scheduling the preinstallation meeting.
3. The pre-installation meeting shall occur on the same day as a construction meeting.
4. Tour job site areas to be waterproofed. Inspect and discuss conditions of substrate(s), existing conditions, drains, curbs, penetrations and other preparatory work performed by other trades.
5. Review required submittals, both completed and yet to be completed. Read the entire Specification line item by line item.
6. Review and finalize the Construction Schedule related to waterproofing work and verify availability of materials, Applicator's personnel, equipment and facilities needed to make progress and avoid delays.
7. Review manufacturer's guidelines with respect to weather conditions.
8. Review required inspections and testing.
9. Review manufacturer's guidelines with respect to weather conditions.

1.05 INSPECTION AND TESTING

- A. Full time inspection is required for Work specified in this Section. Cooperate with any inspection and testing firm engaged by the Owner to perform on-site inspection of the membrane waterproofing work. Comply with the inspector's request in connection with specific test samples, and provide any additional testing that may be requested to confirm that the Work complies with the requirements. The Contractor shall notify the Owner's inspection and testing firm, Architect, and Owner five (5) working days in advance of start of any waterproofing work to be performed on-site, and three (3) working day notice per inspection trip thereafter.
- B. To determine whether the substrates are dry, there shall be three tests performed and paid for by the Contractor and observed by the Owner's inspection personnel. If test methods 1, 2 or 3 fail, then the application of waterproofing shall not proceed until the surface is dried and the test passes. Repeat all three tests after each substrate exposure to moisture such as rain, dew, mist, sleet, etc.
 1. Test 1 (moisture test): Install a 3' x 3' sheet of clear polyethylene over the substrate. Seal the sheet to the substrate by installing a continuous bead of water cut-off mastic (or other pre-approved material) under the sheet around all four edges and then duct tape all four edges as well. If moisture condenses on the underside of the sheet, or shows up in any other form after exactly three hours, then the test has failed and the substrate has too high a moisture content to receive the waterproofing. The substrate must be dried by increasing cure time or torch drying, or both, before repeating the test. Do not proceed to Test 2 until Test 1 passes. Completely remove test materials before proceeding with the waterproofing installation.
 2. Test 2 (moisture test, hot fluid-applied rubberized asphalt only): Once Test 1 has passed, then proceed with Test 2 by applying surface conditioner and liquid membrane to a 2' x 2' area of substrate. The temperature of the liquid membrane and the "working in" of the liquid membrane at the test area shall match that of the final membrane installation as required by the manufacturer. If bubbles or blisters are apparent, or if the liquid membrane "tents up" and releases from the substrate when touched, then the test has failed and the substrate has too high a moisture content to receive the waterproofing.
 3. Test 3 (adhesion test): Once Tests 1 and 2 have passed, then proceed with test three.
 - a. Hot fluid-applied rubberized asphalt: Install a 12" x 12" area of the following in ascending order: surface conditioner, 90 mils of liquid membrane, 12" x 14" sheet of elastomeric reinforcing fully bonded into the hot membrane. The temperature of the liquid membrane and the "working in" of the liquid membrane shall match that of the final membrane installation as required by the manufacturer. Once the liquid membrane has cured (minimum 10 minutes), test the adhesion to the substrate by pulling up on the non-bonded 2" strip of elastomeric reinforcing. If any area of the liquid membrane separates from the substrate instead of separating from itself or the reinforcing, then adhesion is inadequate and the test has failed.

- b. All other waterproofing: Install a 12" x 12" area of the following in ascending order: surface conditioner, membrane waterproofing, 12" x 14" sheet of elastomeric reinforcing fully bonded into the membrane. The "working in" of the membrane shall match that of the final membrane installation as required by the manufacturer. Once the membrane has cured (minimum 10 minutes), test the adhesion to the substrate by pulling up on the non-bonded 2 inch strip of elastomeric reinforcing. If any area of the membrane separates from the substrate instead of separating from either itself or from the reinforcing, then adhesion is inadequate and the test has failed. If the membrane is of a non-curing variety, then a 10-minute wait is not necessary.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Store all materials for membrane waterproofing work in accordance with the manufacturer's recommendations, as approved, and in accordance with the requirements herein specified.
- B. Deliver materials in manufacturer's unopened containers fully identified with brand, type, class, grade and all other qualifying and product information.
- C. Store membrane no more than one pallet high. Provide cover on top and all sides, allowing for adequate ventilation. The membrane shall be stored off the ground or concrete surfaces.
- D. Store primer, waterproofing, mastics, protection course and other flammable products in a dry area away from high heat, flames, or sparks.
- E. Store protection course flat and off the ground, preferably on wood platforms. Provide tarpaulin cover on top and all sides.
- F. Store only as much material at point of use as required for each day's work.
- G. Protect electronic equipment and sensing and detection devices against damage from dust and moisture.

1.07 ENVIRONMENTAL REQUIREMENTS

- A. Do not apply waterproofing materials if ambient, material, and/or substrate temperatures are outside of the waterproofing manufacturer's recommended limits.
- B. Do not perform scan(s) in freezing conditions or during heavy rainfall.

1.08 WARRANTY

- A. Manufacturer's Warranty: Submit to the Architect for transmittal to the Owner two original copies of manufacturer's standard warranty on all materials used on the Project for a period of fifteen (15) years from the date of Substantial Completion. Upload copies to the EPMS (e-Builder)
- B. Contractor/Applicator Guarantee: Submit to the Architect for transmittal to the Owner two (2) original copies and upload a PDF to the EPMS (e-Builder) of an unqualified guarantee for a period of three (3) years on all materials, workmanship and water-tightness, signed by the waterproofing Applicator and the Contractor on the complete waterproofing installation for the Project and that any defects in the installation because of materials or workmanship shall be properly corrected during the guarantee period at no cost to the Owner. Upon written notification within the guarantee period of any such defects, the necessary repairs and replacement shall be properly made at the convenience of the Owner.
- C. Applicator Guarantee: Submit to the Architect for transmittal to the Owner two (2) original copies and upload a PDF to the EPMS (e-Builder) of an unqualified guarantee for a period of twelve (12) years from the expiration of the noted warranty in the above paragraph on all materials, workmanship and water-tightness, signed by the waterproofing Applicator on the complete waterproofing installation for the Project and that any defects in the installation because of materials or workmanship shall be properly corrected during the guarantee period at no cost to the Owner. Upon written notification within the guarantee period of any such defects, the necessary repairs and replacement shall be properly made at the convenience of the Owner.

PART 2 PRODUCTS

2.01 BELOW-GRADE MEMBRANE WATERPROOFING

- A. General Requirements: The waterproofing membrane must meet the following requirements:
1. Must be fluid-applied.
 2. Must be permanently bonded to the substrate over the entire coverage area of the membrane.
 3. Water tightness characteristics do not require containment pressure.
 4. Can be applied during the anticipated Project specific weather conditions with respect to air and substrate temperatures, without loss in bond or other product characteristics.
 5. Membrane manufacturer has accessory flashing products, or approves the use of those by other manufacturers, which comply with the Owner's (Minnesota State's) grade-line through-wall flashing standards.
 6. Membrane has been marketed for the intended use in the Project for not less than ten (10) years.
- B. Reinforcing requirements:
1. The product must have a reinforcing component which is integral to the waterproofing component.
 - a. Hot fluid-applied rubberized asphalt waterproofing system: A double layer of hot fluid applied rubberized asphalt with a reinforcing sheet sandwiched between.
- C. Physical Property Requirements: The manufacturer's standard application of the waterproofing membrane must meet or exceed the following physical properties using the same test methods listed.

Physical Property	Test Method	Minimum Requirement
Water vapor permeability	ASTM E96, Procedure E, CGSB 37.50-M89	0.27 perm 1.7 ng/Pa(s)m max
Low temperature crack bridging capability	CGSB 37.50-M89	No cracking, adhesion loss, or delamination
Heat stability	CGSB 37.50-M89	No change in viscosity, penetration, flow, or low temperature flexibility
Water resistance (5 days/50° C)	CGSB 37.50-M89	No delamination, blistering, emulsification, or deterioration
Salt water resistance (20% sodium carbonate and calcium chloride)	ASTM D896 similar	No delamination, blistering, emulsification, or deterioration
Fertilizer resistance (undiluted 15/5/5, nitrogen/phosphorus/potash)	ASTM D896 similar	No delamination, blistering, emulsification, or deterioration

- D. Approved Products: The following products are conditionally approved pending performance to Applicator Qualifications and Warranty of this section.
1. Hot fluid-applied rubberized asphalt waterproofing membrane:
 - a. Monolithic Membrane 6125 by American Hydrotech

- b. TREMproof 6100 by TREMCO
 - c. 790-11 Hot Rubberized Asphalt Waterproofing by Henry
 - d. Prior to bidding, any submitted substitution requests must be approved by the Architect and Owner and shall comply with all requirements of this Section, including but not limited to: general requirements, physical properties, quality assurance, and warranty requirements.
- E. Reinforced Membrane Waterproofing:
 - 1. Liquid membrane: Supplied to site as solid cakes meeting manufacturer's specifications and ready for melting.
 - 2. Reinforcing: The liquid membrane manufacturer's standard reinforcing.
 - 3. Accessory products:
 - a. Surface conditioner: As recommended by waterproofing manufacturer.
 - b. Elastomeric flashing: A highly flexible 60-mil (min) sheet product, comparable to uncured neoprene as recommended by the waterproofing manufacturer suitable for use at waterproofed brick ledges and through-wall flashing applications.
 - c. Protection course: Semi-rigid, synthetic fiber-reinforced, asphalt impregnated sheet.
 - 1) Type 1: For horizontal use over field membrane as recommended by waterproofing manufacturer. (American Hydrotech Flex 30 or equivalent.)
 - 2) Type 2: For vertical use. PC-2 by W.R. Meadows in 4' x 8' sheets.
 - 3) Type 3: For use at waterproofed brick ledges and through-wall flashing, as recommended by waterproofing manufacturer. (American Hydrotech Flex 10 or equivalent.)
 - 4) Joint and lap cement: Liquid membrane used for sealing laps and edges of the elastomeric reinforcing and elastomeric flashing.
- F. All other membrane waterproofing:
 - 1. Reinforced membrane
 - a. Liquid membrane: Primary waterproofing component of the system as recommended by the manufacturer for sprayed, troweled, or squeegee application.
 - b. Reinforcing: The liquid membrane manufacturer's standard reinforcement.
 - 2. Accessory products
 - a. Surface conditioner: As recommended by waterproofing manufacturer.
 - b. Elastomeric flashing: A highly flexible 60 mil (min) sheet product, comparable to uncured neoprene, as recommended by the waterproofing manufacturer, suitable for use at waterproofed brick ledges and through-wall flashing applications.
 - c. Protection course: A flexible or semi-rigid sheet as recommended by the waterproofing manufacturer that can be bonded to the membrane and offers protection from damage from subsequent work.

2.02 ACCESSORIES:

- A. Cap Flashing: Fry Reglet Corporation, 24 gauge stainless steel, 6" high, surface mounted with sealant trough along upper edge, complete with stainless steel umbrella head fasteners with neoprene gaskets. Furnish prefabricated exterior and interior corner units. Reglets shall be non-magnetic (nickel) stainless steel. Ferrous stainless steel is not acceptable.
 - 1. Provide cap flashings where foundation waterproofing is exposed to sunlight (UV) above grade and shall cover the waterproofing entirely. All laps in the cap flashings shall be 2" minimum.
 - 2. Stainless steel base flashing is only required to cover and protect foundation waterproofing from UV sunlight degradation, where exposed above grade. Stainless steel flashing is not required where waterproofing is below grade and concealed by backfill.
- B. Brick Ledge Flashing: 20 gauge stainless steel fabricated and attached per Drawings.

- C. Insulation: Close-cell extruded polystyrene foam board, thickness as shown on the Drawings. Horizontal applications shall have a minimum compressive strength of 60 psi. The substitution of expanded polystyrene "beadboard" is not acceptable.
- D. Bituminous Mastic Cement: Conform to Federal Specifications SS-C-15C, Type I.
- E. Sealant: A two-component polyurethane sealant and primer conforming to Federal Specifications TT-S-00227E, Type II, Class A, such as MasterSeal NP-2" as manufactured by BASF, or "Dymeric 240FC", as manufactured by Temco. Sealant and primer application in accordance with Section 07 9000.
- F. Backer Rod: Reticulated, bi-cellular, non-gassing polyolefin backer rod that complies with ASTM C 1330, Type B such as "Sof Rod" as manufactured by Construction Foam Products, a division of Nomaco, Inc., Soft Type Backer Rod 104 manufactured by Industrial Thermo Polymers, or Sonolastic Soft Backer Rod by BASF.
- G. Termination Bar: 1/16" thick by 1" high, type 304 stainless steel bar, with pre-drilled holes starting at 2" from each end and continue with a 6" on center spacing therein.
- H. Anchors For Termination Bar: 1/4" diameter by 1 1/2" long, Zamac Nailin, (Stainless Steel Anchors with alloy body, 1/4" diameter).
- I. Sacrificial Slip Sheet: 10-mil polyethylene or approved equal.

PART 3 EXECUTION

3.01 GENERAL

- A. All Work performed under this Section shall be in accordance with the Specifications, Drawings and the manufacturer's instructions and recommendations. In the event of a conflict, the stricter requirement shall prevail.
 - 1. Prior to onset of the waterproofing work, the waterproofing Applicator shall inspect the entire area to be waterproofed or through-wall flashed. Defects and improper conditions affecting installation shall be brought to the attention of the Contractor, in writing, for correction before proceeding with the waterproofing work. The manufacturer's representative shall be on site for the first two days of a new installation to ensure the waterproofing Applicator gets started properly. Manufacturer's representative shall be available, as needed, throughout the installation.

3.02 WEATHER CONDITIONS

- A. Do not proceed with waterproofing work during inclement weather, or when weather forecasts are unfavorable. Do not proceed with waterproofing for a minimum of 24 hours of drying time after the surface to be waterproofed has become completely wetted. If surface dryness remains in question, refer to Article 1.05, Inspection and Testing.

3.03 PROTECTION

- A. Protect all finish surfaces from damage resulting from spillage, dripping and dropping of materials. Prevent waterproofing materials from entering or clogging drains and water conductors. Repair and restore or replace other Work which is soiled or damaged in connection with performance of the waterproofing work.

3.04 PREPARATION OF NEW CONCRETE AND MASONRY SURFACES

- A. All new concrete and masonry surfaces on which the waterproofing is to be applied shall be air-dried cured for a minimum of 14 days or as recommended by the waterproofing manufacturer, whichever is longer, after forms have been stripped. All surfaces shall be thoroughly clean and additional drying shall be accomplished with torches, if necessary. All surfaces shall be dry, clean and free of other foreign materials detrimental to its performance. Any concrete form release agent or curing compound present shall be removed or approved to remain in writing by the waterproofing manufacturer.

1. Examine surface conditions of all substrates and adjoining construction to which the membrane is to be applied. Work shall not proceed until any unsatisfactory conditions detrimental to the proper and timely completion of the waterproofing work have been corrected.
2. Surface(s) shall be free of spalling, voids, loose material and projections, with no course aggregate exposed. Remove all oil, grease and other contaminants. Remove all dirt, dust and debris. Clean all expansion joints back a minimum of 1" from the surface of the joint in a manner acceptable to the waterproofing manufacturer.
3. Immediately report to the Architect, Owner's representative and Contractor in writing, any defects in the surface or any conditions which may adversely affect the performance of products installed under this section of work.

3.05 PRIMING:

- A. American Hydrotech 6125
 1. Apply surface conditioner primer to the surface scheduled to receive the waterproofing, using a low pressure-type sprayer only at a rate of approximately one gallon of primer per 300-600 square feet. Allow to dry. The primed surface shall have 100% coverage and be tanned, but not dark brown or black. Primer shall dry until tack-free.
- B. All other membrane waterproofing
 1. Apply primer (if required by manufacturer) to the surfaces scheduled to receive the waterproofing in accordance with waterproofing manufacturer's recommendations.

3.06 PRE-DETAILING:

- A. American Hydrotech 6125
 1. General:
 - a. Install surface conditioner to substrate at all pre-detailing.
 - b. Pre-detailing shall be continuous and materials shall be fully adhered to one another.
 2. Construction Joints and Cracks:
 - a. 1/16" to 1/4": Sandwich a strip of elastomeric flashing between two 1/8", 125 mil thick (minimum) applications of liquid membrane. Extend the first application of liquid membrane and the elastomeric flashing minimum 3" on either side of the crack and extend the top application of liquid membrane 3" beyond the first two.
 - b. Over 1/4" wide (excluding expansion joints): Notify the Architect and Owner's representative for inspection and direction.
 - c. Inside/outside corners: Follow same procedures as described above (paragraph B.1) while centering detail on the corner.
 - d. Brick ledges and through-wall conditions: Embed a strip of elastomeric flashing into one 1/8", 125 mil thick (maximum) application of liquid membrane.
 - e. Pipe penetrations: Over a 1/8", 125 mil thick (minimum) application of liquid membrane, embed elastomeric flashing. One flashing piece shall be around the pipe and flange to the wall, and the other piece shall be on the wall and flange to the pipe. Wrap base of pipe with elastomeric flashing to seal flange from wall piece. Cover with another application of liquid membrane, 1/8", 125 mil thick (minimum), extending 3" past elastomeric flashing.
- B. All other membrane waterproofing
 1. General:
 - a. Install primer to substrate at all pre-detailing.
 - b. Pre-detailing shall be continuous and all materials shall be continuous and all materials shall be fully adhered to one another.
 - c. Complete all pre-detailing listed under Article 3.07 A.2.
 - d. Pre-detailing shall be in accordance with the manufacturer's approved shop drawings.

3.07 MEMBRANE APPLICATION

- A. Hot fluid-applied rubberized asphalt waterproofing membrane.
 - 1. Liquid membrane melting: Melt cakes of liquid membrane in a melter, approved by the waterproofing manufacturer, under continuous agitation until the material can be drawn free-flowing and lump free at a temperature as recommended by the manufacturer.
 - 2. Liquid membrane application: Over the entire area to be waterproofed, including all pre-detailing, apply the liquid membrane at a rate to provide a continuous initial coating of hot applied liquid membrane 90 mils thick over surface. Work in the liquid membrane by squeegee or brush while applying.
 - 3. Elastomeric flashing: While the liquid membrane is still warm and tacky, fully adhere the 60 mil uncured neoprene elastomeric reinforcing into the entire area of liquid membrane, lapping the seams 6" and sealing laps and edges with liquid membrane.
 - 4. Inspect the membrane surface for bulges, fishmouths, bubbles, and roll-over seams; which shall be cut back and repaired with additional coatings of liquid membrane, and an additional section of elastomeric flashing installed, lapping at least 6" beyond affected area. After entrapped air is relieved, set elastomeric flashing between layers of liquid membrane as described for crack repair. Corners shall be smooth, free of sharp edges with a smooth dense surface. Repairs shall be made immediately.
 - 5. Apply the final continuous top coat of additional 90 mils of hot applied liquid membrane before embedding protection board.
- B. All other membrane waterproofing
 - 1. Membrane application: Install over entire area to be waterproofed, including all pre-detailing. Apply membrane with same mil thickness as under Article 3.08 A.2 and incorporate elastomeric reinforcing.
 - 2. Inspect the membrane surface for bulges, fishmouths, tears, openings, or other deficiencies and repair immediately in accordance with manufacturer's recommendations.

3.08 PROTECTION COURSE:

- A. Installation: Install protection board as soon as possible after elastomeric reinforcing installation and final topcoat application of hot applied liquid membrane. Install protection board over the entire waterproofing membrane to provide continuous, uninterrupted protection. Extend the protection board 2" beyond the waterproofing membrane edges when possible. Lap boards 2" - 3" unless noted otherwise on the Drawings.
- B. Adhesion: Field membrane (spot adhere the protection course). Vertical less than 3 feet (fully adhere the protection course). Brick ledges and through-wall details (fully adhere the protection course).
- C. Plane changes: At corners or other plane changes exceeding 45 degrees, cut the protection board instead of bending for a tight fit and a sharp corner.
- D. Ensure that debris and construction contaminants do not enter behind insulation and/or protection board that may damage or puncture the waterproofing membrane.
- E. Cover installed waterproofing with protection board at the end of each day's work.
- F. No damaging traffic or subsequent construction activities shall be permitted directly on the installed waterproofing and protection board until the permanent overburden is in place.

3.09 CONSTRUCTION PROTECTION SYSTEM

- A. Install and maintain construction protection systems, such that construction activities cause no damage to the waterproofing system.
- B. Owner's inspector shall be present at removal of construction protection system. Damage to waterproofing system will cause the waterproofing system to be non-conforming work, subject to removal and replacement.

3.10 INSULATION

- A. Do not deliver rigid insulation to the Project prior to time of its installation. Protect material during delivery, handling and installation from fire. As soon as practical after the installation of an area of rigid insulation work, protect the material with the other specified Work so that it will not remain exposed longer than necessary.
 - 1. Do not install rigid insulation or protection board that has become wet or soiled, or covered with ice, frost or snow. Also protect the rigid insulation from exposure to high ambient temperatures, excessive exposure to sunlight or contact with hot surfaces and materials which are in excess of the safe temperature above the sublimation temperature indicated by the manufacturer. Do not install broken or damaged sheets of insulation; where possible use full-size sheets of insulation.
 - 2. The membrane waterproofing Applicator shall examine all parts of the supporting substrate and the condition under which the rigid insulation work is to be performed, and notify the Contractor in writing of any conditions detrimental to the proper and timely completion of the rigid insulation work.
 - a. Do not proceed with the installation until all conditions have been corrected in a manner acceptable to the membrane waterproofing Applicator.
 - 3. Apply the insulation/protection board with staggered joints unless shown otherwise in the drawings. Extend insulation/protection board full thickness over the entire area to be covered. Cut and fit rigid insulation tightly around projections. Lap protection board joints 2-3 inches. Do not leave any voids.

3.11 STAINLESS STEEL CAP FLASHING; (WHERE WATERPROOFING IS EXPOSED TO SUNLIGHT ABOVE GRADE)

- A. Over the membrane waterproofing along foundation walls at finish grade, install the stainless steel cap flashing vertical leg to cover the top edges of the waterproofing and insulation/protection board down approximately 6" below grade. Anchor the metal cap flashing securely in place in accordance with the manufacturer's directions. Lap joints tightly and set in a bed of sealant. Where possible, use through-wall flashings for the terminations at the top of the waterproofing of vertical walls. Apply as per Drawings.
- B. Close and seal ends to maintain water-tightness and fill top trough with sealant to provide a water-tight, surface mounted cap flashing.

3.12 SACRIFICIAL SLIP SHEET

- A. On below-grade backfilled vertical waterproofing applications, install a sacrificial slip sheet out board of all other installed products in direct contact with backfill.
- B. Slip sheet shall not be attached to any other material allowing it to be "drawn down" by backfill compaction.

3.13 FIELD QUALITY CONTROL

- A. General: Monitor the final layer installation and backfill operations to assure no damage is done to the waterproofing membrane. Alert all parties concerned of any activities which might adversely affect the performance of the waterproofing system.

3.14 TEMPORARY PROTECTION

- A. If there are any delays in the Work, such that materials will not be properly protected because the specified sequence of Work will not be performed in a timely manner, the Contractor shall provide all necessary temporary protection and remove the temporary protection when the Work is resumed.

END OF SECTION

SECTION 07 1813
PEDESTRIAN TRAFFIC COATINGS

PART 1 GENERAL

1.01 SUMMARY

- A. All pedestrian traffic coating materials and procedures shall be as per this section. No substitutions shall be allowed.
- B. This section includes the application of a cold fluid applied, polyurethane concrete deck waterproofing with non-slip aggregate surface that prevents the passage of water.
- C. This waterproofing is intended for pedestrian traffic only. It may be used as an exposed floor finish or may be used under thinset tile flooring. Refer to Drawings and details for specific locations.

1.02 APPLICATOR QUALIFICATIONS:

- A. The pedestrian traffic coatings work shall be performed by a single firm experienced and specialized in applying pedestrian traffic coatings, as shown and specified. The pedestrian traffic coatings installation firm shall be an approved and trained Applicator by the manufacturer. The field supervisor and the Project foreman for the pedestrian traffic coatings Applicator shall each have at least 3 years approved experience with the application of this waterproofing product.

1.03 SUBMITTALS:

- A. Product Data (PD): Submit copies of the manufacturer's printed instructions for evaluating, preparing, and treating substrate; technical data; and tested physical and performance properties; and printed instructions for installation of pedestrian traffic coatings, including procedures and materials for flashing, splicing, bonding, and condition at pipe penetrations.
- B. Submit a copy of the manufacturer's approval letter of the Applicator and indicate by transmittal form that copies of the Project Specifications and application instructions have been distributed to the pedestrian traffic coatings Applicator.
- C. Shop Drawings (SD): Submit shop drawings to indicate tie-in details to existing substrates, termination and non-typical details, pipe penetrations and supports, show changes from horizontal to vertical elevation, and inside and outside corner applications. Shop drawings shall include a pedestrian traffic coatings protection plan. Provide descriptions and drawings of materials and methods to protect pedestrian traffic coatings system from damage by subsequent construction activities. Copies of the manufacturer's instructions, guidelines and shop drawings should be kept on site during installation for reference.
- D. Manufacturer's Review of Pedestrian Traffic Coatings System (SR): Before delivering pedestrian traffic coatings materials to the Project site, submit the following:
 - 1. A written statement signed by the Contractor's pedestrian traffic coatings Applicator and manufacturer's representative stating that the A/E's Drawings and Specifications have been reviewed, and that they are in agreement that the selected materials and system for pedestrian traffic coatings are proper and adequate for the application shown. Indicate by transmittal form that a copy of this statement has also been distributed to the Owner.
 - 2. A written approval of the condition(s) of the substrate(s) to proceed with the pedestrian traffic coatings, signed by the all of the following parties: manufacturer's representative, installing Applicator, and Contractor.

3. **Manufacturer's Approval of Moisture Content/Test Results:** The manufacturer shall test the moisture content of each floor location scheduled for coatings, immediately prior to waterproofing, and shall submit the written approval of the moisture content of each of the substrates to the A/E based on the attached test results. Tests shall be made no sooner than 28 days after the installation of new concrete substrate, and no sooner than 6 days after the installation of topping mortar. The moisture tests shall comply with ASTM D4263, "Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method" or commonly referred to as the "Rubber Mat Moisture Test". Additional testing may be conducted, if desired, by the manufacturer. The Owner's representative(s) shall observe all moisture content testing, and the Contractor shall notify the Owner's representative(s) at least 5 days in advance of any testing.
4. If any portion of the floors scheduled to be waterproofed become wet after the testing and approval performed per Article 1.03 D.3, but prior to waterproofing, then the moisture testing and approval procedures shall be repeated.
- E. Submit MSDS information for all materials proposed for use for this specific Project.
- F. **Maintenance Data:** Submit maintenance manuals which identify substrates and type of pedestrian traffic coatings system applied and including recommendations for periodic inspections, cleaning, care, maintenance, and repair of the pedestrian traffic coatings system.

1.04 QUALITY ASSURANCE:

- A. Specify a Preinstallation Meeting in accordance to Section 01 7000 - Execution and Closeout Requirements. After completion of shop drawing review and upon completion of the 28 day cure of new concrete, 6 day cure of any mortar topping, and mechanical preparation (shot blasting) of the substrate, the pedestrian traffic coatings Applicator shall meet with the manufacturer's representative, Contractor, A/E, and Owner's representatives at the Project site to review the pedestrian traffic coatings procedures, acceptance of surfaces, minimum curing periods, forecasted weather conditions, special details and sheet flashings and coordination of other trades. The Contractor shall provide notice to attendees prior to convening the PreInstallation Meeting as specified in Section 01 7000. Review methods and procedures related to this coatings work, including, but not necessarily limited to the following:
 1. Tour job site areas to receive pedestrian traffic coatings. Inspect and discuss conditions of substrate(s), existing conditions, drains, curbs, penetrations and other preparatory work performed by other trades. Review the field conditions for each item of Article 1.06 C.
 2. Review required submittals, both completed and yet to be completed.
 3. Review the entire Specification, line item by line item.
 4. Review and finalize the Construction Schedule related to pedestrian traffic coatings work and verify availability of materials, Applicator's personnel, equipment and facilities needed to make progress and avoid delays.
 5. Review required inspections and testing.
 6. Review manufacturer's guidelines with respect to weather conditions.
- B. Each floor surface shall be inspected after all floor preparation is completed. Written approval of the prepared floor surface, signed by the pedestrian traffic coatings manufacturer's representative, the installing applicator, and the Contractor, shall be submitted to and approved by the A/E prior to the pedestrian traffic coatings application.
- C. **Source Limitation:** Obtain pedestrian traffic coatings materials through one source from a single manufacturer.

- D. Mockups: The Contractor shall prepare a separate concrete slab 9 sq. ft. (.84 sq. m) in area, displaying a typical, slab-to-wall joint/curb transition. Cure mockup slab 28 days, for the mockup pedestrian traffic coatings application. Mechanically abrade the substrate, prime and apply the pedestrian traffic coatings system to the mockup deck to demonstrate surface preparation, crack and joint treatment, corner treatment, thickness, texture, and execution quality. If the Architect or Owner's Representative determines mockups do not comply with requirements, reapply pedestrian traffic coatings until mockups are approved. Mockup slabs shall be stored in areas to receive pedestrian traffic coatings in preparation for mockup application, and shall be retained for reference during the pedestrian traffic coatings application.

1.05 DELIVERY, STORAGE, AND HANDLING:

- A. Deliver all materials in original, unopened containers of packaging clearly labeled with manufacturer's name, brand name and type, shelf life, date of manufacture and all identifying numbers.
- B. Store all materials for waterproofing work in accordance with the manufacturer's recommendations, as approved, and in accordance with the requirements herein specified. Store products away from sparks and open flames.
- C. Remove and replace liquid materials that cannot be applied within their stated shelf life.
- D. Remove all solvent soaked rags from the site or place them in proper containers to be removed from site at the end of each day.
- E. Protect stored materials from direct sunlight.

1.06 PROJECT/SITE CONDITION:

- A. Environmental Requirements: Do not apply pedestrian traffic coatings materials if ambient, materials, and/or substrate temperatures are outside the range of ambient temperatures recommended by the manufacturer. Temperatures shall be rising and stay above the minimum for the following 48 hours. All surfaces to receive the pedestrian traffic coatings shall be free of water, dew, frost, snow and ice. Do not apply pedestrian traffic coatings when the surface temperature is below 40°F (4°C) or above 90°F (32°C). Do not apply when temperatures are less than 5°F (3°C) above dew point or when weather rain, snow, fog, or mist can directly interfere with the application and curing period. Do not apply pedestrian traffic coatings until substrates have a moisture content approved by the manufacturer immediately prior to application, and the written approvals have been received and approved by the Architect.
- B. Moisture Testing: The condition of "dry" substrate for the start of pedestrian traffic coatings application shall be determined by the ASTM D4263 moisture test method as outlined in the Section. The Architect and Owner's Representative shall be notified at least 5 days in advance of any moisture content testing to observe the testing, and shall be advised in writing of the results of the manufacturer's moisture testing whenever a moisture test is completed and approved, prior to beginning pedestrian traffic coatings.
- C. Inspect and identify existing substrate for conditions requiring special preparation. Refer to Item 3.04 of this Section for detailed requirements at each of the following conditions:
 - 1. Verify and discuss method of substrate preparation. Provide advice on the type of machinery required to mechanically shot blast, abrade, rout, grind, and prepare the substrates. Review the cleanup required upon completion of substrate preparation.
 - 2. Metal projections, pipe penetrations, and drain perimeters shall be prepared and primed.
 - 3. Cracks less than 1/16" wide.
 - 4. Cracks between 1/16" and 1/8" wide.
 - 5. Cracks greater than 1/8" wide.
 - 6. Expansion joints.

7. Review defect projections such as fins, ridges, exposed aggregate, honeycombs, spalls, and granulations to be leveled and made smooth by grinding or by applying approved mortar toppings and their bonding agents as described in Section 03 53 00 - Concrete Toppings.
 8. At terminations of pedestrian traffic coatings on flat substrates, verify the location of the ¼"x ¼" keyways to terminate coating.
 9. At any existing polyurethane deck coatings being restored or tied into, manufacturer's representative shall inspect the surface, determine compatibility, and recommend preparation of interface surface, including wire brushing, grinding, sandblasting, solvent washing, and priming necessary.
 10. Upon completion of all substrate preparation work, provide written approval of the substrate as required by Item 1.03.
- D. Verify whether any fiberglass fiber reinforcing is present in the concrete substrate. If so, any fiber projections shall be burned off the substrate surface with a weed burner flame immediately after abrasion of the concrete surface and just prior to coatings application.
 - E. Verify locations of temporary closures at all openings to prevent contamination of pedestrian traffic coatings before, after, and during application, and to coordinate ventilation of area from adjacent, occupied areas. Remove temporary enclosures at completion of coatings application.
 - F. Plan and install adequate ventilation for process of application and curing.

1.07 WARRANTY:

- A. Refer to Section 01 7800 - Closeout Submittals for additional requirements.
- B. Manufacturer's and Applicator's Joint Warranty: Submit to the A/E for transmittal to Owner, two (2) original copies of manufacturer's standard warranty on all materials used on the Project for a period of five (5) years from the date of Substantial Completion.
- C. Coatings Installation Warranty: Submit to the A/E for transmittal to the Owner two (2) original copies of a Coatings Installation Warranty. The Coatings Installation Warranty shall cover the complete pedestrian traffic coatings installation and any defects in the installation because of materials or workmanship, regardless of any previous inspections and approvals of the installation by the Owner's representative, and shall be properly corrected during the warranty period at no cost to the A/E or the Owner. Upon written notification within the warranty period of any such defects, the necessary repairs and replacement shall be properly made at the convenience of the Owner.

PART 2 PRODUCTS

2.01 PEDESTRIAN TRAFFIC COATINGS PRODUCTS:

- A. Pedestrian Traffic Coating, Type SC4: Subject to compliance with requirements, provide products by one of the following manufacturers:
 1. "Vulkem 350 Base Coat / 351 Top Coat" by Nameco/Vulkem/Tremco International, Inc.
 2. "MasterSeal Traffic 2500 by BASF
- B. Physical Requirements: Provide pedestrian traffic coatings complying with ASTM C957, ASTM D412, and ASTM D2240.
- C. Material Compatibility: Provide primers, sealants, detail coat material, vertical application material, base coat material, top coat material, and miscellaneous materials that are compatible with one another and with substrate under conditions of service and application, as demonstrated by the manufacturer based on testing and field experience.
- D. Primer: Manufacturer's standard factory formulated primer recommended for substrate and conditions indicated. Primer shall be applied to each substrate.
 1. Vulkem: Primers #171, #181, and #191
 2. MasterSeal P 173, P 220, P122

- E. Sealant: Manufacturer's recommended two-part polyurethane sealant and primer proven by the manufacturer to be compatible with their deck coating.
 - 1. Vulkem: Vulkem Two-Part; Tremco Dymeric and Primer #1, Primer #6, and 200 Cleaner.
 - 2. MasterSeal NP2 and Primer MasterSeal P 173.
- F. Detail Coats: Single component, slightly thixotropic, aromatic liquid polyurethane coating for liquid applied flashings, particularly on vertical transitions or slopes.
 - 1. Vulkem 350 Base Coat: 30 wet mil thickness minimum; 35 wet mil max.
 - 2. MasterSeal M 200 Base Coat: 25 wet mil thickness minimum; 35 wet mil max.
- G. Base Coat: Single component, slightly thixotropic, aromatic liquid polyurethane elastomeric waterproofing. Apply minimum wet mil thickness of the Base Coat recommended by the manufacturer as follows:
 - 1. Vulkem 350 Base Coat: 30 wet mil thickness minimum; 35 wet mil max.
 - 2. MasterSeal M 200 Base Coat: 25 wet mil thickness minimum; 35 wet mil max.
- H. Intermediate Coat: Single component, slightly thixotropic, aromatic liquid polyurethane elastomeric waterproofing. Apply minimum wet mil thickness of the intermediate coat of "Base Coat" material as recommended by the manufacturer as follows:
 - 1. Vulkem 350 Base Coat as Intermediate Coat: 20 wet mil thickness minimum; 35 wet mil maximum.
 - 2. MasterSeal M 200 Base Coat as Intermediate Coat: 20 wet mil thickness minimum; 35 wet mil maximum.
- I. Top Coat: Single component, aliphatic liquid polyurethane elastomeric waterproofing. Apply minimum wet mil thickness of the topcoat recommended by the manufacturer as follows:
 - 1. Vulkem 351 Top Coat: 20 wet mil thickness minimum with aggregate; 35 wet mil maximum.
 - 2. MasterSeal TC 225 Top Coat: 20 wet mil thickness minimum with aggregate; 35 wet mil maximum.
- J. Vertical Coat Applications: Single component, aliphatic liquid polyurethane elastomeric waterproofing. Apply minimum wet mil thicknesses of the base coat and top coat recommended by the manufacturer as follows:
 - 1. Vulkem 350 Base Coat for Vertical Application: three layers of 10 wet mil thickness minimum; Vulkem 351 Top Coat: two layers of 10 wet mil maximum with aggregate.
 - 2. MasterSeal Base Coat for Vertical Application: three layers of 10 wet mil thickness minimum; MasterSeal Top Coat: two layers of 10 wet mil maximum with aggregate.
- K. Aggregate: Uniformly graded, washed silica sand composed of clean grit particles at least 6.5 on the MOH's scale of hardness, 80% in the 25-40 mesh size and no more than 2% fines passing a 70 mesh screen. The aggregate shall contain no more than 0.5% iron oxide. Aggregate shall be approved in writing from manufacturer.
 - 1. Spreading Rate: As recommended by manufacturer for substrate and service conditions indicated, by not less than 10 to 20 lb/100 sq. ft. (4 to 12kg/10sq. m.).
 - 2. Aggregate shall be applied to the wet Top Coat, and shall be back rolled into the coating.
 - 3. Contractor shall apply a sample area at the initial application for approval of the texture by the Architect and the Owner.

2.02 MISCELLANEOUS MATERIALS

- A. Joint Sealant: Two-part component polyurethane sealant and primer recommended by manufacturer for substrate and joint conditions indicated and for compatibility with waterproofing coatings; complying with ASTM C920. Type M, Class 25, Grade NS for sloping and vertical applications or Grade P for deck applications, and use T where subject to traffic or use NT elsewhere.
- B. Reinforcing Strip: Manufacturer's recommended mesh reinforcement embedded in the Base Coat application. MasterSeal 995 Reinforcing Fabric by BASF.

- C. Backer Rod: Reticulated, bi-cellular, non-gassing polyolefin backer rod that complies with ASTM C 1330, Type B such as "Sof Rod" as manufactured by Construction Foam Products, a division of Nomaco, Inc., Soft Type Backer Rod as manufactured by ITP, or Sonolastic Soft Backer Rod by BASF.
- D. Galvanized Sheet Metal: For use in creating waterproofed dams around large pipe or duct penetrations in the floor deck. 20 gauge sheet metal.

PART 3 EXECUTION

3.01 GENERAL

- A. All Work performed under this Section shall be in accordance with the Specifications, Drawings, and the manufacturer's instructions and recommendations. In the event of a conflict, the stricter requirement shall prevail.
- B. Prior to onset of coatings work, the pedestrian traffic coatings Applicator shall inspect the entire area to be coated for compliance with requirements and other conditions affecting performance.
 - 1. Verify that concrete has cured and aged for minimum of 28 days, and that mortar toppings have then cured and aged for minimum of 6 additional days, as recommended by the pedestrian traffic coatings manufacturer, prior to moisture content testing.
 - 2. Identify equipment pads for waterproofing at mechanical equipment rooms. Coordinate waterproofing application over and around pads prior to the installation of the equipment.
 - 3. Verify that substrate(s) are visibly dry and free of moisture. Test for capillary moisture in the substrate(s) using test submitted by manufacturer as required by this Section. The Architect shall provide approval of written copy of moisture test report before proceeding with coatings work.
 - 4. Inspect substrate for surface imperfections. Proceed with installation only after unsatisfactory conditions have been corrected.
 - 5. Provide letter of acceptance of the substrate to the Architect prior to beginning the work of this Specification as required by Item 1.03.
 - 6. Provide temporary protection of existing conditions, work in progress and work in place as described in the shop drawing's construction protection plan. Provide for adequate ventilation.
 - 7. Protect all finish surfaces from damage resulting from spillage, dripping, and dropping of materials. Prevent coating materials from entering or clogging drains and water conductors. Repair and restore or replace other Work, which is soiled or damaged in connection with performance of the coating work.
 - 8. If floor becomes wet after prior approvals to proceed, then repeat moisture test procedures required by this Section before proceeding.

3.02 PREPARATION OF CONCRETE, MORTAR TOPPINGS, AND MASONRY SURFACES

- A. If possible, coordinate Contractor prior to pouring the concrete or mortar topping substrate, provide reglet recesses in the concrete substrate in which to apply sealant coves at corner transitions, such as at slab intersections with walls or around mechanical curb perimeters, so that the finish application is flush. Refer to Drawings.
- B. All new concrete and masonry surfaces on which pedestrian traffic coatings are to be applied shall have been air dried for a minimum of 28 days after forms have been stripped prior to any mortar topping installation. All mortar toppings shall wet cure for a minimum of 3 days and air dry for another minimum of 3 days before moisture content testing of the substrates for the pedestrian traffic coatings application. All surfaces shall be dry, clean and free of other foreign matter detrimental to performance.
- C. Apply bonding agents and mortar toppings as required to infill cavities or provide slope to drain as indicated on the Drawings, after substrate is approved and surface prep is completed. When infilling large areas abutting vertical wall surfaces, tool the mortar topping with an edging tool or install form for a reglet recess to accommodate the perimeter sealant application. Install mortar topping per Section 03 53 00.

- D. Mechanically abrade the substrate surfaces in a uniform manner by shot blasting or other method recommended and approved by manufacturer.
- E. Burn off any fiberglass fibers embedded in the concrete substrate using a weed burner.
- F. Surface shall be free of spalling, voids, loose material and projections, with no coarse aggregate exposed. Remove all oil grease, dirt, dust and debris and other contaminants.
- G. Mask off adjoining surfaces not receiving pedestrian traffic coatings to prevent spillage or over-application affecting other construction.

3.03 PREPARATION AT TERMINATIONS AND PENETRATIONS

- A. Prepare vertical and horizontal surfaces at terminations and penetrations through pedestrian traffic coatings and at expansion joints, drains, and sleeves according to ASTM C898 and manufacturer's written instructions. Wire brush and/or sandpaper all metal surfaces to be coated to a clean, shiny surface. Vacuum areas and wipe metal surfaces clean.
- B. Prime substrate as instructed by pedestrian traffic coatings manufacturer.
- C. Apply sealant in fills and perimeter seals as recommended by the manufacturer. Provide sealant cants around penetrations and at inside corners of deck to wall butt joints when recommended by pedestrian traffic coatings manufacturer. Allow all sealant applications to cure a minimum of 16 hours.
- D. Prime and apply a Detail Coat of pedestrian traffic coating and embed a joint reinforcing strip in Detail Coat when recommended by the pedestrian traffic coating manufacturer, and extend Detail Coat for the full height of any vertical application (10 mil). Allow Detail Coat to cure for 24 hours.
- E. At terminations of pedestrian traffic coatings areas on flat substrates: Route a ¼"x ¼" keyway straight across flat surface, in which to terminate coating.

3.04 JOINT AND CRACK TREATMENT:

- A. Prepare, treat, rout, and fill joints and cracks in substrate according to ASTM C898 and the manufacturer's written instructions. Remove dust and dirt from joints and cracks complying with ASTM D4258 before coating surfaces.
- B. Cracks less than 1/16" wide:
 - 1. Prime and apply Detail Coat a minimum of 6 inches (150 mm) wide, 3 inches (75 mm) along each side of joint or crack, and extend Detail Coat for the full height of any vertical application (10 mil). Embed a joint reinforcing strip in the wet Detail Coat if recommended by manufacturer. Allow all Detail Coats to cure for minimum 24 hours.
 - 2. Feather terminating edge of Detail Coat to avoid edges from showing through the finished coating.
- C. Cracks between 1/16" and 1/8" wide:
 - 1. Prime, fill with sealant, and tool flush with putty knife. Allow sealant to cure a minimum of 16 hours.
 - 2. Prime and apply a Detail Coat a minimum of 6 inches (150 mm) wide, 3 inches (75 mm) along each side of joint or crack, and extend Detail Coat for the full height of any vertical application (10 mil).
 - 3. Embed a joint reinforcing strip in the wet Detail Coat if recommended by manufacturer.
 - 4. Allow all Detail Coats to cure for minimum 24 hours.
 - 5. Feather terminating edge of Detail Coat to avoid edges from showing through the finished coating.
- D. Cracks greater than 1/8" wide in any length of the crack:
 - 1. Mechanically rout out joint to 3/8" wide and ½" deep, and vacuum clean the joint.
 - 2. Comply with ASTM C1193 for joint sealant installation.
 - 3. Prime substrate within joint.

4. Apply bond breaker or non-gassing backer rod between sealant and bottom of joint.
 5. Apply sealant within joint, per manufacturer's instructions, and tool flush at surface. Sealant shall cure for minimum 16 hours.
 6. Prime and apply Detail Coat a minimum of 6 inches (150 mm) wide, 3 inches (75 mm) along each side of joint or crack, and extend Detail Coat for the full height of any vertical application (10 mil). Embed a joint reinforcing strip in the wet Detail Coat if recommended by manufacturer. Allow all Detail Coats to cure for minimum 24 hours.
 7. Feather terminating edge of Detail Coat to avoid edges from showing through the finished coating.
- E. Cants at inside corners, curbs to floors, walls to floors, wall to wall:
1. Sweep, vacuum and clean joints.
 2. Comply with ASTM C1193 for joint sealant installation.
 3. Prime substrate within joint.
 4. Apply bond breaker or non-gassing backer rod between sealant and bottom of joint.
 5. Apply sealant within joint, per manufacturer's instructions, and tool flush at surface. Sealant shall cure for minimum 16 hours.
 6. Prime and apply Detail Coat a minimum of 6 inches (150 mm) wide, 3 inches (75 mm) along each side of joint or crack, and extend Detail Coat for the full height of any vertical application (10 mil). Embed a joint reinforcing strip in the wet Detail Coat if recommended by manufacturer. Allow all Detail Coats to cure for minimum 24 hours.
 7. Feather terminating edge of Detail Coat to avoid edges from showing through the finished coating.
- F. Expansion joints:
1. Do not apply pedestrian traffic coatings coats across true expansion joints. Terminate on each side and seal to expansion joint seal according to manufacturer's recommendations for sealing expansion joints.

3.05 WATERPROOF TOP COAT APPLICATION:

- A. Apply each top coat of waterproof coating according to ASTM C898 and manufacturer's written instructions.
- B. Start installing waterproof top coating in presence of manufacturer's technical representative.
- C. Apply primer over prepared substrate.
- D. Mix materials and apply waterproofing top coat by roller, notched squeegee, trowel, or other application method suitable to slope of substrate.
- E. Apply Base Coat to obtain a seamless membrane free of entrapped gases, with a minimum/maximum wet film thickness as noted in Articles 2.01 G. and J. above. Allow Base Coat to cure 24 hours. Check for surface tack.
- F. Base Coat and Intermediate Coat shall each have a slight surface tack to aid in adhesion of the next coating. Coating shall not debond from premature curing. If the Base or Intermediate Coat has cured longer than 24 hours and has no tack, then the surface shall be cleaned with a cloth dampened with Xylene or Xylol, and then primed with waterproofing primer. **DO NOT SATURATE THE WATERPROOF COATING SURFACES WITH SOLVENT.**
- G. Apply Intermediate Coat in seamless membrane free of entrapped gases, with a minimum/maximum wet film thickness per Articles 2.01 H and J. Allow Intermediate Coat to cure for 24 hours. Check for surface tack (see previous paragraph). (Eliminate this step if waterproofing is used under ceramic floor tile.)
- H. Apply initial Top Coat at vertical surfaces only per Article 2.01 J (10 mil).
- I. Upon completion of previous Article 3.05 H, apply Top Coat of waterproofing in seamless membrane free of entrapped gases, with a minimum/maximum wet film thickness per Articles 2.01 I and J.

- J. Immediately broadcast sand grit aggregate into the wet horizontal and vertical Top Coat at a rate to comply with Article 2.01 K. Immediately back-roll the surface to fully coat and imbed aggregate particles as the coating is applied.
- K. The Architect and the Owner shall view and approve the finish texture of the aggregate application after the first 100 square feet are applied, and shall compare to the mockup sample.
- L. Apply all waterproofing coatings up vertical pipe penetrations and vertical wall surfaces at transitions to horizontal surfaces. Cove waterproof coating a minimum 6 inches up vertical surfaces. End waterproofing in a straight horizontal line.
- M. Verify wet film thickness of waterproofing on each coat every 100 sq. ft. (9.3 sq. m.).
- N. Allow finished waterproofing application to cure 24 hours before allowing any traffic or work over its surface.

3.06 FIELD QUALITY CONTROL:

- A. Periodically check waterproofing layers for any indication of bubbling or trapped air or excess moisture during its application and cure. Any bubbling shall be corrected according to the manufacturer's recommendations prior to any further application of coatings.
- B. Where ceramic tile is applied over waterproofing material, verify that the aggregate finish in the final top coat is applied at the specified rate and is not coated over with the top coat to an extent that smooth, shiny areas develop in the finish. The aggregate roughness is required to develop physical bond with the tile setting bed.
- C. Flood Testing: Prior to testing, verify live load capacity of floor deck to carry ponding water with the Structural Engineer. The Contractor shall construct all watertight dams and shall perform the flood testing. Flood test each deck area for leaks, according to recommendations in ASTM D5957, after completing waterproofing, but before overlying construction is placed. Install temporary containment assemblies, plug or dam drains, and flood with potable water. The Contractor shall repair all damages, or replace damaged materials, as a result of flood testing failures or leakages, at no additional cost to the Owner.
 - 1. Flood to an average depth of 2 ½ inches (65 mm) with a minimum depth of 1 inch (25 mm) and not exceeding a depth of 4 inches (100 mm). Maintain 2 inches (50 mm) of clearance from top of sheet flashings.
 - 2. Flood each area for 48 hours.
 - 3. After flood testing, repair leaks, repeat flood tests, and make further repairs according to the manufacturer's instructions until waterproofing installation is watertight.
- D. The Owner will engage an independent inspection consultant to perform construction observation during installation of all coatings work. The Consultant will observe conditions under which the coatings are installed, observe flood testing, if performed, and observe underside of decks and terminations for evidence of leaks during such flood testing. Notify the inspection consultant per requirements listed in Article 1.03 D.3., at least 5 days prior to applications, and coordinate schedule.

3.07 CURING, PROTECTING, AND CLEANING:

- A. Cure coatings according to manufacturer's written recommendations, taking care to prevent contamination and damage during application stages and curing.
- B. Protect coatings from damage and wear during remainder of construction period.
- C. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION

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**SECTION 07 2100
THERMAL INSULATION**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Board insulation at cavity wall construction, perimeter foundation wall, and underside of floor slabs.
- B. Batt insulation and vapor retarder in exterior wall, ceiling, and roof construction.

1.02 REFERENCE STANDARDS

- A. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications; 2024.
- B. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; 2023.
- C. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board; 2025.
- D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2024.
- E. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2024a.
- F. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Wall Assemblies Containing Combustible Components; 2025.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data on product characteristics, performance criteria, and product limitations.
- C. Manufacturer's Installation Instructions: Include information on special environmental conditions required for installation and installation techniques.

PART 2 PRODUCTS

2.01 APPLICATIONS

- A. Insulation Under Concrete Slabs: Extruded polystyrene (XPS) board.
- B. Insulation at Perimeter of Foundation: Extruded polystyrene (XPS) board.
- C. Insulation Inside Masonry Cavity Walls: Expanded polystyrene (EPS) board.
- D. Insulation on Inside of Concrete and Masonry Exterior Walls: Extruded polystyrene (XPS) board.
- E. Insulation for filling perimeter window and door shim spaces and crevices in exterior walls: Mineral Wool Batt Insulation

2.02 FOAM BOARD INSULATION MATERIALS

- A. Extruded Polystyrene (XPS) Board Insulation: Comply with ASTM C578 with either natural skin or cut cell surfaces.
 - 1. Flame Spread Index (FSI): Class A - 0 to 25, when tested in accordance with ASTM E84.
 - 2. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.
 - 3. Type and Thermal Resistance, R-value: Type IV, 5.0 (0.88), minimum, per 1 inch thickness at 75 degrees F mean temperature.
 - 4. Products:
 - a. DuPont de Nemours, Inc; Styrofoam Brand Square Edge: building.dupont.com/#sle.
 - b. Kingspan Insulation LLC; GreenGuard GG25-LG XPS Insulation Board: www.kingspan.com/#sle.

- c. Owens Corning Corporation: www.ocbuildingspec.com/#sle.
- d. Substitutions: See Section 01 6000 - Product Requirements.

2.03 ACCESSORIES

- A. Tape: Reinforced polyethylene film with acrylic pressure sensitive adhesive.
 - 1. Application: Sealing of interior circular penetrations, such as pipes or cables.
 - 2. Width: Are required for application.
- B. Tape joints of rigid insulation in accordance with insulation manufacturers' instructions.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate, adjacent materials, and insulation materials are dry and that substrates are ready to receive insulation.
- B. Verify substrate surfaces are flat, free of honeycomb, fins, irregularities, or materials or substances that may impede adhesive bond.

3.02 BOARD INSTALLATION AT FOUNDATION PERIMETER

- A. Adhere a 6 inches wide strip of polyethylene sheet over construction, control, and expansion joints with double beads of adhesive each side of joint.
- B. Install boards horizontally on foundation perimeter.
 - 1. Place boards to maximize adhesive contact.
 - 2. Install in running bond pattern.
 - 3. Butt edges and ends tightly to adjacent boards and to protrusions.
- C. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

3.03 BOARD INSTALLATION AT EXTERIOR WALLS

- A. Adhere 6 inches wide strip of polyethylene sheet over expansion joints with double beads of adhesive each side of joint.
- B. Install boards horizontally on walls.
 - 1. Install in running bond pattern.
 - 2. Butt edges and ends tightly to adjacent boards and protrusions.
- C. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

3.04 BOARD INSTALLATION AT CAVITY WALLS

- A. Adhere a 6 inches wide strip of polyethylene sheet over expansion joints with double beads of adhesive each side of joint.
- B. Install boards to fit snugly between wall ties.
- C. Install boards horizontally on walls.
- D. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

3.05 BOARD INSTALLATION UNDER CONCRETE SLABS

- A. Place insulation under slabs on grade after base for slab has been compacted.
- B. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.
- C. Prevent insulation from being displaced or damaged while placing vapor retarder and placing slab.

3.06 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements for additional requirements.

3.07 PROTECTION

- A. Do not permit installed insulation to be damaged prior to its concealment.

END OF SECTION

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SECTION 07 2700 AIR BARRIERS

PART 1 GENERAL

1.01 SUMMARY

- A. The building envelope shall contain a continuous air/moisture barrier consisting of a material or a combination of materials to resist the passage of air into or out of the conditioned or semi conditioned space.
- B. The building envelope shall contain a continuous and durable air/moisture barrier consisting of a material or a combination of materials to resist the passage of any moisture into the back-up wall, intentional or unintentionally, through the exterior cladding and exterior sealant joints.
- C. The air/moisture barrier shall be integrated, air and watertight, with all other exterior envelope components (below grade waterproofing, curtain walls, windows, roofs, louvers, flashings) to redirect any moisture that accumulates behind the cladding back to the exterior and to establish and maintain the integrity and continuity of the whole building air barrier strategy.
- D. The air/moisture barrier and thermal insulation shall be positioned within the wall assembly and have physical properties so that moisture dissipates and subsequent moisture from weather or occupancy does not accumulate on any back-up walls or interior conditioned spaces.
- E. Materials to bridge and seal the following air/moisture leakage pathways and gaps:
 - 1. Connections of the walls to the roof vapor barrier and/or membrane.
 - 2. Connections of the walls to the foundation waterproofing.
 - 3. Wall expansion and control joints.
 - 4. Wall openings and penetrations of window frames, storefront, curtain walls, louvers, and doors.
 - 5. Wall penetrations: piping, conduit, duct and similar penetrations.
 - 6. Masonry ties, screws, bolts and similar penetrations.
 - 7. All other air leakage pathways in the building envelope.

1.02 REFERENCE STANDARDS

- A. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2025.
- B. ASTM D4258 - Standard Practice for Surface Cleaning Concrete for Coating; 2023.
- C. ASTM D4263 - Standard Practice for Indicating Moisture in Concrete by the Plastic Sheet Method; 2024.
- D. ASTM D4541 - Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers; 2022.
- E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2024.
- F. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2024a.
- G. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2024.
- H. ASTM E1186 - Standard Practices for Air Leakage Site Detection in Building Envelopes and Air Barrier Systems; 2017.
- I. ASTM E2178 - Standard Test Method for Determining Air Leakage Rate and Calculation of Air Permeance of Building Materials; 2021a.
- J. ASTM E2357 - Standard Test Method for Determining Air Leakage Rate of Air Barrier Assemblies; 2025.
- K. NFPA 268 - Standard Test Method for Determining Ignitability of Exterior Wall Assemblies Using a Radiant Heat Energy Source; 2022.

- L. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Wall Assemblies Containing Combustible Components; 2025.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Administrative Submittals
 - 1. Letter from the Manufacturer certifying that they meet the Manufacturer Qualification requirements including the name and contact information of the local technical representative.
 - 2. Letter from the Manufacturer certifying that the Contractor and Lead Installer is approved by the Manufacturer and have been thoroughly trained and meet the Contractor Qualification Requirements.
- C. Performance Submittals
 - 1. Material and assembly performance data sheets and testing results showing compliance with the air resistive Performance Criteria specified.
 - 2. Material data sheets and testing results showing compliance with the air barrier's vapor permeance Performance Criteria properties specified.
 - 3. Material data sheets and Manufacturers acceptable adhesion criteria for each membrane (liquid applied membrane and transition membranes) for the various project specific substrates in which the material will be bonded against.
 - 4. Material data sheets and testing results showing compliance with Fire, Flame and Smoke Performance Criteria properties specified. Contractor shall submittal with other exterior enclosure manufacturers for assembly tests requirements.
 - 5. Submit letter from primary material Manufacturer stating that materials proposed for use are permanently chemically compatible and adhesively compatible with adjacent materials proposed for use.
 - a. Compatibility and adhesion testing shall be performed early in the construction process.
 - b. Construction Manager, Manufacturer, and Subcontractor responsible for the work of this section will be required to coordinate with other trades and other Manufacturers to supply and verify compatibility.
- D. Material and System Installation Submittals
 - 1. Product and technical data sheets for all materials, transition membranes, sealants, termination mastics and other accessories.
 - 2. Include manufacturer's written instructions for evaluating, preparing, and treating each substrate that will receive the air/moisture barrier. Submit letter from Manufacturer stating that cleaning materials used during installation are chemically compatible with adjacent materials proposed for use.
 - 3. Include manufacturer's written instructions for the installation of the air/moisture barrier and all accessories.
 - 4. Include manufacture's wet and dry film thickness requirements and contractor testing frequency requirements.
 - 5. Include VOC content of each material, and applicable legal limit in the jurisdiction of the project.
 - 6. Include manufacturer's approved repair material and written instructions for preparing, treating and repairing the membrane where other trades may penetrate it with post installed anchors after installation. Regardless of Manufacturer claims, the air/moisture barrier shall be considered "not self-sealing/healing" and all penetrations shall be sealed air and watertight.
 - a. If the air barrier installer will not be sealing post installed penetrations/anchors created by others, then those contractors shall be trained on-site by the air barrier installer and Manufacturer to perform these auxiliary repairs in accordance with the Manufactures approved repair mythology.

- b. It shall be the Contractors responsible to coordinate the training between trades and to ensure the repairs are performed in accordance with the Manufactures written instructions.
- E. Shop Drawing Submittals
 - 1. Refer to Section 01 3000 - Administrative Requirements for submittal procedures.
 - 2. Show locations and extent of air-barrier materials, accessories, and assemblies specific to project conditions coordinated with other trades.
 - 3. Include details for project specific substrate joints and cracks, control and expansion joints, counterflashing strips, inside and outside corners, window and door wraps, terminations, tie-ins with adjoining construction, miscellaneous penetrations, electric boxes, post installed anchors and similar items.
 - 4. Include details installation method at all types of wall openings in which the transition membrane will extend into the wall return, such as windows, louvers, and doors. Detail and identify the type of compatible sealant/ mastic used to seal the splice joints located within the return.
 - 5. Include details where the membrane will not wrap into the opening (curtain walls) and how this return is protected.
 - 6. Building expansion joint detail shall include the size of the joint's anticipated movement, as supplied by the A/E, and the materials and installation methods required to accommodate such movement.
 - 7. Consult air barrier manufacturer for additional installation guidelines illustrations to assist with meeting shop drawing requirements
- F. Samples
 - 1. Refer to Section 01 3000 - Administrative Requirements for submittal procedures.
 - 2. Submit clearly labeled samples, three (3) inch by four (4) inch minimum size of each material specified.
 - 3. Contractor shall coordinate and supply any other trades/manufacturers with physical samples in which their material will come into direct contact with the air barrier to obtain chemical and adhesive compatibility testing and certification early in the project.

1.04 QUALITY ASSURANCE

- A. Manufacturers Qualifications:
 - 1. Manufacturer that has produced fluid applied air/moisture barriers available and marketed for their intended use in the last 5 years.
 - 2. Manufacture that produces primary materials and regularly engaged in manufacturing specified fluid-applied membranes. Secondary materials from a source acceptable to the primary materials Manufacturer.
 - 3. Manufacturer that has a trained and experienced local technical support staff available to supply on-site technical assistance within 24 hours.
 - 4. Manufacturer technical representative trained and familiar with the specified testing methods.
- B. Contractor Qualifications:
 - 1. A company experienced in applying fluid applied air/moisture barrier materials similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance in the last 5 years.
 - 2. A company approved to install the specified fluid applied air/moisture barrier with an on-site lead installer familiar and thoroughly trained by the specified Manufacturer.
 - 3. Use adequate number of skilled workers who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the Work of this Section.
 - 4. A company approved to install the specified with an on-site lead installer familiar and trained by the specified air/moisture barrier manufacturer.

5. The installer shall have on-site and continuously test the thickness of material as it is being applied with a wet mil gauge.
6. If requested, supply AIA Document A305, Contractor's Qualification Statement including written evidence of a satisfactory experience record with work of this type and scope. If requested, provide five references for projects of a size exceeding 75 percent of the area included in this Project that are at least five years old. These references shall include project schedules, including bid date, start and completion dates, Owner and/or A/E contacts including names, addresses and telephone numbers, and the specific products/systems installed on each referenced project

1.05 MOCK-UPS

- A. See Section 01 4000 - Quality Requirements for additional requirements.
- B. Mock-Up:
 1. Refer to section 04 2000 & 07 1300 for integrated masonry and waterproofing mock-up for additional requirements.
 2. Mock-up and dimensions and wall configuration, including window/curtain wall opening of mock-up as specified in section 04 2000 and on the Contract Drawings.
 3. Include typical air/moisture barrier sealing/flashing around penetrations such as plumbing and electrical penetration within the wall located above the elevation of the through-wall flashing.
 4. Include air/moisture barrier sealing around built-in ladder type masonry and post installed masonry ties.
 5. Include air/moisture barrier transition between waterproofing and air barrier.
 6. Include air/moisture barrier transition between roof and roof vapor barrier if present in mock-up.
 7. Include air/moisture barrier transition at window/curtain wall within mock-up. If window, air/moisture barrier shall transition within the window return. If curtain wall, air/moisture barrier shall not extend into opening but mock-up shall show how the return is protected.
 8. The mock-up shall be conducted by the lead mechanic and air barrier Manufacturer's technical representative.
 9. Contractor shall have on-site and continuously test the thickness of materials as it is being applied with a wet mil gauge.
- C. Mock-Up Testing: After the curing period recommended by material manufacturer, but prior to installation of insulation and cladding, Owner's Testing agency and/or Consultant will perform the following tests:
 1. ASTM D4541 to test adhesion of air/moisture barrier membrane and transition membrane.
 2. ASTM E1186-4.2.7 to test laps, seams, ladder type masonry ties and post installed masonry tie/anchor.

1.06 AIR BARRIER PREINSTALLATION MEETING

- A. Preinstallation Meeting:
 1. Refer to Section 01 7000 - Execution and Closeout Requirements.
 2. Air/moisture barrier Preinstallation meeting and mock-up shall be an integrated exterior envelope meeting including waterproofing, masonry, through wall flashing. Refer to section 04 2000 for additional requirements.
 3. Convene a minimum of two weeks prior to commencing Work of this Section. All submittals, compatibility testing and shop drawings shall be submitted and approved prior to the meeting.
 4. Agenda for air/moisture barrier shall include, at a minimum, construction and testing of mock-up, sequence of construction, coordination with substrate preparation, air barrier materials approved for use, compatibility of materials, shop drawings, coordination with installation of adjacent and covering materials, and details of construction and chemical/fire safety plans.

5. Attendance is required by: Manufacturer Technical Representative, Contractor, Installer, Lead Mechanic, Consultant, Architect, Enclosure Commissioning Agent, and representatives of related trades including covering materials, substrate materials and adjacent materials.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Sequence deliveries to avoid delays, and to minimize on-site storage.
- B. Remove and replace liquid materials that cannot be applied within their stated shelf life. Remove damaged material from site and dispose of in accordance with applicable regulations.
- C. Deliver materials to Project site in original packages with seals unbroken, labeled with material Manufacturer's name, product, date of manufacture, and directions for storage.
- D. Store materials in their original undamaged packages in a clean, dry, protected location and within temperature range required by material manufacturer. Protect stored materials from direct sunlight and other sources of ultra-violet light.
- E. Handle materials in accordance with material manufacturer's recommendations.

1.08 PROJECT CONDITIONS

- A. Environmental Limitations: Apply air barrier within the range of ambient and substrate temperatures recommended in writing by air-barrier manufacturer.
- B. Protect substrates prior and after installation from environmental conditions that affect air-barrier performance.
- C. Do not apply air barrier to a damp or wet substrate or during snow, rain, fog, or mist.
- D. Sequencing:
 1. Do not install air barrier material before the roof, wall openings and parapet walls have been sufficiently protected to prevent a buildup of water in the interior of the building or within the back-up wall. Protect and cover the top of the wall prior to the installation of the air barrier system to avoid water entering the wall assembly. Apply temporary measures such as self-adhered membrane or flashing with long UV exposure performance in all areas where the air barrier will be installed on the wall surfaces below.
 2. Sequence the installation of the wall insulation and cladding in such a manner to protect the membrane from UV deterioration. Membrane shall not be exposed longer than manufacturer's written instructions.

1.09 WARRANTY

- A. Refer to Section 01 7800 - Closeout Submittals for additional requirements.
- B. Material Warranty: Provide material manufacturer's standard product warranty, for a minimum five (5) years from date of Substantial Completion.
- C. Subcontractor Warranty: Provide a two (2) year installation warranty from date of Substantial Completion, including all accessories and materials of the air barrier assembly, against failures including loss of air tight seal, loss of watertight seal, loss of attachment, loss of adhesion and failure to cure properly.

PART 2 PRODUCTS

2.01 FLUID APPLIED AIR BARRIER MATERIALS

- A. Fluid-Applied Membrane Air Barrier: Use regular, high temperature or low- temperature formulation depending on site conditions, within temperature ranges specified by manufacturer. Subject to compliance with Performance Criteria Requirements specified.

2.02 MANUFACTURERS:

- A. WR Grace; www.grace.com
- B. Tremco; www.tremcosealants.com

- C. Henry Company; www.henry.com
- D. Substitutions: See Section 01 2500 - Substitution Procedures.

2.03 PERFORMANCE CRITERIA

- A. Material Performance: Provide air barrier materials to conform to the State Energy Code with an air permeance not to exceed 0.004 cubic feet per minute per square foot under a pressure differential of 1.57 pounds per square foot (0.004 cfm/ft² @ 1.57 psf), when tested in accordance with ASTM E2178 (unmodified).
- B. Assembly Performance: Provide a continuous air barrier in the form of an assembly that has an air leakage rate not to exceed 0.04 cubic feet per minute per square foot under a pressure differential of 1.57 pounds per square foot (0.04 cfm/ft² @ 1.57 psf) when tested in accordance with ASTM E2357. The assembly shall accommodate movements of building materials by providing expansion and control joints as required. Expansion / control joints, changes in substrate and perimeter conditions shall utilize appropriate accessory materials.
- C. Vapor Permeance: The water vapor permeance shall be determined in accordance with ASTM E96/E96M and shall be declared by the material Manufacturer.
 - 1. Water vapor permeance required: less than or equal to 0.1 perms.
- D. Adhesion Performance: The membrane shall be fully adhered to the substrate without voids, pinholes, or blisters.
 - 1. Capable of withstanding combined design wind, fan and stack pressures, both positive and negative on the envelope without damage or displacement, and shall transfer the load to the structure. Fluid applied air barriers shall not displace adjacent materials in the air barrier assembly under full load.
 - 2. The air/moisture barrier assembly shall be joined in an air and watertight and flexible manner to the air barrier materials of adjacent assemblies, allowing for the relative movement of assemblies due to thermal and moisture variations and creep.
 - 3. Adhesion rates as stated by the material manufacturer depending on the substrate and tested per ASTM D4541.
- E. In locations where the critical building envelope components adhere/seal directly to the air barrier/transition membrane, the minimum adhesion value shall be 7.5 lb/in width.
- F. The air barrier must be durable to withstand the construction process and UV stable for the anticipated time that it will be exposed.
- G. Fire, Flame and Smoke Properties:
 - 1. NFPA 285 "Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load Bearing Wall Assemblies Containing Combustible Components" (coordinated with other specification sections)
 - 2. ASTM E119 "Standard Test Methods for Fire Tests of Building Construction and Materials"
 - 3. ASTM E84 "Standard Test Method for Surface Burning Characteristics of Building Materials"
 - 4. NFPA 268 "Standard Test Method for Determining Ignitability of Exterior Wall Assemblies Using a Radiant Heat Energy Source"
- H. Compatibility Properties: The wall air/moisture barrier will come into direct contact with various substrates and other exterior building enclosure assemblies to create an air and moisture tight system. All intersecting materials (sealants and transition membranes) shall be compatible and fully bonded to its substrate.

2.04 ACCESSORIES

- A. Requirement: Provide primers, transition strips, termination strips, joint reinforcing fabric and strips, joint sealants, counterflashing strips, flashing sheets and metal termination bars, termination mastic, substrate patching materials, adhesives, tapes, foam sealants, lap sealants, and other accessory materials that are recommended in writing by air-barrier manufacturer to produce a complete air-barrier assembly and that are compatible with primary air-barrier material and adjacent construction to which they may seal.
- B. Ultraconforming flashing (Detail Membrane): Self-adhesive, high-performance, flexible, acrylic detailing membrane
 - 1. Thickness: 38 mil
 - 2. UV resistance: Approved by manufacturer for up to 365 days of weather exposure
 - 3. Elongation capability: up to 370% in multiple directions
 - 4. Products:
 - a. 3M 3015 UC
 - b. Substitutions: Not permitted
- C. Thinners and Cleaners: As recommended by material manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Contractor shall examine substrates, areas, and conditions under which the air barrier assembly will be installed, with air barrier technical representative present, for compliance with requirements.
 - 1. Confirm site access logistics and scheduling requirements, including but not limited to use of scaffolding, lifts and staging.
 - 2. Verify that surfaces and conditions are suitable prior to commencing work of this section. Do not proceed with installation until unsatisfactory conditions have been corrected.
 - 3. Ensure that the following conditions are met:
 - a. Surfaces are sound, dry, even, and free of excess mortar or other contaminants.
 - b. Inspect substrates to be smooth without large voids or sharp protrusions. Inform General Contractor if substrates are not acceptable and need to be repaired by the concrete sub-trade.
 - c. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids in concrete with substrate-patching material.
 - d. Inspect masonry joints to be reasonably flush and completely filled, and ensure all excess mortar sitting on masonry ties has been removed. Inform Contractor if masonry joints are not acceptable and need to be repaired by the mason sub-trade.
 - 4. Verify substrate is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D4263 and take suitable measures until substrate passes moisture test as required by the Manufacturer.
 - 5. Verify sealants are compatible with membrane proposed for use. Perform field peel-adhesion test on materials to which sealants are adhered. Ensure that sealant and backer rod are in place and have cured within masonry back-up wall control and expansion joints prior to application of transition membrane.
 - 6. Notify Architect in writing of anticipated problems using fluid-applied membrane over substrate prior to proceeding.

3.02 PREPARATION

- A. Clean, prepare, and treat substrate according to material Manufacturer's written instructions. Provide clean, dust-free, and dry substrate for air barrier application.
- B. Ensure that penetrating work by other trades is in place and complete, including at all precast exterior wall assemblies.

- C. Prepare surfaces by brushing, scrubbing, scraping, grinding or compressed air to remove loose mortar, dust, oil, grease, oxidation, mill scale and other contaminants which will affect adhesion of the fluid-applied membrane.
- D. Wipe down metal surfaces to remove release agents or other non-compatible coatings using clean sponges or with a material chemically compatible with the primary air material.
- E. Concrete and Masonry: Prepare, treat, rout, and fill joints and cracks in substrate according to ASTM C1193 and air-barrier manufacturer's written instructions. Remove dust and dirt from joints and cracks complying with ASTM D4258 before coating surfaces.
- F. Prepare, treat, rout, and fill joints and cracks in substrate according to ASTM C1193 and air-barrier manufacturer's written instructions.
- G. Remove dust and dirt from joints and cracks complying with ASTM D4258 before coating surfaces.
- H. Prime substrate for installation of sheet membrane transition strips and as follows:
 - 1. Prime masonry, concrete substrates with conditioning primers.
 - 2. Prime glass-fiber surfaced gypsum sheathing an adequate number of coats to achieve required bond, with adequate drying time between coats.
 - 3. Prime wood, metal, and painted substrates with primer.
 - 4. Prepare, treat, and seal vertical and horizontal surfaces at terminations and penetrations through air barrier at protrusions.
 - 5. Clean, prime, treat and seal all seams any transitions membranes that have been installed to the liquid applied membrane after it has cured in accordance with the manufactures requirements.
 - 6. Apply primer for transition and self-adhering materials at all porous substrates at the rate instructed by the air barrier material Manufacturer for 1 inch beyond terminating edge of transition membrane. Allow primer to set/cure completely before transition strip application.
- I. Prime substrate for installation of fluid-applied air barrier if recommended by material manufacturer based on project conditions.
- J. Protection from spray-applied materials:
 - 1. Mask off adjoining surfaces not covered by air barrier to prevent spillage and overspray affecting other construction such as curtain wall surroundings. Masking shall be material that is readily removable without producing residue that will negatively affect the adhesion of the curtain walls primary sealant joint.
 - 2. Ensure any required foam stop or back up materials are in place to prevent over-spray and achieve complete seal.
- K. At changes in substrate plane, apply sealant or termination mastic beads at sharp corners and edges to form a smooth transition from one plane to another.
- L. Cover gaps in substrate plane and form a smooth transition from one substrate plane to another with stainless-steel sheet mechanically fastened to structural framing to provide continuous support for air barrier.
- M. Bridge isolation and expansion joints and minor discontinuous wall-to-wall, deck-to-wall, and deck-to-deck joints with air-barrier accessory material that accommodates joint movement according to manufacturer's written instructions and details.

3.03 INSTALLATION

- A. Install air barrier accessories and air barrier material to provide continuity throughout the building envelope in a shingle fashion. Install materials in accordance to air/moisture barrier manufacturer's written instructions, approved shop drawing and Contract Documents to form a seal with adjacent construction and ensure continuity of air and water barrier.

- B. Coordinate and connect and seal compatible exterior wall air/moisture barrier transition material continuously to roofing membrane vapor retarder, concealed flashing, below grade waterproofing, floor-to-floor construction, window, door and louver systems, and other construction used in exterior wall openings, using accessory materials according to air/moisture barrier manufacturer's written instructions, approved shop drawing and Contract Documents to form a seal with adjacent construction and ensure continuity of air and water barrier.
- C. Provide transition material at changes in substrate plane (with bead of sealant/mastic, membrane counter-flashing or other material recommended by material Manufacturer) under membrane to eliminate all sharp 90 degree inside corners and to make a smooth transition from one plane to another.
- D. Use full sheets of transition membrane to minimize and limit the number of seams within the sill, head and jamb return of windows, doors and louvers. Cut and tightly overlap material at head-jamb and sill-jamb intersections in accordance with the approved shop drawings to minimize build-up. Coordinate with other trades and install only compatible sealant/mastic at exposed or rough cut seams within window, door and louver openings. Do not extend air barrier transition membrane into curtain wall returns that will receive the primary sealant joints of the curtain wall.
- E. Position subsequent sheets of self-adhering transition material so that membrane overlaps the membrane sheet below by a minimum of 2 inches, unless greater overlap is recommended by the material Manufacturer.
- F. Ensure self-adhering transition membrane is securely adhered with specialized hand roller. Utilizing other tools, such as knife blades and hand pressure are not acceptable.
- G. Seal around all penetrations with termination mastic/sealant, membrane counter-flashing or other procedure in accordance with material Manufacturer's instructions, ensuring chemical and adhesive compatibility with adjoining materials.
- H. Apply a bead or trowel coat of mastic along self-adhering transition membrane seams at reverse lapped seams, rough cuts, and as recommended by the material Manufacturer. Exposed upper edges of membranes are not allowed.
- I. Terminate top edge of the self-adhered membrane to substrate with termination mastic at end of each working day and protect the wall above from accumulating moisture that may negatively affect the bond of the in-place air barrier.
- J. Install fluid-applied membrane using equipment and methods recommended by Manufacturer. Installer shall continually test the thickness of surface applied membrane using a wet mil gauge during installation to ensure that the dry film thickness meets the required project and material Manufacture requirements.
- K. Install fluid applied membrane uniformly and air/water tight around all embedded masonry ties.
- L. Coordinate with other trades so that all post installed anchors/straps or supports (installed by other trades) are set in manufacturer compatible sealant and cap sealed around plate/strap and anchor air and watertight.
- M. Inspect installation prior to enclosing assembly and repair punctures, damaged areas and inadequately lapped seams with a patch of membrane lapped as recommended by material Manufacturer. Coordinate with other trades that may be penetrating or covering the air barrier.
- N. Do not cover air barrier until it has been tested and inspected by testing agency.

3.04 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements for additional requirements.
- B. Periodic observation and wet mil testing by Owner's Consultant during construction. Periodic ASTM E1186-4.2.7 during Owner's Consultants site visits.
- C. ASTM D4541 testing if workmanship appears to be unacceptable.

3.05 CLEANING AND PROTECTION

- A. Protect air-barrier system from damage during application and remainder of construction period, according to manufacturer's written instructions.
 - 1. Protect air barrier from exposure to UV light and harmful weather exposure as recommended in writing by manufacturer. If exposed to these conditions for longer than recommended, remove and replace air barrier or install additional, full-thickness, air-barrier application after repairing and preparing the overexposed materials according to air-barrier manufacturer's written instructions.
 - 2. Protect air barrier from contact with incompatible materials and sealants not approved by air-barrier manufacturer.
- B. Clean spills, stains, and soiling from construction that would be exposed in the completed work using cleaning agents and procedures recommended in writing by manufacturer of affected construction.
- C. Remove masking materials after installation.

END OF SECTION

SECTION 07 5300
ELASTOMERIC MEMBRANE ROOFING

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Thermal barrier
 - 2. Vapor retarder
 - 3. Insulation
 - 4. EPDM membrane roofing and flashings
 - 5. Roof hatch
- B. Products Installed But Not Furnished Under This Section:
 - 1. Sheet metal caps, sleeves, and umbrella hoods
- C. Related Sections
 - 1. Section 05 5200 – Guardrails
 - 2. Section 06 1005 – Roof-Related Rough Carpentry
 - 3. Section 07 6205 – Roof-Related Sheet Metal Flashing
- D. New Roof Systems: Areas 1.1, 1.2, and 1.3
 - 1. Refer to the Roof Type Details on the Drawings for specific roof system components.
 - 3. Install roof membrane flashing at primary and overflow roof drains, roof hatch, mechanical curbs, vents, and control joints, etc. as shown on the Drawings. Provide ballasted guardrails.
 - 4. Provide and install new sheet metal flashings.

1.02 SUBMITTALS

- A. Product Data:
 - 1. Thermal barrier
 - 2. Vapor retarder
 - 3. Insulation, each type
 - 4. Membrane and flashings
 - 5. Membrane manufacturer's associated materials
 - 6. Flashing, each type
- B. Shop Drawings:
 - 1. Tapered insulation system
 - 2. Plan view representations of roof system assembly attachment, including but not limited to, visual representation of fastener and adhesive bead spacing, frequency, patterns, etc. as applicable and intended to be provided on this Project to meet or exceed resistance of the wind pressures indicated on the Structural Drawings.
- C. Description of roof system attachment, including product description, frequency, spacing, and patterns as appropriate to meet or exceed resistance of the wind pressures indicated on the Structural Drawings.
- D. Certifications
 - 1. Provide manufacturer's certification letter that all submitted products intended for installation on this Project meet manufacturer's requirements and that the Contractor is acceptable to the manufacturer of the accepted roofing system.

2. Provide manufacturer's written confirmation that the submitted shop drawings representing roof system assembly attachment intended for this Project meets or exceeds resistance of the wind pressures indicated on the Structural Drawings.

1.03 QUALITY ASSURANCE

- A. Roof system assembly attachment shall meet or exceed the minimum design wind pressure resistance capacities indicated on the Structural Drawings.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Store materials between 60 and 80 F. When ambient temperatures fall below 60 F, Contractor is responsible for providing heated storage areas for materials. Heat storage area in a manner which does not pose a fire hazard.
- B. Apply adhesives and sealants at room temperature, 60 to 80 F. Expose only enough materials to colder temperatures that can be applied within these limits. Restore to room temperature when exposed to lower temperatures prior to use.
- C. Provide continuous protection of materials against wetting and moisture absorption.
- D. Heed manufacturer's cautions regarding safe handling, use, and storage of materials.

1.05 PROJECT CONDITIONS

- A. Environmental requirements: Wind velocity and temperature limitations shall be based on the Contractor's ability to apply materials in the specified manner. Splicing and seaming work shall not be conducted when ambient conditions cause condensation to form at splicing and seaming locations, when ambient temperature is below 0 F, or when wind-chill factor is below -20 F.
- B. Protection:
 1. Install temporary insulation seal-offs at the completion of each day's work and completely remove upon resumption of work.
 2. Coordinate application of membrane to provide protection of underlying materials from wetting or other damage by the elements on a continuous basis.
 3. Completely install sheet metal sleeves, caps, or enclosures on a daily basis.
 4. Torches are not permitted on the roof.

1.06 WARRANTY

- A. Warranties shall be dated no earlier than the date of the Certificate of Substantial Completion established by the Architect/Engineer.
- B. Manufacturer's Warranty:
 1. 30-year NDL: Prior to acceptance of Work, furnish roof system manufacturer's written 30-year NDL full system warranty
 - a. Wind speed coverage up to 72 mph
 - b. Include a final inspection report provided by the manufacturer's representative certifying compliance with specified warranty requirements.
- C. Contractor's Warranty:
 1. Prior to acceptance of Work, furnish written 5-year warranty covering all roofing work specified herein using the form at the end of this Section. Contractor's warranty shall cover the period of time ending five years after the date of Substantial Completion established by the Architect/Engineer.
 2. The Contractor's warranty period is not intended to correspond with the term of the Performance Bond. Term of bond is one year and is not required to extend through the term of the Contractor's warranty.

1.07 WORK SCHEDULE AND LIQUIDATED DAMAGES

- A. Roof-Related Pre-Construction Conference (applies to work associated with roof-related Specification Sections 06 1005, 07 5300, and 07 6205):
1. Prior to starting any Work on the Contract, the Architect, Owner, Owner's representative, Owner's roofing observer, the General Contractor and the roofing subcontractor shall meet at the site to discuss procedures, schedules, review submittals, etc. for the Work. The roofing contractor's manpower scheduler and foreman, who shall be on the Project full-time directing the Work, and the roofing contractor's sheet metal foreman and other subcontractors' foremen, shall attend this meeting. If the roofing contractor's foremen are not present at this scheduled meeting, the meeting will be canceled and rescheduled at roofing contractor's expense.
- B. Schedule:
1. Crew size: Roof work shall be conducted by crews of no less than six (6) workers.
 2. Sequencing:
 - a. Roof-related work shall be constructed in segments of not less than one (1) full roof working day and a minimum of 40 hours per week. Contractors shall staff crew accordingly to accomplish roof-related work within the number of roof working days intended. General Contractor and roofing-related subcontractors shall coordinate and provide a written schedule on how they intend to meet working days allotted (see Submittals).
 - b. Work shall be conducted between the hours of 7 AM to 5 PM, Monday through Friday of each week. Work on other than those hours or days specified, including legal holidays, school holidays, Saturdays and Sundays may be granted provided a request is made at least 48 hours in advance and that Contractor assumes all responsibility for safeguard of Owner's property
 3. Completion: Contractor shall complete all roof work within 40 roof working days/10 weeks. This applies to all roof-related work included in this Section and Sections 06 1005 and 07 6205.
- C. Notification: At least 14 calendar days before beginning Work covered by this Section (and associated roof-related Sections included herein) and a minimum of two business days prior to subsequent Work, the roofing contractor shall inform the Architect/Engineer in writing of when Work will be performed.
- D. Definition: For the purpose of this Contract, a "roof working day" is defined as any date that roofing work is done or can be done on the Project as determined by the roofing construction observer. Nonworking days could result if bad weather arises. Documentation will be made by the Owner's roofing consultant each day on a daily field report as to whether the day is to be considered a roof working day or a non-roof working day.
- E. Liquidated Damages: In accordance with the provisions as set forth in Article 8 of the General Conditions, the Contractor shall pay to the Owner as fixed, agreed, and liquidated damages for each roof working day of delay beyond the time of completion until the Work is completed or accepted, the sum of One Thousand No/100 Dollars (\$1,000.00) per roof working day and the Contractor and his sureties shall be liable for the amount thereof. Liquidated damages will be enforced by a deduct Change Order to the Contract.

PART 2 PRODUCTS

2.01 GENERAL

- A. Use a single manufacturer for all roof types.
- B. All products are to be approved by membrane manufacturer to meet requirements for the full system warranty specified and a UL Class A fire rating. The assembly with foam plastic insulation shall pass NFPA 276 or UL 1256.
- C. Approved Manufacturers:
 - 1. Carlisle
 - 2. Elevate
 - 3. Johns Manville
 - 4. Versico

2.02 THERMAL BARRIER

- A. Non-structural glass mat faced, non-combustible, water-resistant, treated gypsum core panel for use in commercial roof assemblies, 1/2" thick
 - 1. Georgia-Pacific
 - 2. USG

2.03 VAPOR RETARDER

- A. Self-adhering, vapor impermeable sheet:
 - 1. Carlisle 725 TR Air and Vapor Barrier
 - 2. Elevate V-Force Vapor Barrier
 - 3. Johns Manville JM Vapor Barrier SAR
 - 4. Verisco VapAir Seal 725 TR
- B. Primer: As recommended by the vapor retarder manufacturer

2.04 INSULATION

- A. Isocyanurate:
 - 1. Flat stock: Closed-cell polyisocyanurate foam core with fiberglass facers both sides, meeting ASTM C1289, Type II, Class 1, Grade 2 (20 psi), dimensional stability of 2%, 24 hr minimum cure time plus an additional 24 hours per inch, and a maximum board thickness of 2". Maximum 4' by 4' boards. All packages shall have RIC/TIMA label
 - 2. Tapered: Factory-fabricated isocyanurate insulation with slope as shown on the Drawings. Direction changes shall use mitered boards.
 - 3. High-density isocyanurate as approved by membrane manufacturer for warranty requirements, maximum 1/2" thick
 - a. Manufacturer's responsibility to meet new insulation R-value as indicated in the code information on Drawing Title Sheet
- B. Batt: ASTM C665, Type 1, preformed glass fiber batt
 - 1. For filling acoustical steel deck flutes: 0.75 pcf inert, non-organic fiberglass batts, supplied by acoustical deck manufacturer; Vulcraft, Wheeling, or equal
- C. Spray polyurethane foam (SPF): Two-component polyurethane spray foam system Class A fire-rated, 1.75 psf density, with 25/105 flame spread/smoke developed per ASTM E84 / UL 723 @ 4" wide by 2" thick, R-value 6.6 initial, 6.0 cured
 - 1. Froth-Pak by Dow
 - 2. Handi-Foam by ICP Building Solutions Group

2.05 ELASTOMERIC MEMBRANE

- A. EPDM (ethylene-propylene-diene monomer), ASTM D4637 Type 1 (non-reinforced). Sheets shall be as large as possible.
 - 1. Thickness: 90 mil
 - 2. Application: Fully-adhered
 - 3. Color: White
- B. Provide related materials from the same manufacturer as roof membrane and install in compliance with manufacturer's general recommendations if not specifically noted herein.
 - 1. Adhesives, sealants, and surface cleaner
 - 2. Seam tape: Minimum 6" wide factory-applied seam tape; or field-applied seam tape
 - 3. Membrane securement strip: Reinforced EPDM fastening strip with 2" diameter metal plates
 - 4. Termination bar: 1/8" x 1" aluminum with pre-drilled holes at 6" on-center
 - 5. Walkway pads

2.06 ELASTOMERIC FLASHINGS

- A. Cured EPDM flashing sheet, 60 mil thick
- B. Uncured EPDM flashing sheet, 60 mil thick
- C. Preformed EPDM pipe sleeves: Factory prefabricated, 60 mil

2.07 FASTENERS

- A. Thermal Barrier to Steel Deck:
 - 1. Self-tapping #12 or #14 fluorocarbon coated screw with drill point, through minimum 6.5 sq. in. hot-dipped galvanized steel plate. Plates and screws must be clearly labeled from the same manufacturer and shall be intended to be used together.
 - a. White screws shall be used in areas where deck is exposed on the interior.
 - 2. Install screws with manufacturer's recommended screw guns and bit sizes.
 - 3. Minimum pull-out strength of 300 lb. per fastener.
 - 4. Minimum 3/4", maximum 1-1/4" penetration through flanges. Length to penetrate top of deck but not to extend below the bottom of the rib. Change screw length in tapered insulation sections to meet this criterion.
- B. Flashing to lumber: Galvanized 1-1/2" barbed roofing nails through 1" metal discs
- C. Membrane securement strip to wood or masonry: Coated screws as recommended by the manufacturer, with minimum 1" penetration into substrate. Install screw with manufacturer's approved screw guns.
- D. Termination bar to wood or masonry: As required by membrane manufacturer
- E. Scupper flanges to wood blocking: 1-3/4" galvanized roofing nails

2.08 MISCELLANEOUS

- A. Low rise foam adhesive: As recommended by the membrane manufacturer
- B. Mastic: One-part, low viscosity, self-wetting butyl mastic
- C. Air Stop:
 - 1. Cured EPDM flashing sheet: 45-mil thick
 - 2. Butyl tape: Double-sided
 - 3. Adhesive
 - 4. Other products as required by the membrane/flashing manufacturer

- D. Separation detail membrane: York 304 SA by York Mfg, self-adhering stainless steel flashing, flexible 2 mil sheet of Type 304 stainless steel laminated on one side to 10 mil butyl adhesive and a siliconized release liner or approved equal. Contractor shall verify compatibility with uncured flashing and air barrier designed by others.
- E. Vent Pipe Extensions:
 - 1. PVC pipe: Equivalent diameter of vent pipe, ASTM D2665, Schedule 40
 - 2. Hubless cast-iron soil pipe: CISPI 301, service weight, with joints conforming to CISPI 310
 - 3. No-hub connectors: Neoprene pipe sleeves with stainless steel drawbands, ASTM C564
- F. Roof Hatch: Pre-fabricated, insulated galvanized steel curb, size as indicated on the Drawings. Prime and paint to match sheet metal flashing.
 - 1. Babcock Davis Type BRHPG
 - 2. Bilco Type S manufactured by
 - 3. Nystrom Building Products Type RHP
 - 4. Safety Rail

PART 3 EXECUTION

3.01 GENERAL

- A. All products are to be installed in accordance with membrane manufacturer's requirements to meet the specified warranty requirements.

3.02 PREPARATION OF SURFACES

- A. Surfaces to receive new materials shall be free of all dirt, debris, loose materials, and free moisture in any form. Mechanically scrape exposed surface if necessary to remove projections.
- B. Verify that surfaces to receive new materials have no defects or errors that would result in poor application or cause latent defects in workmanship.
- C. Prepare surfaces to receive and to be compatible with new membrane or flashings or separate with 1/2" plywood.
- D. Torches will not be permitted on the roof.

3.03 DECK JOINTS

- A. Concrete deck joints less than 2": Install backer rod in the joints and cover joint with 6" wide uncured neoprene flashing with compatible adhesive where self-adhering vapor retarder is not provided.
- B. Concrete deck joints 2" - 4": Install 24-gauge sheet metal plate, fastened to one side of joint with all edges of sheet metal covered with 6" wide uncured neoprene flashing with compatible adhesive where self-adhering vapor retarder is not provided.
- C. Steel deck joints less than 4": Install 24-gauge sheet metal plate lapped minimum 6" onto deck, fastened on one side. Provide fiberglass batt insulation in deck flutes beneath metal plate.
- D. Openings greater than 4" shall be brought to the attention of the Architect for further instruction.

3.04 THERMAL BARRIER

- A. Mechanically fasten to the steel deck in pattern recommended by the manufacturer to meet or exceed wind uplift pressure resistance (DWPR) capacities indicated on the Drawings.

- B. Stagger panel end joint with respect to each other and all joints. Butt panel ends and edges.

3.05 VAPOR RETARDER

- A. Install self-adhering sheet in accordance with manufacturer's recommendations.

3.06 INSULATION

- A. No moisture content in the insulation will be permitted at time of application.
- B. Stagger joints between layers where multiple layers are used or where installed over existing insulation. Stagger joints a minimum of 25% of the board dimension. Maximum 1/4" joint width allowed.
- C. Install insulation and cover board in low rise foam adhesive.
 - 1. Install insulation in adhesive beads following manufacturer's written instructions (approved submittal). Use bead spacing as required to meet or exceed resistance of the wind pressures indicated on the Structural Drawings.
 - 2. Adhesive shall be applied only to properly prepared and pre-approved substrates, free of debris, dirt, grease, oil, or moisture.
 - 3. Minimum product temperature at time of application shall be 70 F. Adhesive shall not be applied when surface or ambient temperatures are below 40 F or above 110 F.
 - 4. Insulation shall be fully bonded to the substrate with maximum 4' x 4' board size.
 - 5. Place boards onto adhesive beads and walk on the boards, spreading the adhesive for maximum contact. A second walking over will be required after 10 minutes to ensure maximum contact and bond strength.
 - 6. A flat, uniform surface shall be achieved prior to installation of subsequent materials.
- D. Fill voids with insulation as shown on the Drawings.
- E. Install tapered insulation in accordance with Project and approved shop drawings.
- F. Provide batt insulation at locations indicated on the Drawings.

3.07 FULLY-ADHERED EPDM MEMBRANE

- A. Position membrane roll at a location that will not overload the deck structure. Place membrane over insulation or cover board (as detailed) without stretching and without disturbing insulation and allow the membrane to relax for approx. 1/2 hour before splicing.
- B. Lap adjoining sheets a minimum of 6" for a minimum 6" splice. Laps shall be a minimum of 4 feet apart from any roof drain.
- C. Smoothly fold back half the membrane sheet without wrinkles or buckles. Apply adhesive evenly to both back of membrane and surface of substrate evenly without globs and puddles per approved shop drawings. Allow adhesive to dry until tacky, without stringing or sticking to a dry finger touch.
- D. Roll membrane into adhesive without wrinkles or buckles and brush down with a push broom to ensure complete contact.
- E. Fold back other half of membrane and repeat above procedures.
- F. Take special care to ensure that no bonding adhesive is applied to the splice area.
- G. Membrane splicing with factory-applied seam tape: Install per membrane manufacturer's written instructions.

- H. Membrane splicing with field-applied seam tape: Follow membrane manufacturer's requirements to meet specified DWPR capacities and warranty requirements. Manufacturer's requirements take precedence, however in general, install as follows.
 - 1. Apply primer in a thin, even coat to both membrane surfaces in the splice area. Splice areas shall be uniform in color, streak-free, and free of globs or puddles. Allow to dry.
 - 2. Mark bottom membrane sheet 1/2" from the edge of the top sheet along the entire splice length.
 - 3. Unroll tape, align paper backing with marked line, and press tape down to bottom sheet using firm even hand pressure. Continue for length of splice.
 - 4. Pull paper backing from the splice tape beneath the top sheet and allow the top sheet to fall freely onto the exposed tape.
 - 5. Press top sheet onto tape using firm, even, hand pressure across splice towards the splice edge.
 - 6. Immediately roll the splice with a 2" wide steel roller using positive pressure. Roll across the splice edge, not parallel to it.
- I. Fasten membrane securement strip at 6" on-center.
- J. Bond an additional layer of membrane to the primary membrane with splicing adhesive beneath splashblocks and pipe supports. Provide manufacturer's protective mat between membrane and pavers.
- K. Install vent stack extensions where necessary to obtain minimum 12" flashing height.

3.08 ELASTOMERIC FLASHING

- A. Install where roofing system joins vertical surfaces on a daily basis.
- B. Cured flashings are required unless detail construction does not allow satisfactory installation. Install uncured flashings at those locations, and at all corners.
- C. Install flashing using the longest pieces practicable, not exceeding 30 feet, fully bonding the flashing to the membrane before fully bonding to the vertical surface. Fully bond cured flashing even at transitional locations or reflashings with uncured materials will be required.
- D. Fun factory splices in the cured flashing horizontally. Do not place in the splice to membrane area, or at the inside angle transitioning to the vertical surface. Stagger horizontal factory splices on vertical surfaces.
- E. Extend flashing a minimum of 6" beyond membrane securement strip on both sides.
- F. Thoroughly clean surface of membrane in the splice area with surface cleaner using clean rags.
- G. Use splicing adhesive applied at the manufacturer's recommended rate at locations where flashing is applied over EPDM membrane or meta.
- H. Use flashing adhesive applied at the manufacturer's recommended rate at locations where flashing is applied to substrates other than EPDM or metal.
- I. Apply adhesive to the flashing and to the surface to which the flashing is to be applied, allow the adhesive to become tacky such that it does not string or stick to a dry finger touch, and roll the flashing into place taking care to make full surface contact so bridging does not occur.
- J. Use surface cleaner to clean the splice edge, minimum 1" either side of the edge, apply a bead of sealant to completely cover the splice edge and feather onto sheets. Seal the same day installed, but no sooner than 60 minutes after splice has been completed.
- K. At wood substrates, nail the top of the flashing at a maximum of 12" on-center and seal the top edge with a bead of sealant.

- L. At concrete or masonry substrates, or at other locations indicated on the Drawings, set the top edge of the flashing in minimum 1-1/2" wide bed of mastic (or other product required by the membrane manufacturer) and install a termination bar, sealed at the top with compatible sealant.
- M. Install preformed flashing sleeves in a similar manner to other flashings using mastic and clamping ring at top of sleeve.

3.09 ROOF DRAINAGE

- A. Thoroughly clean bottom surface of membrane in the clamping area with surface cleaner using clean rags.
- B. Apply membrane to drain using full application of mastic and install clamping ring.
- C. Temporarily protect roof drains. Sections of insulation board may be cut to fit into drain base to keep debris from falling into drain leaders. Remove temporary protection prior to precipitation.
- D. Set and secure scupper flanges through a continuous bed of mastic as shown on the Drawings. Provide flashing over scupper flanges.

3.10 SEAL-OFF

- A. Provide watertight, wind resistant condition at the end of each day's work.
- B. As a minimum, the seal-off shall consist of:
 - 1. Fully bonded separation sheet if wet materials are encountered or suspected below the existing membrane
 - 2. Unbonded insulation filler boards to support the new EPDM membrane
 - 3. EPDM roof membrane spliced to the underside of the existing membrane
 - 4. Continuous 2 x 4 installed parallel with the seal-off
 - 5. Sandbag ballast to resist the wind, minimum 3' on-center
- C. Completely remove the seal-off at the continuation of the Work.

3.11 FIELD QUALITY CONTROL

- A. Withdrawal tests of fasteners and nailers may be required if attachment is in question.
- B. Sample of the flashing may be taken to determine the degree to which it has cured prior to installation.
- C. A sample of the completed splice may be required if in question, at a location selected by the Architect/Engineer. Patching of the test opening shall be by the Contractor using standard splicing methods.
- D. Field tests may be performed by Architect/Engineer to evaluate moisture content of installed materials.
- E. Application of the roof system shall be checked by the Contractor and may be checked by the Architect/Engineer.

3.12 CLEANING

- A. Remove all roofing materials from surfaces not specified to receive these materials such as walls, walkways, metal flashings, etc.
- B. Staining or damage caused by solvent or oil spills shall be repaired.

END OF SECTION

ELASTOMERIC ROOFING WARRANTY

Owner:

Street Address:

City

State

Zip

Project Name:

Project No.

Project Address:

Date of Final Acceptance:

Roofing Installation Contractor:

Street Address:

City

State

Zip

Phone No. ()

Email:

This warranty stipulates that the above-named Contractor shall, during a period of five (5) years from the date of Substantial Completion of the Work, maintain the roof system, including the wood blocking, vapor retarder, insulation, roof membrane and flashings, in a watertight condition and repair all defects which result from faulty workmanship or defective materials, without further cost to the Owner, including replacement of wet insulation caused by such defects.

Excluded from this warranty may be any and all damage to said roof, the buildings or their contents, caused by acts or omissions of the Owner; fire, lightning, winds of peak gust speeds of 72 mph or higher measured at 10 meters above the ground, hailstorm, or other unusual phenomenon of the elements; movement or failure of the supporting building structure that causes membrane or flashing failure; or vapor condensation beneath the roof.

Exclude from this warranty damages to the building or the contents.

Before expiration of the above warranty period, the above-named Contractor shall inspect the roof in the presence of the Owner and make necessary correction of all deficiencies not considered normal. The warranty shall remain in force until the necessary repair work has been done.

ROOFING INSTALLATION CONTRACTOR

Signature

Printed Name

Title

Date

SECTION 07 6201
NON-ROOF RELATED SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fabricated sheet metal items, including flashings and counterflashings not specified elsewhere.
- B. Sealants for joints within sheet metal fabrications.

1.02 REFERENCE STANDARDS

- A. AAMA 611 - Specification for Anodized Architectural Aluminum; 2024.
- B. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.
- C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.
- D. ASTM A666/A666M - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2024.
- E. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018 (Reapproved 2024).
- F. CDA A4050 - Copper in Architecture - Handbook; Current Edition.
- G. SMACNA (ASMM) - Architectural Sheet Metal Manual; 2012.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, installation locations including adjacent materials, and details.
- C. Samples: Submit two samples, 4 by 4 inches in size, illustrating metal finish color.

1.04 QUALITY ASSURANCE

- A. Perform work in accordance with SMACNA (ASMM) and CDA A4050 requirements and standard details, except as otherwise indicated.
- B. Maintain one copy of each document on site.
- C. Fabricator and Installer Qualifications: Company specializing in sheet metal work with five years of documented experience.
- D. Fabricate and install exterior sheet metal flashing and trim to withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failing, rattling, leaking, or fastener disengagement.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. See Section 01 7419 - Construction Waste Management and Disposal for packaging waste requirements.
- B. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.
- C. Prevent contact with materials that could cause discoloration or staining.

1.06 WARRANTY

- A. Warranty: Provide three (3) year written warranty covering materials and installation for sheet metal.
 - 1. Include that system shall be watertight and weather-proof.
 - 2. Warranty shall be manufacturer, fabricator, installer, and Contractor, jointly and severally, and signed by offices of each company.

- B. Finish Warranty: Provide a Manufacturer's 20-year written warranty for color-coated sheet metal covering color fade, chalk, and film integrity.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Sheet Metal Flashing and Trim:
 - 1. ALUCOBOND by 3A Composites USA: www.alucobondusa.com/#sle.
 - 2. Fairview Architectural LLC: www.fairview-na.com/#sle.
 - 3. Petersen Aluminum Corporation: www.pac-clad.com/#sle.
 - 4. Taylor Metal Products: www.taylormetal.com/#sle.
 - 5. _____.
 - 6. Substitutions: See Section 01 6000 - Product Requirements.

2.02 SHEET MATERIALS

- A. Pre-Finished Aluminum: ASTM B209 (ASTM B209M); 18 gauge, 0.05 inch thick; plain finish shop pre-coated with fluoropolymer coating.
 - 1. Fluoropolymer Coating: High Performance Organic Finish, AAMA 2604; multiple coat, thermally cured fluoropolymer finish system.
 - 2. Color: As selected by Architect from Manufacturer's full range of colors.
- B. Stainless Steel: ASTM A666/A666M, Type 304 alloy, soft temper, 26 gauge, ____ inch thick; smooth No. 4 - Brushed finish.

2.03 FABRICATION

- A. Form sections true to shape, accurate in size, square, and free from distortion or defects.
- B. Form pieces in longest possible lengths.
- C. Hem exposed edges on underside 1/2 inch; miter and seam corners.
- D. Form material with flat lock seams, except where otherwise indicated; at moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.
- E. Fabricate corners from one piece with minimum 18-inch long legs; seam for rigidity, seal with sealant.

2.04 FLASHING PANELS

- A. Flashing Panels for Exterior Wall Penetrations: Premanufactured components and accessories as required to preserve integrity of building envelope; suitable for conduits and facade materials to be installed.

2.05 ACCESSORIES

- A. Fasteners: Same material and finish as flashing metal, with soft neoprene washers.
- B. Primer Type: Zinc chromate.
- C. Protective Backing Paint: Zinc molybdate alkyd.
- D. Concealed Sealants: Non-curing butyl sealant.
- E. Exposed Sealants: ASTM C920; elastomeric sealant, with minimum movement capability as recommended by manufacturer for substrates to be sealed; color to match adjacent material.

PART 3 EXECUTION

3.01 PREPARATION

- A. Install starter and edge strips, and cleats before starting installation.
- B. Install surface mounted reglets true to lines and levels, and seal top of reglets with sealant.
- C. Back paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 15 mil, 0.015 inch.

3.02 INSTALLATION

- A. Secure flashings in place using concealed fasteners.
- B. Apply plastic cement compound between metal flashings and felt flashings.
- C. Fit flashings tight in place; make corners square, surfaces true and straight in planes, and lines accurate to profiles.
- D. Seal metal joints watertight.
- E. Provide for separation of dissimilar metals or corrosive substrates by coating concealed surfaces with bituminous coating or other permanent separation as recommended by manufacturer / fabricator. Provide sawcut reglets as necessary for complete installation.
- F. Interior closure panels: Form metal into shapes where non-standard trim pieces are required to conceal the removal of mechanical equipment in the 700 Building.

3.03 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements for field inspection requirements.
- B. Inspection will involve surveillance of work during installation to ascertain compliance with specified requirements.

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SECTION 07 6205
ROOF-RELATED SHEET METAL FLASHING

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Roof-related sheet metal flashing
 - 2. Roof-related joint sealants
- B. Products Furnished But Not Installed Under This Section:
 - 1. Caps, sleeves, and umbrella hoods
- C. Related Sections:
 - 1. Section 06 1005 – Roof-Related Rough Carpentry
 - 2. Section 07 5300 – Elastomeric Membrane Roofing

1.02 SUBMITTALS

- A. Product Data:
 - 1. Color-coated sheet metal
 - 2. Joint sealant
- B. Shop Drawings: All sheet metal including typical seaming and sheet metal to sheet metal connections.
- C. Test Results: If Contractor proposes new cap flashing which deviates from the Project Drawings, proposed substitution must be in accordance with the design intent of the Project and test results must be submitted verifying compliance with requirements in Quality Assurance Article herein.
- D. Sample: Sheet metal manufacturer's standard color chart
- E. Warranties: Signed warranty forms as part of Closeout submittals

1.03 QUALITY ASSURANCE

- A. This Project's sheet metal roof edge securement design and detailing shall be per NRCA's design and third-party validated shop-formed details meeting the current MN Building Code ANSI-SPRI ES-1 requirement. Substitution will be allowed provided it demonstrates (via the submittal process) that it meets the current MN Building Code ANSI-SPRI ES-1 requirement.
- B. Factory shall have capability to show conformance with National Coil Coater's Association Technical Bulletins for factory color-coated steel.
- C. Manufacturer to provide factory applied protection for finished color-coated sheet metal by means of a strippable plastic film.
- D. Sheet metal items not specifically noted on the Drawings or in the Specifications shall be in accordance with recommendations of The Architectural Sheet Metal Manual published by Sheet Metal and Air-Conditioning Contractors National Association, Inc. (SMACNA)

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Store flammable materials in conformance with fire codes and in a manner that will not create a potential fire hazard.
- B. Exercise care during fabrication and erection to avoid damage to the finished surface.
- C. Store color-coated sheet metal in a manner that will protect it from sun exposure up until the time of installation.

- D. Store sheet metal components in a manner that will keep them clean and dry until installed.

1.05 PROJECT CONDITIONS

- A. Protection:
 - 1. Prevent damage to new or existing materials, including protection from damage by ladders and other equipment. Potentially damaging materials such as metal scraps, acid flux, and other debris shall not be permitted to come into contact with the roof surface.
 - 2. Suitable fire extinguishing equipment shall be immediately available at all locations where soldering, welding, or cutting equipment is used.
 - 3. Maintain a fire watch wherever soldering, welding, or cutting is performed.
- B. Construction Schedule: Install sheet metal as soon as possible after membrane work has been completed. Sheet metal work shall be fully complete by the given completion date.

1.06 WARRANTY

- A. Warranties shall be dated no earlier than the date of the Certificate of Substantial Completion established by the Architect/Engineer.
- B. Manufacturer's Warranty: Prior to acceptance of the Work, furnish written finish warranty for color-coated sheet metal as follows:
 - 1. 35-year for adhesion
 - 2. 20-year for fade and chalk
- C. Contractor's Warranty:
 - 1. Prior to acceptance of the Work, furnish written 5-year warranty covering all roofing work specified herein, using the form at the end of this Section. The Contractor's warranty shall cover the period of time ending five years after the date of Substantial Completion.
 - 2. The Contractor's warranty period is not intended to correspond with the term of the Performance Bond. Term of bond is one year and is not required to extend through the term of the Contractor's warranty.

1.07 ROOF-RELATED WORK SCHEDULE AND LIQUIDATED DAMAGES

- A. Refer to Section 07 5300 for requirements that also apply to this Section.

PART 2 PRODUCTS

2.01 SHEET METAL

- A. Use a single manufacturer for all sheet metal materials.
- B. Color-coated steel: Kynar 500 / Hylar 5000 PVDF finish factory applied to G90 24-gauge galvanized steel, ASTM A653. Touch-up paint shall be color match as recommended and supplied by the sheet metal manufacturer.
 - 1. Color shall match existing from manufacturer's standard colors. Verify with Owner at the pre-construction conference.
 - 2. Acceptable Materials:
 - a. ColorKlad by CMP Metals
 - b. Pac-Clad by Peterson Aluminum
 - c. UNA-CLAD by Holcim Elevate
 - d. Ultra-Clad by Coated Metals Group
- C. Galvanized steel: ASTM A653, G90, commercial quality

- D. Bonderized steel for soldered sheet metal items intended to match color-coated sheet metal flashings. Prep, prime, and paint to match adjacent sheet metal.
 - 1. Paint Grip bonderized steel; phosphate etched galvanized steel, ASTM A653, commercial quality, G90 coating designation
 - 2. Primer and touch-up paint as recommended by the sheet metal manufacturer

2.02 FASTENERS

- A. Fasteners shall be of same material as flashings on which they are used and shall be of type and size as shown on the Drawings or as specified herein, unless noted otherwise. Exposed fasteners through sheet metal shall match new sheet metal color.
 - 1. Zinc plated for galvanized steel
- B. EPDM washers: Fasteners exposed to the weather shall have EPDM washers under heads to ensure watertightness.
- C. Sheet Metal to Wood:
 - 1. Where exposed: No. 8 minimum size steel hex head screw, 1-1/2" long. Minimum 150 lbs. per screw installed withdrawal resistance.
 - 2. Where not exposed: Minimum #14 flat head wood screw
- D. Sheet metal to sheet metal: Self-tapping screws, 1/2" long and minimum #3 diameter
- E. Sheet metal to concrete or masonry: Tapcon Blue Climaseal hex head threaded removable masonry anchor, 1/4" minimum diameter, length to penetrate masonry minimum 1". Minimum 300 lbs. per anchor installed withdrawal resistance

2.03 ROOF RELATED JOINT SEALANT

- A. ASTM C920, Type S or M, Grade NS, Class 25, Use M (masonry), color selected and approved by Owner.
 - 1. Sikaflex NP 1
 - 2. Titebond Metal Roof WeatherMaster Sealant
 - 3. Tremco Dymonic
 - 4. Tremco Vulkem 116
- B. Primer: Non-staining, quick-drying type and consistency recommended by the sealant manufacturer.
- C. Backer rod: ASTM C1330, Type B, bi-cellular, non-staining, non-gassing, chemically inert foam rod of diameter 25 to 50 percent greater than width of joint. Backer rod shall be compatible with sealant and recommended by the sealant manufacturer.
 - 1. Sof-Rod by Construction Foam Products, Zebulon, North Carolina, 800-345-7279, www.cfoamproducts.com
 - 2. ITP Soft Type Backer Rod 104 by Industrial Thermo Polymers Ltd., Brampton, Ontario, Canada, 800-387-3847, www.tundrafoam.com
- D. Compressible joint filler: Closed cell neoprene pad, 3/8" thick, ASTM D1056, Class RE41, with compressibility of greater than 50%, Expansion Joint, #3300, manufactured by Wire-Bond, Charlotte, North Carolina, 800-849-6722, www.wirebond.com
- E. Butyl tape: Gray butyl tape specifically designed for sealing sheet metal end laps, cap flashing, corner molding, sheet metal curb flashings, etc.
- F. Bond breaker tape: As recommended by sealant manufacturer
- G. Mastic: One-part, low viscosity, self-wetting butyl mastic

2.04 MISCELLANEOUS

- A. Solder: ASTM B32, alloy grade Sn50 (50% tin, 50% lead) or Sn60 (60% tin, 40% lead). Use solder alloy grade which is appropriate for types of flux and heating ranges being used.
- B. Soldering flux: Use least corrosive flux suitable for specific application. Use materials and methods to neutralize as recommended by the flux manufacturer and American Welding Society (AWS).
 - 1. For galvanized or bonderized steel: Fed. Spec. 0-F-506C, Type I, Form A or B
- C. Fire-rated slip sheet (to be used only where soldering occurs): FR-10 Fire Retardant Slip sheet by Atlas Roofing Corp.
- D. Solvent/cleaner: As recommended by the sheet metal manufacturer for cleaning substrate prior to sealant/tape installation
- E. Shims for sheet metal flashing related to through-wall construction: High impact plastic Series 16 adjustable horseshoe shims (3-5/8" long x 1-15/16" wide, with 5/8" gap width). Shims shall be 1" high adjustable shim stack with 1/16" breakaway segments and adjustable lengths. Compressive strength 10,000 to 12,000 psi. Classified as slow burning with no toxic fumes. Coefficient of linear expansion is 3 to 5 x 10⁻⁵ inches/inch/degrees C. Contact Dynamic Fastener, St. Paul, MN.
- F. Mastic: One-part, low viscosity, self-wetting butyl mastic
- G. Pad: 1/4" thick EPDM

PART 3 EXECUTION

3.01 REMOVALS

- A. Removed materials need not be salvaged unless specifically required for reuse.
- B. Where existing sheet metal is to be reused, extra precautions shall be taken to prevent damage to metal during reinstallation.

3.02 PREPARATION

- A. Verify that surfaces to receive sheet metal are smooth, clean, and have no free water present in any form.
- B. Verify that nailers to receive sheet metal are properly placed.
- C. Verify shapes and dimension of surface to be covered before fabrication of sheet metal.
- D. Cut, clean, and prime reglets to receive new reglet insert flashing.

3.03 FABRICATION AND INSTALLATION

- A. Sheet metal installation shall as a minimum be in accordance with ANSI/SPRI ES-1 and recommendations of Factory Mutual Loss Prevention Data Sheet 1-49 Perimeter Flashing.
- B. Shop fabricate all items requiring soldering or welding unless noted otherwise.
- C. Re-coat soldered joints of color-coated sheet metal with material and in manner specified by the sheet metal manufacturer.
- D. Sheet metal work shall be of material and gauge specified and shaped to be installed in strict conformance with Project Drawings.
- E. Plane surfaces shall be free from waves or buckles.
- F. Turn back exposed metal edges into hemmed edge.

- G. Use elastomeric sealant at reglets and scuppers as necessary to make a watertight installation including foam backer rod as necessary to make a good sealant joint.
- H. Screws shall be turned into place rather than driven.
- I. Clean, grind, and otherwise prepare surfaces to be welded to provide the best weld possible in accordance with AWS Code for Welding in Building Construction. Membrane shall be completely protected during welding.
- J. Field-crimp where indicated on the Drawings.

3.04 SOLDERING

- A. Clean surfaces to be soldered, removing oils and foreign matter.
- B. Pre-tin edges of sheet metal before soldering is begun.
- C. Apply flux and begin soldering immediately.
- D. Soldering shall be done slowly with well-heated soldering irons until the seams are thoroughly heated and the solder has been completely sweated through the full width of the seams.
- E. Remove acid flux residue as recommended by the manufacturer. As a minimum, use a solution of washing soda in water.

3.05 CAP FLASHING, COUNTERFLASHING, AND KEEPER STRIPS

- A. Provide preformed cap flashing with drive cleat joinery extending out 2' to 4' maximum in each direction at corners and intersections of new sheet metal cap flashings.
- B. Space cap flashing sections so cover plate locations will be balanced between corners of roof edge.
- C. Align cover plates for cap flashing and fascia flashing along roof edges.
- D. Lap intersecting counterflashings, except fascia counterflashings, minimum 3" and securely fasten.
- E. Fasten counterflashing corners with pop rivets or screws and seal with sealant.
- F. Fasten at center of cover plates along inside face with screws through EPDM washers and field crimp inside edge over cap flashing. Nail fasten S-cleat cover plates at 6" on-center. No fasteners will be allowed in the outside face or the top of the cover plate.
- G. Screw cap flashing on roof edges at 18" on-center. Screw cap flashings (non-roof edge related) and counterflashing to wood blocking with screws through EPDM washers at 30" on-center.
- H. Parapet Cap Flashing:
 - 1. For parapet cap flashing with 12" maximum width, fasten outer edge of cap flashing with continuous keeper strip fastened to blocking at 6" on-center, and fasten inside of cap to wood blocking with screws at 30" on-center. Do not field crimp cap flashing to keeper strip.
 - 2. For parapet cap flashing over 12" in width, fasten outer and inner edge of cap flashing with continuous keeper strip fastened to blocking. Crimp inside face of cap flashing to keeper strip only.
 - 3. When cap/fascia flashing is present, allow additional break in keeper strip to maintain plumb installation of cap/fascia flashing.

4. For roof edge metal at parapets, fasten outer edge of cap flashing with continuous keeper strip fastened to blocking at 6" on-center. Fasten flange of edge metal to wood blocking at 6" on-center and strip in with continuous 8" wide EPDM membrane strip.
5. Provide butyl tape on back side of sheet metal flashings at fasteners penetrating the membrane.

3.06 FIELD QUALITY CONTROL

- A. Alignment and elevation of installed sheet metal shall be verified by Contractor and may be verified by Architect/Engineer.
- B. Withdrawal tests of installed fasteners may be required if attachment is in question.
- C. Construction Observation:
 1. The Owner will retain the services of an independent agency for full-time construction observation and testing of the Work included in this Section.
 2. Notify Owner's construction observer whenever work is to be done in sufficient time (two days minimum) to arrange observation.
 3. The Contractor shall not commence work until the Owner's construction observer is present.
- D. Testing Services Criteria:
 1. The Owner, Architect/Engineer, and/or Owner's Representative reserve the right to have tests made when deemed necessary.
 2. Tests not specified as part of a trade section will be paid for by the Owner unless such tests reveal a failure of the Work to meet requirements of the Contract Documents.
 3. Tests revealing a failure in the Work shall be paid for by the Contractor.
 4. Tests shall be made in accordance with recognized standards by a competent, independent testing laboratory selected by the Owner, the Architect/Engineer, and/or the Owner's Representative.
 5. Materials found defective or not in conformance with the Contract Documents shall be promptly replaced or repaired at the Contractor's expense.
 6. Samples required for testing shall be furnished by the Contractor and selected as directed by the Architect/Engineer and/or the Owner's Representative.
 7. The Contractor shall repair openings required for testing to the satisfaction of the construction observer.

3.07 CLEANING

- A. Clean surfaces of flux, scraps, dirt, and other blemishes immediately. Potentially damaging materials shall not contact the roof surface.
- B. Remove strippable plastic film from color-coated sheet metal immediately after installation.

END OF SECTION

SHEET METAL FLASHING WARRANTY

Owner:

Street Address:

City

State

Zip

Project Name:

Project No.

Project Address:

Date of Final Acceptance:

Sheet Metal Flashing Installer:

Street Address:

City

State

Zip

Phone No. ()

Email:

This warranty stipulates that the above-named Contractor shall, during a period of five (5) years from the date of Substantial Completion of the Work, maintain the sheet metal flashing systems and repair all defects which result from faulty workmanship or defective materials, without further cost to the Owner, including replacement of wet insulation caused by such defects.

Excluded from this warranty may be any and all damage to said roof, the buildings or their contents, caused by acts or omissions of the Owner; fire, lightning, winds of peak gust speeds of 72 mph or higher measured at 10 meters above the ground, hailstorm, or other unusual phenomenon of the elements; movement or failure of the supporting building structure that causes membrane or flashing failure; or vapor condensation beneath the roof.

Exclude from this warranty damages to the building or the contents.

Before expiration of the above warranty period, the above-named Contractor shall inspect the roof in the presence of the Owner and make necessary correction of all deficiencies not considered normal. The warranty shall remain in force until the necessary repair work has been done.

SHEET METAL FLASHING INSTALLER

Signature

Printed Name

Title

Date

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**SECTION 07 7200
ROOF ACCESSORIES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Roof hatches, with safety railing system.

1.02 REFERENCE STANDARDS

- A. 29 CFR 1910.23 - Ladders; Current Edition.
- B. 29 CFR 1910.29 - Fall Protection Systems and Falling Object Protection - Criteria and Practices; Current Edition.
- C. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.
- D. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2021.

1.03 SUSTAINABILITY REQUIREMENTS

- A. See Section 01 8113 B3 Sustainability Design Requirements.
- B. See Section 01 611 Volatile Organic Compound (VOC) Content Restrictions.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used.
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
 - 4. Maintenance requirements.
- C. Shop Drawings: Submit detailed layout developed for this project and provide dimensioned location and number for each type of roof accessory.
- D. Warranty Documentation:
 - 1. Submit manufacturer warranty.
 - 2. Ensure that forms have been completed in Owner's name and registered with manufacturer.
 - 3. Submit documentation that roof accessories are acceptable to roofing manufacturer, and do not limit the roofing warranty.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. See Section 01 7419 - Construction Waste Management and Disposal for packaging waste requirements.
- B. Store products in manufacturer's unopened packaging until ready for installation.
- C. Store products under cover and elevated above grade.

1.06 WARRANTY

- A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.
- B. Manufacturer Warranty: Provide 10 manufacturer warranty for function and compatibility with roofing manufacturer. Complete forms in Owner's name and register with manufacturer.

PART 2 PRODUCTS

2.01 ROOF HATCHES

- A. Roof Hatch Manufacturers:
 - 1. Activar Construction Products Group, Inc. - JL Industries: www.activarcpg.com/#sle.

2. Babcock-Davis; ThermalMAX: www.babcockdavis.com/#sle.
 3. Best Access Doors: www.bestaccessdoors.com/#sle.
 4. Bilco Company; Type L (service stair size): www.bilco.com/#sle.
 5. Nystrom, Inc: www.nystrom.com/#sle.
 6. Substitutions: See Section 01 6000 - Product Requirements.
- B. Roof Hatches: Factory-assembled aluminum frame and cover, complete with operating and release hardware.
1. Style: Provide flat metal covers unless otherwise indicated.
 2. Mounting: Provide frames and curbs suitable for mounting conditions as indicated on drawings.
 3. Thermally Broken Hatches: Provide insulation within frame and cover.
 - a. Thermal performance: R-20.0 minimum.
 4. For Ships Ladder Access: Single leaf; 30 by 96 inches.
- C. Frames and Curbs: One-piece curb and frame with integral cap flashing to receive roof flashings; extended bottom flange to suit mounting.
1. Material: Mill finished aluminum, 11 gauge, 0.0907 inch thick.
 2. Insulation: Manufacturer's standard; 3 inch rigid polyisocyanurate, located on outside face of curb. R-10 minimum.
 3. Curb Height: As indicated on drawings.
- D. Safety Railing System: Roof hatch safety rail system mounted directly to curb without penetration of roofing system.
1. Railing Size: 30 by 96 inches.
 2. Railing: Comply with 29 CFR 1910.23 for ladder safety, with a safety factor of two.
 3. Self-Closing Gate: Comply with 29 CFR 1910.29 for safe egress and fall protection through hatch opening.
 4. Posts and Rails: Aluminum tubing.
 5. Gate: Same material as railing; automatic closing with latch.
 6. Finish: Manufacturer's standard, factory applied finish.
 7. Gate Hinges and Post Guides: ASTM B221 (ASTM B221M), 6063 alloy, T5 temper aluminum.

PART 3 EXECUTION

3.01 EXAMINATION

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

3.02 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using methods recommended by manufacturer for achieving acceptable results for applicable substrate under project conditions.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions, in manner that maintains roofing system weather-tight integrity.

3.04 PROTECTION

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

END OF SECTION

SECTION 07 8400 FIRESTOPPING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Firestopping systems.

1.02 REFERENCE STANDARDS

- A. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009 (Reapproved 2016).
- B. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2024.
- C. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems; 2024.
- D. ASTM E1966 - Standard Test Method for Fire-Resistive Joint Systems; 2024.
- E. ASTM E2174 - Standard Practice for On-Site Inspection of Installed Firestop Systems; 2024.
- F. ASTM E2393 - Standard Practice for On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers; 2024.
- G. ASTM E2307 - Standard Test Method for Determining Fire Resistance of Perimeter Fire Barriers Using Intermediate-Scale, Multi-Story Test Apparatus; 2025.
- H. ASTM E2837 - Standard Test Method for Determining the Fire Resistance of Continuity Head-of-Wall Joint Systems Installed between Rated Wall Assemblies and Nonrated Horizontal Assemblies; 2023a, with Editorial Revision (2024).
- I. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015, with Editorial Revision (2021).
- J. ITS (DIR) - Directory of Listed Products; Current Edition.
- K. FM (AG) - FM Approval Guide; Current Edition.
- L. SCAQMD 1168 - Adhesive and Sealant Applications; 1989, with Amendment (2022).
- M. UL 1479 - Standard for Fire Tests of Penetration Firestops; Current Edition, Including All Revisions.
- N. UL 2079 - Standard for Tests for Fire Resistance of Building Joint Systems; Current Edition, Including All Revisions.
- O. UL (DIR) - Online Certifications Directory; Current Edition.
- P. UL (FRD) - Fire Resistance Directory; Current Edition.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Schedule of Firestopping: List each type of penetration, fire rating of the penetrated assembly, and firestopping test or design number.
- C. Product Data: Provide data on product characteristics, performance ratings, and limitations.
- D. Sustainable Design Submittal: Submit VOC content documentation for nonpreformed materials.
- E. Manufacturer's Installation Instructions: Indicate preparation and installation instructions.
- F. Manufacturer's qualification statement.
- G. Installer's qualification statement.

1.04 QUALITY ASSURANCE

- A. Fire Testing: Provide firestopping assemblies of designs that provide the scheduled fire ratings when tested in accordance with methods indicated.
 - 1. Listing in UL (FRD), FM (AG), or ITS (DIR) will be considered as constituting an acceptable test report.
 - 2. Valid evaluation report published by ICC Evaluation Service, Inc. (ICC-ES) at www.icc-es.org will be considered as constituting an acceptable test report.
 - 3. Submission of actual test reports is required for assemblies for which none of the above substantiation exists.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years documented experience.
- C. Installer Qualifications: Company specializing in performing the work of this section and:
 - 1. Verification of minimum five years documented experience installing work of this type.
 - 2. Licensed by local authorities having jurisdiction (AHJ).

1.05 FIELD CONDITIONS

- A. Comply with firestopping manufacturer's recommendations for temperature and conditions during and after installation; maintain minimum temperature before, during, and for three days after installation of materials.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Firestopping Manufacturers:
 - 1. 3M Fire Protection Products: www.3m.com/firestop/#sle.
 - 2. A/D Fire Protection Systems Inc: www.adfire.com/#sle.
 - 3. Hilti, Inc: www.hilti.com/#sle.
 - 4. Nelson FireStop Products: www.nelsonfirestop.com/#sle.
 - 5. Tremco Commercial Sealants & Waterproofing; TREMstop Acrylic: www.tremcosealants.com/#sle.
 - 6. Substitutions: See Section 01 6000 - Product Requirements.

2.02 MATERIALS

- A. Firestopping Materials: Any materials meeting requirements.
- B. Volatile Organic Compound (VOC) Content: Provide products having VOC content lower than that required by SCAQMD 1168.
- C. Mold and Mildew Resistance: Provide firestopping materials with mold and mildew resistance rating of zero(0) in accordance with ASTM G21.
- D. Primers, Sleeves, Forms, Insulation, Packing, Stuffing, and Accessories: Provide type of materials as required for tested firestopping assembly.

2.03 FIRESTOPPING ASSEMBLY REQUIREMENTS

- A. Perimeter Fire Containment Firestopping: Use system that has been tested according to ASTM E2307 to have fire resistance F Rating equal to required fire rating of floor assembly.
 - 1. Movement: Provide systems that have been tested to show movement capability as indicated.
 - 2. Temperature Rise: Provide systems that have been tested to show T Rating as indicated.
 - 3. Air Leakage: Provide systems that have been tested to show L Rating as indicated.
 - 4. Where floor assembly is not required to have a fire rating, provide systems that have been tested to show L Rating as indicated.

- B. Head-of-Wall (HW) Joint System Firestopping at Joints Between Fire-Rated Wall Assemblies and Non-Rated Horizontal Assemblies: Use system that has been tested according to ASTM E2837 to have fire resistance F Rating equal to required fire rating of wall assembly.
 - 1. Movement: Provide systems that have been tested to show movement capability as indicated.
- C. Floor-to-Floor (FF), Floor-to-Wall (FW), Head-of-Wall (HW), and Wall-to-Wall (WW) Joints, Except Perimeter, Where Both Are Fire-Rated: Use system that has been tested according to ASTM E1966 or UL 2079 to have fire resistance F Rating equal to required fire rating of the assembly in which the joint occurs.
 - 1. Movement: Provide systems that have been tested to show movement capability as indicated.
 - 2. Air Leakage: Provide systems that have been tested to show L Rating as indicated.
 - 3. Watertightness: Provide systems that have been tested to show W Rating as indicated.
 - 4. Listing by FM (AG), ITS (DIR), UL (DIR), or UL (FRD) in their certification directories will be considered evidence of successful testing.
- D. Through Penetration Firestopping: Use system that has been tested according to ASTM E814 to have fire resistance F Rating equal to required fire rating of penetrated assembly.
 - 1. Temperature Rise: Provide systems that have been tested to show T Rating as indicated.
 - 2. Air Leakage: Provide systems that have been tested to show L Rating as indicated.
 - 3. Listing by FM (AG), ITS (DIR), UL (DIR), or UL (FRD) in their certification directories will be considered evidence of successful testing.
- E. Acoustically Rated Firestopping: Provide system tested in accordance with ASTM E90 with STC rating of 50, minimum.

2.04 FIRESTOPPING SYSTEMS

- A. Firestopping: Any material meeting requirements.
 - 1. Fire Ratings: Use system that is listed by FM (AG), ITS (DIR), or UL (FRD) and tested in accordance with ASTM E814, ASTM E119, or UL 1479 with F Rating equal to fire rating of penetrated assembly and minimum T Rating Equal to F Rating and in compliance with other specified requirements.

PART 3 EXECUTION

3.01 EXAMINATION

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

3.02 PREPARATION

- A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other materials that could adversely affect bond of firestopping material.
- B. Remove incompatible materials that could adversely affect bond.

3.03 INSTALLATION

- A. Install materials in manner described in fire test report and in accordance with manufacturer's instructions, completely closing openings.
- B. Do not cover installed firestopping until inspected by Owner's Independent Testing Agency.
- C. Do not cover installed firestopping until inspected by authorities having jurisdiction.

3.04 FIELD QUALITY CONTROL

- A. Independent Testing Agency: Inspection agency employed and paid by Owner, will examine penetration firestopping in accordance with ASTM E2174 and ASTM E2393.
- B. Repair or replace penetration firestopping and joints at locations where inspection results indicate firestopping or joints do not meet specified requirements.

3.05 CLEANING

- A. Clean adjacent surfaces of firestopping materials.

3.06 PROTECTION

- A. Protect adjacent surfaces from damage by material installation.

END OF SECTION

SECTION 07 9201
NON-ROOF RELATED JOINT SEALANTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Nonsag gunnable joint sealants.
- B. Joint backings and accessories.
- C. Owner-provided field quality control.

1.02 REFERENCE STANDARDS

- A. ASTM C794 - Standard Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants; 2018 (Reapproved 2022).
- B. ASTM C834 - Standard Specification for Latex Sealants; 2017 (Reapproved 2023).
- C. ASTM C919 - Standard Practice for Use of Sealants in Acoustical Applications; 2024.
- D. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018 (Reapproved 2024).
- E. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2025.
- F. ASTM C1330 - Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants; 2023.
- G. ASTM C1521 - Standard Practice for Evaluating Adhesion of Installed Weatherproofing Sealant Joints; 2019 (Reapproved 2020).

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data: Submit manufacturer's technical datasheets for each product to be used; include the following:
 - 1. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.
 - 2. List of backing materials approved for use with the specific product.
 - 3. Substrates that product is known to satisfactorily adhere to and with which it is compatible.
 - 4. Substrates the product should not be used on.
 - 5. Substrates for which use of primer is required.
 - 6. Installation instructions, including precautions, limitations, and recommended backing materials and tools.
- C. Product Data for Accessory Products: Submit manufacturer's technical data sheet for each product to be used, including physical characteristics, installation instructions, and recommended tools.
- D. Color Cards for Selection: Where sealant color is not specified, submit manufacturer's color cards showing standard colors available for selection.
- E. Sustainable Design Documentation: For sealants and primers, submit VOC content and emissions documentation; see Section 01 6116.
- F. Preinstallation Field Adhesion Test Plan: Submit at least two weeks prior to start of installation.
- G. Preinstallation Field Adhesion Test Reports: Submit filled out Preinstallation Field Adhesion Test Reports log within 10 days after completion of tests; include bagged test samples and photographic records.
- H. Provide Manufacturer's letter of compatibility for each of the products specified in this section that come in direct contact with adjacent materials specified in other sections, including but not limited to: 04, 2000, 07 1300, 07 2700, and 08 4413.
- I. Executed warranty.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years documented experience.
- B. Installer Qualifications: Company specializing in performing the work of this section and with at least five years of documented experience.
- C. Comply with recommendations of ASTM C1193 for use of joint sealants.
- D. Preinstallation Field Adhesion Test Plan: Include destructive field adhesion testing of one sample of each combination of sealant type and substrate, except interior acrylic latex sealants, and include the following for each tested sample.
 - 1. Identification of testing agency.
 - 2. Preinstallation Field Adhesion Test Log Form: Include the following data fields, with known information filled out.
 - a. Test date.
 - b. Copy of test method documents.
 - c. Age of sealant upon date of testing.
 - d. Test results, modeled after the sample form in the test method document.
 - e. Indicate use of photographic record of test.
- E. Field Adhesion Test Procedures:
 - 1. Allow sealants to fully cure as recommended by manufacturer before testing.
 - 2. Have a copy of the test method document available during tests.
 - 3. Record the type of failure that occurred, other information required by test method, and the information required on the Field Quality Control Log.
 - 4. When performing destructive tests, also inspect the opened joint for proper installation characteristics recommended by manufacturer, and report any deficiencies.
 - 5. Deliver the samples removed during destructive tests in separate sealed plastic bags, identified with project, location, test date, and test results, to Owner.
 - 6. If any combination of sealant type and substrate does not show evidence of minimum adhesion or shows cohesion failure before minimum adhesion, report results to Architect.
- F. Destructive Field Adhesion Test: Test for adhesion in accordance with ASTM C1521, using Destructive Tail Procedure.
 - 1. Sample: At least 18 inches long.
 - 2. Minimum Elongation Without Adhesive Failure: Consider the tail at rest, not under any elongation stress; multiply the stated movement capability of the sealant in percent by two; then multiply 1 inch by that percentage; if adhesion failure occurs before the 1-inch mark is that distance from the substrate, the test has failed.
 - 3. If either adhesive or cohesive failure occurs before minimum elongation, take necessary measures to correct conditions and retest; record each modification to products or installation procedures.

1.05 WARRANTY

- A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.
- B. Manufacturer Warranty: Provide 2-year manufacturer warranty for installed sealants and accessories that fail to achieve a watertight seal, exhibit loss of adhesion or cohesion, or do not cure. Complete forms in Owner's name and register with manufacturer.
- C. Extended Correction Period: Correct defective work within five period commencing on Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Nonsag Sealants:

1. Dow: www.dow.com/#sle.
2. Master Builders Solutions: www.master-builders-solutions.com/en-us/#sle.
3. Sika Corporation: www.usa.sika.com/#sle.
4. Tremco Commercial Sealants & Waterproofing: www.tremcosealants.com/#sle.
5. Substitutions: See Section 01 6000 - Product Requirements.

2.02 JOINT SEALANT APPLICATIONS

- A. Scope:
 1. Exterior Joints:
 - a. Seal the following joints:
 - 1) Wall expansion and control joints.
 - 2) Joints between doors, windows, and other frames or adjacent construction.
 - 3) Joints between different exposed materials.
 2. Interior Joints:
 - a. Seal the following joints:
 - 1) Joints between door frames, window frames, and other frames and adjacent construction.
 - 2) In sound-rated wall and ceiling assemblies, gaps at electrical outlets, wiring devices, and piping penetrations.
 3. Do Not Seal:
 - a. Intentional weep holes in masonry.
 - b. Joints where sealant is specified to be furnished and installed by manufacturer of product to be sealed.
 - c. Joints where sealant installation is specified in other sections.
- B. Exterior Joints: Use nonsag elastomeric sealant, unless otherwise indicated.
 1. Lap Joints in Sheet Metal Fabrications: Butyl rubber, noncuring.
- C. Interior Joints: Use nonsag polyurethane sealant, unless otherwise indicated.
- D. Interior Wet Areas: restrooms and mothers room; fixtures in wet areas include plumbing fixtures and other similar items.
- E. Sound-Rated Assemblies: Walls and ceilings identified as STC-rated, sound-rated, or acoustical.

2.03 JOINT SEALANTS - GENERAL

- A. Sealants and Primers: Provide products with acceptable levels of volatile organic compound (VOC) content; see Section 01 6116.

2.04 NONSAG JOINT SEALANTS

- A. Nonstaining Silicone Sealant: ASTM C920, Grade NS, Uses M and A; not expected to withstand continuous water immersion or traffic.
 1. Movement Capability: Plus and minus 50 percent, minimum.
 2. Dirt Pick-Up: Reduced dirt pick-up compared to other silicone sealants.
- B. Polyurethane Sealant: ASTM C920, Grade NS, Uses M and A; multi-component; not expected to withstand continuous water immersion or traffic.
 1. Movement Capability: Plus and minus 25 percent, minimum.
 2. Color: Match adjacent finished surfaces.
- C. Acrylic Emulsion Latex: Water-based; ASTM C834, single component, nonstaining, nonbleeding, nonsagging; not intended for exterior use.
 1. Color: To be selected by Architect from manufacturer's full range.
- D. Noncuring Butyl Sealant: Solvent-based, single component, nonsag, nonskinning, nonhardening, nonbleeding; nonvapor permeable; intended for fully concealed applications.

2.05 ACCESSORIES

- A. Sealant Backing Rod, Bi-Cellular Type:
 - 1. Backing rod at exterior wall locations shall be non-oily, non-gassing, non-absorbent, non-staining polyolefin foam with a bi-cellular structure and/or acceptable material as recommended or accepted by the sealant manufacturer.
 - 2. Cylindrical flexible sealant backings complying with ASTM C1330 Type B.
 - 3. Size: 25 to 50 percent larger in diameter than joint width.
 - 4. Products:
 - a. Adfast USA Inc; Adseal BR-2600 Backer Rod: www.adfastcorp.com/#sle.
 - b. Nomaco, Inc; SOF Rod: www.nomaco.com/#sle.
 - c. Substitutions: See Section 01 6000 - Product Requirements.
- B. Backing Tape: Self-adhesive polyethylene tape with surface that sealant will not adhere to and recommended by tape and sealant manufacturers for specific application.
- C. Joint Cleaner: Noncorrosive and nonstaining type, type recommended by sealant manufacturer; compatible with joint forming materials.
- D. Primers: Type recommended by sealant manufacturer to suit application; nonstaining.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that joints are ready to receive work.
- B. Verify that backing materials are compatible with sealants.
- C. Verify that backer rods are of the correct size.
- D. Preinstallation Adhesion Testing: Install a sample for each test location indicated in the test plan.
 - 1. Test each sample as specified in PART 1 under QUALITY ASSURANCE article.
 - 2. Notify Architect of date and time that tests will be performed, at least seven days in advance.
 - 3. Record each test on Preinstallation Adhesion Test Log as indicated.
 - 4. If any sample fails, review products and installation procedures, consult manufacturer, or take other measures that are necessary to ensure adhesion; retest in a different location; if unable to obtain satisfactory adhesion, report to Architect.
 - 5. After completion of tests, remove remaining sample material and prepare joints for new sealant installation.

3.02 PREPARATION

- A. Remove loose materials and foreign matter that could impair adhesion of sealant.
- B. Clean joints, and prime as necessary, in accordance with manufacturer's instructions.
- C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.
- D. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.

3.03 INSTALLATION

- A. Install this work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.
- B. Provide joint sealant installations complying with ASTM C1193.
- C. Install bond breaker backing tape where backer rod cannot be used.
- D. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.

- E. Do not install sealants or primers when the air or substrate temperatures are 40 degrees F or below at the time of installation or during the entire curing period.
- F. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.

3.04 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements for additional requirements.
- B. Perform field quality control inspection/testing as specified in PART 1 under QUALITY ASSURANCE article.
- C. Remove and replace failed portions of sealants using same materials and procedures as indicated for original installation.

END OF SECTION

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**SECTION 08 1113
HOLLOW METAL DOORS AND FRAMES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Non-fire-rated hollow metal doors and frames.
- B. Fire-rated hollow metal doors and frames.
- C. Thermally insulated hollow metal doors with frames.
- D. Sound-rated hollow metal doors and frames.
- E. Hollow metal borrowed lites glazing frames.
- F. Sound-rated hollow metal borrowed lite windows.

1.02 REFERENCE STANDARDS

- A. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.
- B. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors; 2024.
- C. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100); 2023.
- D. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; 2025.
- E. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.
- F. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable; 2024.
- G. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2023.
- H. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic-Cement Concrete; 2020.
- I. ASTM C476 - Standard Specification for Grout for Masonry; 2023.
- J. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2023.
- K. ASTM E413 - Classification for Rating Sound Insulation; 2022.
- L. BHMA A156.115 - Hardware Preparation in Steel Doors and Frames; 2016.
- M. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.
- N. ITS (DIR) - Directory of Listed Products; Current Edition.
- O. NAAMM HMMA 830 - Hardware Selection for Hollow Metal Doors and Frames; 2002.
- P. NAAMM HMMA 831 - Hardware Locations for Hollow Metal Doors and Frames; 2024.
- Q. NAAMM HMMA 840 - Guide Specifications for Receipt, Storage and Installation of Hollow Metal Doors and Frames; 2024.
- R. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2025.
- S. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; 2022.
- T. UL (DIR) - Online Certifications Directory; Current Edition.
- U. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Submittal process shall be started immediately following the contract Notice to Proceed to achieve early frame delivery. Shop drawings shall be submitted with sufficient detail to assure a comprehensive quality control check.
- C. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes; and one copy of referenced standards/guidelines.
- D. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and any indicated finish requirements. Shop drawing door and frame numbers shall be numbered the same as on the Contract Documents.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years documented experience.
- B. Maintain at project site copies of reference standards relating to installation of products specified.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Comply with NAAMM HMMA 840 or ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
- B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion and adverse effects on factory applied painted finish.
- C. Provide for early separate delivery of hollow metal door frames.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Hollow Metal Doors and Frames:
 - 1. Ceco Door, an Assa Abloy Group company: www.assaabloydss.com/#sle.
 - 2. Curries, an Assa Abloy Group company: www.assaabloydss.com/#sle.
 - 3. Republic Doors, an Allegion brand: www.republicdoor.com/#sle.
 - 4. Steelcraft, an Allegion brand: www.allegion.com/#sle.
 - 5. Substitutions: See Section 01 6000 - Product Requirements.
- B. Sound-Rated Hollow Metal Doors, Frames, and Windows:
 - 1. AMBICO Limited: www.ambico.com/#sle.
 - 2. De La Fontaine; STC - Acoustical Core: www.delafontaine.com/#sle.
 - 3. Overly Door Company: www.overly.com/#sle.
 - 4. Krieger Specialty Products: www.kriegerproducts.com.
 - 5. Substitutions: See Section 01 6000 - Product Requirements.

2.02 PERFORMANCE REQUIREMENTS

- A. Requirements for Hollow Metal Doors and Frames:
 - 1. Steel Sheet: Comply with one or more of the following requirements; galvanized steel complying with ASTM A653/A653M, cold-rolled steel complying with ASTM A1008/A1008M, or hot-rolled pickled and oiled (HRPO) steel complying with ASTM A1011/A1011M, commercial steel (CS) Type B, for each.
 - 2. Accessibility: Comply with ICC A117.1 and ADA Standards.
 - 3. Glazed Lights: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings. Style: Manufacturer's standard.

4. Hardware Preparations, Selections and Locations: Comply with NAAMM HMMA 830 and NAAMM HMMA 831 or BHMA A156.115 and ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
 5. Maximum Air Leakage requirements: Exterior doors shall comply with current Minnesota Energy Code, including referenced testing standards
 - a. Non-glazed swinging entrance doors: 0.2 cfm/sf maximum air leakage at 1.57 psf minimum test pressure per AAMA/WDMA/CSA 101/I.S.2/A440 or NFRC 400 or 0.3 cfm/sf maximum air leakage at 6.24 psf minimum test pressure per AAMA/WDMA/CSA 101/I.S.2/A440
 6. U-value: Exterior doors and frames shall comply with current Minnesota Energy Code, nonresidential use.
 - a. Swinging opaque doors: U-0.370.
- B. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

2.03 HOLLOW METAL DOORS

- A. Exterior Doors: Thermally insulated.
1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
 - a. Level 2 - Heavy-duty.
 - b. Physical Performance Level B, 500,000 cycles; in accordance with ANSI/SDI A250.4.
 - c. Model 1 - Full Flush.
 - d. Door Face Metal Thickness: 14 gauge, 0.067 inch, minimum.
 - e. Zinc Coating: A60/ZF180 galvanized coating; ASTM A653/A653M.
 2. Door Thickness: 1-3/4 inches, nominal.
 3. Top Closures: Flush with top of faces and edges.
 4. Minimum Sound Transmission Coefficient (STC) of 26.
 5. Weatherstripping: Refer to Section 08 7100.
 6. Door Finish: Factory primed and field finished.
- B. Interior Doors, Non-Fire-Rated:
1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
 - a. Level 2 - Heavy-duty.
 - b. Physical Performance Level B, 500,000 cycles; in accordance with ANSI/SDI A250.4.
 - c. Model 1 - Full Flush.
 - d. Door Face Metal Thickness: 18 gauge, 0.042 inch, minimum.
 2. Door Thickness: 1-3/4 inches, nominal.
 3. Minimum Sound Transmission Coefficient (STC) of 26.
 4. Door Finish: Factory primed and field finished.
- C. Fire-Rated Doors:
1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
 - a. Level 2 - Heavy-duty.
 - b. Physical Performance Level B, 500,000 cycles; in accordance with ANSI/SDI A250.4.
 - c. Model 1 - Full Flush.
 - d. Door Face Metal Thickness: 18 gauge, 0.042 inch, minimum.
 2. Fire Rating: As indicated on Door Schedule, tested in accordance with UL 10C and NFPA 252 ("positive pressure fire tests").
 3. Provide units listed and labeled by UL (DIR) or ITS (DIR).
 - a. Attach fire rating label to each fire rated unit.
 4. Door Thickness: 1-3/4 inches, nominal.

5. Minimum Sound Transmission Coefficient (STC) of 26.
 6. Door Finish: Factory primed and field finished.
- D. Sound-Rated Interior Doors:
1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
 - a. Level 2 - Heavy-duty.
 - b. Physical Performance Level B, 500,000 cycles; in accordance with ANSI/SDI A250.4.
 - c. Model 1 - Full Flush.
 - d. Door Face Metal Thickness: 16 gauge, 0.053 inch, minimum.
 2. Sound Transmission Class (STC) Rating of Door and Frame Assembly: STC of 50, minimum, calculated in accordance with ASTM E413, and tested in accordance with ASTM E90.
 3. Door Core Material: Manufacturer's standard construction as required to meet acoustic requirements indicated.
 4. Door Thickness: 1-3/4 inch.
 5. Door Finish: Factory primed and field finished.
 6. Sound Seals: Integral, in door and/or frame.

2.04 SOUND-RATED HOLLOW METAL WINDOWS

- A. Materials
1. Sheet Steel:
 - a. Cold-rolled steel sheet conforming to ASTM A1008/A1008M.
 - b. Hot-rolled steel sheet conforming to ASTM A1011/A1011M.
 2. Acoustic material: Manufacturer's standard for required STC rating.
- B. Sound Transmission Class (STC) Rating of Window Assembly: STC of 50, minimum, calculated in accordance with ASTM E413, and tested in accordance with ASTM E90.
- C. Components
1. Frames: Fabricate in accordance with Architect-approved shop drawings, and as follows:
 - a. Frame: Fabricate from steel sheet, minimum 14 gauge and appropriate to maintain STC ratings
 - b. Factory assemble and weld window frames.
 - c. Factory supplied glazing in conformance with tested standards. Glazing to be factory supplied loose ready for site installation by others.
 2. Glazing Stops: Formed steel channel, butted corners; prepared for countersunk screws.
- D. Glass and Glazing
1. Clear laminated acoustical glass shall be furnished in the thickness required to meet the STC rating. Glazing to be factory supplied loose ready for site installation by others.
- E. Finishes
1. Primer: Factory primed and field finished.

2.05 HOLLOW METAL FRAMES

- A. Comply with standards and/or custom guidelines as indicated for corresponding door in accordance with applicable door frame requirements.
- B. Frame Finish: Factory primed and field finished.
- C. Exterior Door Frames: Full profile/continuously welded type.
1. Galvanizing: Components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A653/A653M, with A40/ZF120 coating.
 2. Frame Metal Thickness: 14 gauge, 0.067 inch, minimum.
 3. Weatherstripping: Separate, see Section 08 7100.
- D. Interior Door Frames, Non-Fire Rated: Full profile/continuously welded type.
1. Frame Metal Thickness: 16 gauge, 0.053 inch, minimum.

- E. Door Frames, Fire-Rated: Full profile/continuously welded type.
 - 1. Fire Rating: Same as door, labeled.
 - 2. Frame Metal Thickness: 16 gauge, 0.053 inch, minimum.
- F. Sound-Rated Door Frames: Full profile/continuously welded type.
 - 1. Frame Metal Thickness: 16 gauge, 0.053 inch, minimum.
- G. Borrowed Lites Glazing Frames: Construction and face dimensions to match door frames, and as indicated on drawings.
- H. Provide mortar guard boxes for hardware cut-outs in frames to be installed in masonry or to be grouted.
- I. Frames in Masonry Walls: Size to suit masonry coursing with head member 4 inches high to fill opening without cutting masonry units.

2.06 FINISHES

- A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.
 - 1. Primer shall be applied uniformly: inside, outside, and under removable stops and trim.

2.07 ACCESSORIES

- A. Glazing: As specified in Section 08 8000, factory installed.
- B. Removable Stops: Formed sheet steel, mitered corners; prepared for countersink style tamper proof screws.
- C. Astragals for Double Doors: Specified in Section 08 7100.
- D. Grout for Frames: Mortar grout complying with ASTM C476 with maximum slump of 4 inches as measured in accordance with ASTM C143/C143M for hand troweling in place; plaster grout and thinner pumpable grout are prohibited.
- E. Silencers: Resilient rubber, fitted into drilled hole; provide three on strike side of single door, three on center mullion of pairs, and two on head of pairs without center mullions.
- F. Temporary Frame Spreaders: Provide for factory- or shop-assembled frames.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that opening sizes and tolerances are acceptable.
- C. Verify that finished walls are in plane to ensure proper door alignment.

3.02 PREPARATION

- A. Coat inside of frames to be installed in masonry or to be grouted, with bituminous coating, prior to installation.

3.03 INSTALLATION

- A. Install doors and frames in accordance with manufacturer's instructions and related requirements of specified door and frame standards or custom guidelines indicated.
- B. Install fire rated units in accordance with NFPA 80.
- C. Coordinate frame anchor placement with wall construction.
- D. Grout frames in masonry construction, using hand trowel methods; brace frames so that pressure of grout before setting will not deform frames.
- E. At sound-rated windows, fill voids between concealed side of frame and adjacent wall construction with dense fiberglass.
- F. Install door hardware as specified in Section 08 7100.
- G. Touch up damaged factory finishes.

3.04 TOLERANCES

- A. Maximum Diagonal Distortion: 1/16 inch measured with straight edge, corner to corner.

3.05 ADJUSTING

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

3.06 SCHEDULE

- A. Refer to Door and Frame Schedule on the drawings.

END OF SECTION

**SECTION 08 1116
ALUMINUM DOORS AND FRAMES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Glazed aluminum doors.
- B. Aluminum monumental stile and rail doors.

1.02 REFERENCE STANDARDS

- A. AAMA 609 & 610 - Cleaning and Maintenance Guide for Architecturally Finished Aluminum; 2025.
- B. AAMA 611 - Specification for Anodized Architectural Aluminum; 2024.
- C. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2024.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data: Manufacturer's descriptive literature for each type of door; include information on fabrication methods, finishing, hardware preparation, and accessories.
- C. Shop Drawings: Include elevations of each opening type and schedule of openings.
 - 1. Verify dimensions by field measurements before fabrication and indicate on shop drawings.
- D. Verification Samples: Two actual pieces of products in each finish specified, not less than 6 inches square or 6 inches long for linear components. For finishes subject to color variation, include not less than two samples illustrating extreme range to be anticipated.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with not less than ten years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of type specified and with at least five years of documented experience.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver aluminum components in manufacturer's standard protective packaging, palletted, crated, or banded together.
- B. Inspect delivered components for damage and replace. Repaired components will not be accepted.
- C. Store components in clean, dry, indoor area, under cover in manufacturer's packaging until installation.
- D. Protect materials and finish from damage during handling and installation.

1.06 WARRANTY

- A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Glazed Aluminum Doors:
 - 1. Tru-Therm/Interclad; Endura II Series.
 - 2. W.L. Hall; Tubecraft 60M Series
 - 3. Substitutions: See Section 01 6000 - Product Requirements.

2.02 DOORS AND FRAMES

- A. Aluminum Monumental Stile and Rail Doors: Extruded aluminum, alloy 6063-T6 temper, with 3/16 inch minimum wall thickness, and having full width galvanized steel 3/8 inch tie rods within top and bottom rails.
 - 1. Thickness: 2 inches, nominal.
 - 2. Stile Width: See Drawings.
 - 3. Top Rail Height: See Drawings.
 - 4. Bottom Rail Height: See Drawings.
 - 5. Finish: Class I - Color anodized.
 - 6. Texture: Smooth.
- B. Dimensions and Shapes: As indicated on drawings; dimensions indicated are nominal.
 - 1. Provide the following clearances:
 - a. Hinge and Lock Stiles: 1/8 inch.
 - b. Between Meeting Stiles: 1/4 inch.
 - c. At Top Rail and Bottom Rail: 1/8 inch.

2.03 COMPONENTS

- A. Additional Door Hardware: See Section 08 7100.

2.04 FINISHES

- A. Class I Color Anodized Finish: Electrolytically deposited colored anodic coating; AAMA 611 AA-M12C22A44, minimum dry film thickness (DFT) of 0.7 mils, 0.0007 inch.
- B. Color: Match color specified in Section 08 4413..

2.05 ACCESSORIES

- A. Fasteners: Aluminum, non-magnetic stainless steel, or other material warranted by manufacturer as non-corrosive and compatible with aluminum components.
- B. Brackets and Reinforcements: Manufacturer's high-strength aluminum units where feasible, otherwise, non-magnetic stainless steel or steel hot-dip galvanized in compliance with ASTM A123/A123M.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that frames installed by other trades for installation of doors of this section are in strict accordance with recommendations and approved shop drawings and within tolerances specified in manufacturer's instructions.

3.02 PREPARATION

- A. Perform cutting, fitting, forming, drilling, and grinding of frames as required for project conditions.
- B. Replace components with damage to exposed finishes.
- C. Separate dissimilar metals to prevent electrolytic action between metals.

3.03 INSTALLATION

- A. Install doors in accordance with manufacturer's instructions and approved shop drawings.
- B. Hang doors and adjust hardware to achieve specified clearances and proper door operation.

3.04 CLEANING

- A. Upon completion of installation, thoroughly clean door surfaces in accordance with AAMA 609 & 610.
- B. Do not use abrasive, caustic, or acid cleaning agents.

3.05 PROTECTION

- A. Protect products of this section from damage caused by subsequent construction until Date of Substantial Completion.
- B. Replace damaged or defective components that cannot be repaired to a condition indistinguishable from undamaged components.

END OF SECTION

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**SECTION 08 3100
ACCESS DOORS AND PANELS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Wall-mounted access units.
- B. Ceiling-mounted access units.

1.02 REFERENCE STANDARDS

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide sizes, types, finishes, hardware, scheduled locations, and details of adjoining work.

1.04 QUALITY ASSURANCE

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

PART 2 PRODUCTS

2.01 WALL- AND CEILING-MOUNTED ACCESS UNITS

- A. Manufacturers:
 - 1. Activar Construction Products Group, Inc. - JL Industries: www.activarcpg.com/#sle.
 - 2. ACUDOR Products Inc: www.acudor.com/#sle.
 - 3. Babcock-Davis: www.babcockdavis.com/#sle.
 - 4. Best Access Doors: www.bestaccessdoors.com/#sle.
 - 5. Nystrom, Inc; HVAC - Access Doors: www.nystrom.com/#sle.
 - 6. Substitutions: See Section 01 6000 - Product Requirements.
- B. Wall- and Ceiling-Mounted Units: Factory-fabricated door and frame, fully assembled units with corner joints welded, filled and ground flush; square and without rack or warp; coordinate requirements with type of installation assembly being used for each unit.
 - 1. Material: Steel.
 - 2. Style: Exposed frame with door surface flush with frame surface.
 - a. Gypsum Board Mounting Criteria: Use drywall bead type frame.
 - 3. Door Style: Single thickness with rolled or turned in edges.
 - 4. Frames: 16-gauge, 0.0598-inch minimum thickness.
 - 5. Heavy-Duty Single Steel Sheet Door Panels: 14-gauge, 0.0747-inch minimum thickness.
 - 6. Steel Finish: Primed.
 - 7. Primed and Factory Finish: Polyester powder coat; color white.
 - 8. Door/Panel Size: 2'-6" x 2'-6" .
 - 9. Hardware:
 - a. Hardware for Fire-Rated Units: As required for listing.
 - b. Hinges for Non-Fire-Rated Units: Continuous piano hinge.
 - c. Handle: No handle.
 - d. Latch/Lock: Tamperproof tool-operated cam latch.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that rough openings are correctly sized and located.

3.02 PREPARATION

- A. Clean surfaces thoroughly prior to proceeding with this work.

- B. Prepare surfaces using methods recommended by manufacturer for applicable substrates in accordance with project conditions.

3.03 INSTALLATION

- A. Install units in accordance with manufacturer's instructions.
- B. Install frames plumb and level in openings, and secure units rigidly in place.
- C. Position units to provide convenient access to concealed equipment when necessary.

3.04 SCHEDULE

- A. Install to provide maintenance access to service all equipment concealed by scheduled construction including, but not limited to: filters, stainers, control actuators, isolation and shut-off valves, damper actuators, control valves, and sound attenuators.

**SECTION 08 3323
OVERHEAD COILING DOORS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Interior non-fire-rated coiling doors.
- B. Electric operators and control stations.

1.02 REFERENCE STANDARDS

- A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.
- B. ASTM A666/A666M - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2024.
- C. ITS (DIR) - Directory of Listed Products; Current Edition.
- D. NEMA EN 10250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2024.
- E. NEMA ICS 2 - Industrial Control and Systems Controllers, Contactors and Overload Relays Rated 600 Volts; 2008 (Reaffirmed 2020).
- F. NEMA MG 00001 - Motors and Generators; 2024.
- G. UL (DIR) - Online Certifications Directory; Current Edition.
- H. UL 325 - Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems; Current Edition, Including All Revisions.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide general construction, electrical equipment, and component connections and details.
- C. Shop Drawings: Indicate pertinent dimensioning, anchorage methods, hardware locations, and installation details.
- D. Manufacturer's qualification statement.
- E. Installer's qualification statement.
- F. Maintenance Data: Indicate lubrication requirements and frequency and periodic adjustments required.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of type specified and with at least three years documented experience.
- C. Products Requiring Electrical Connection: Listed and classified by ITS (DIR), UL (DIR), or testing firm acceptable to authorities having jurisdiction as suitable for purpose specified and indicated.

1.05 WARRANTY

- A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.
- B. Manufacturer Warranty: Provide 2-year manufacturer warranty for roller shaft counterbalance assembly. Complete forms in Owner's name and register with manufacturer.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Overhead Coiling Metal Doors:

1. Alpine Overhead Doors, Inc: www.alpinedoors.com/#sle.
2. Clopay Building Products: www.clopaydoor.com/#sle.
3. Raynor Garage Doors: www.raynor.com/#sle.
4. Rite-Hite Corp: www.ritehite.com/#sle.
5. The Cookson Company: www.cooksondoor.com/#sle.
6. Wayne-Dalton, a Division of Overhead Door Corporation: www.wayne-dalton.com/#sle.
7. Substitutions: See Section 01 6000 - Product Requirements.

2.02 COILING DOORS

- A. Interior Non-Fire-Rated Coiling Doors: Stainless steel slat curtain.
 1. Single Thickness Slats: Manufacturer's standard.
 2. Nominal Slat Size: 3 inches wide by required length.
 3. Finish: No. 4 - Brushed.
 4. Guides, Angles: Stainless steel.
 5. Hood Enclosure: Manufacturer's standard; to match door material.
 6. Electric operation.
 7. Mounting: As indicated on drawings.

2.03 MATERIALS

- A. Metal Curtain Construction: Interlocking slats.
 1. Curtain Bottom for Slat Curtains: Fitted with angles to provide reinforcement and positive contact in closed position.
 2. Weatherstripping for Doors: Moisture and rot proof, resilient type, located at jamb edges, bottom of curtain, and where curtain enters hood enclosure of all doors.
 3. Stainless Steel Slats: Minimum thickness, complying with ASTM A 666, Type 304, rollable temper.
- B. Guide Construction: Continuous, of profile to retain door in place with snap-on trim, mounting brackets of same metal.
- C. Guides - Angle: ASTM A36/A36M metal angles, size as required by manufacturer for location and function.
- D. Hood Enclosure and Trim: Internally reinforced to maintain rigidity and shape.
- E. Roller Shaft Counterbalance: Steel pipe and helical steel spring system, capable of producing torque sufficient to ensure smooth operation of curtain from any position and capable of holding position at mid-travel; with adjustable spring tension; requiring 25 lb nominal force to operate.

2.04 ELECTRIC OPERATION

- A. Operator, Controls, Actuators, and Safeties: Comply with UL 325; provide products listed by ITS (DIR), UL (DIR), or testing agency acceptable to authorities having jurisdiction.
 1. Provide interlock switches on motor operated units.
- B. Electric Operators:
 1. Mounting: Side mounted.
 2. Motor Enclosure:
 - a. Interior Coiling Doors: NEMA MG 00001, Type 4; open drip proof.
 3. Motor Rating: 1/3 HP; continuous duty.
 4. Motor Voltage: 120 volts, single phase, 60 Hz.
 5. Motor Controller: NEMA ICS 2, full voltage, reversing magnetic motor starter.
 6. Controller Enclosure: NEMA EN 10250, Type 4.
 7. Opening Speed: 12 inches per second.
 8. Brake: Manufacturer's standard type, activated by motor controller.
 9. Manual override in case of power failure.

- C. Control Station: Provide standard three button, 'Open-Close-Stop' momentary-contact control device for each operator complying with UL 325.
 - 1. 24 volt circuit.
 - 2. Surface mounted, at interior door jamb.
 - 3. Entrapment Protection Devices: Provide sensing devices and safety mechanisms complying with UL 325.
 - a. Primary Device: Provide electric sensing edge, wireless sensing, NEMA 1 photo eye sensors, or NEMA 4X photo eye sensors as required with momentary-contact control device.
- D. Safety Edge: Located at bottom of coiling door, full width, electro-mechanical sensitized type, wired to stop and reverse door direction upon striking object, hollow neoprene covered.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that adjacent construction is suitable for door installation.
- B. Verify that electrical services have been installed and are accessible.
- C. Verify that door opening is plumb, header is level, and dimensions are correct.
- D. Notify Architect of any unacceptable conditions or varying dimensions.
- E. Commencement of installation indicates acceptance of substrate and door opening conditions.

3.02 INSTALLATION

- A. Install units in accordance with manufacturer's instructions.
- B. Use anchorage devices to securely fasten assembly to wall construction and building framing without distortion or stress.
- C. Securely and rigidly brace components suspended from structure. Secure guides to structural members only.
- D. Fit and align assembly including hardware; level and plumb, to provide smooth operation.
- E. Install enclosure and perimeter trim.

3.03 TOLERANCES

- A. Maintain dimensional tolerances and alignment with adjacent work.
- B. Maximum Variation From Plumb: 1/16 inch.
- C. Maximum Variation From Level: 1/16 inch.
- D. Longitudinal or Diagonal Warp: Plus or minus 1/8 inch per 10 feet straight edge.

3.04 ADJUSTING

- A. Adjust operating assemblies for smooth and noiseless operation.

3.05 CLEANING

- A. Clean installed components.
- B. Remove labels and visible markings.

END OF SECTION

SECTION 08 3613 SECTIONAL DOORS

PART 1 GENERAL

2.01 SECTION INCLUDES

- A. Overhead sectional doors, electrically operated.
- B. Operating hardware and supports.
- C. Electrical controls.

2.02 REFERENCE STANDARDS

- A. ASTM 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; 2004 (Reapproved 2012).
- B. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014 (Reapproved 2021).
- C. DASMA 102 - American National Standard Specifications for Sectional Doors; 2018.
- D. ITS (DIR) - Directory of Listed Products; Current Edition.
- E. NEMA ICS 2 - Industrial Control and Systems Controllers, Contactors and Overload Relays Rated 600 Volts; 2008 (Reaffirmed 2020).
- F. NEMA MG 00001 - Motors and Generators; 2024.
- G. NEMA EN 10250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2024.
- H. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- I. UL (DIR) - Online Certifications Directory; Current Edition.
- J. UL 325 - Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems; Current Edition, Including All Revisions.

2.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate opening dimensions and required tolerances, connection details, anchorage spacing, hardware locations, and installation details.
- C. Product Data: Show component construction, anchorage method, and hardware.
- D. Manufacturer's Installation Instructions: Include any special procedures required by project conditions.
- E. Manufacturer's Qualification Statement.
- F. Installer's Qualification Statement.
- G. Operation Data: Include normal operation, troubleshooting, and adjusting.
- H. Maintenance Data: Include data for motor and transmission, shaft and gearing, lubrication frequency, spare part sources.
- I. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

2.04 QUALITY ASSURANCE

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

- B. Installer Qualifications: Company specializing in performing work of type specified and with at least three years documented experience.
- C. Comply with applicable code for motor and motor control requirements.
- D. Products Requiring Electrical Connection: Listed and classified by ITS (DIR), UL (DIR), or testing firm acceptable to authorities having jurisdiction, as suitable for purpose specified.

2.05 WARRANTY

- A. See Section 01 7800 - Closeout Submittals for warranty requirements.
- B. Correct defective Work within a five year period after Date of Substantial Completion.
- C. Warranty: Include coverage for electric motor.
- D. Provide five year manufacturer warranty for electric operating equipment.

PART 2 PRODUCTS

3.01 MANUFACTURERS

- A. Sectional Doors:
 - 1. Clopay Building Products: www.clopaydoor.com/#sle.
 - 2. Raynor Garage Doors: www.raynor.com/#sle.
 - 3. Wayne-Dalton, a Division of Overhead Door Corporation: www.wayne-dalton.com/#sle.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.

3.02 STEEL DOORS

- A. Steel Doors: Flush steel, insulated; standard lift operating style with track and hardware; complying with DASMA 102, Commercial application.
 - 1. Performance: Withstand positive and negative wind loads equal to 1.5 times design wind loads specified by local code without damage or permanent set, when tested in accordance with ASTM E330/E330M, using 10 second duration of maximum load.
 - 2. Door Nominal Thickness: 2 inches thick.
 - 3. Thermal Transmittance: U-factor of 0.31 Btu/hr sq ft degrees F, maximum, in accordance with DASMA 102.
 - 4. Air Leakage Rate: Less than 0.40 cfm/sf when tested in accordance with ASTM E283 at test pressure difference of 1.57 psf.
 - 5. Exterior Finish: Factory finished with acrylic baked enamel; color as selected by Architect.
 - 6. Interior Finish: Factory finished with acrylic baked enamel; color as selected from manufacturers standard line.
 - 7. Glazed Lights: Full panel width, one row; set in place with resilient glazing channel.
 - 8. Electric Operation: Electric control station.
- B. Door Panels: Steel construction; outer steel sheet of 20 gauge, 0.0359 inch minimum thickness, flush profile; inner steel sheet of 27 gauge, 0.0164 inch minimum thickness, flat profile; core reinforcement sheet steel roll formed to channel shape, rabbeted weather joints at meeting rails; polyurethane insulation.
- C. Window Frame: Manufacturers standard, finish to match.
- D. Glazing: Heat-strengthened glass; insulated glass units; clear; 1/2 inch overall thickness.

3.03 ALUMINUM DOORS

- A. Aluminum Doors: Stile and rail aluminum with glazed panels; standard lift operating style with track and hardware; complying with DASMA 102, Commercial application.
 - 1. Door Nominal Thickness: 2 inches thick.
 - 2. Finish: Factory anodized; color as selected from manufacturers standard line.
 - 3. Glazed Lights: See drawings for layout; set in place with resilient glazing change
 - 4. Electric Operation: Electric control station.

- B. Door Panels: Paneled aluminum construction; extruded aluminum stiles and rails; 2 inch thick infill panels of sheet aluminum; stile and rail joints welded; rabbeted weather joints at meeting rails.
- C. Window Frame: Manufacturers standard, finish to match.
- D. Glazing: Annealed float glass; single pane; frosted; 1/8 inch overall thickness.
- E. Basis of Design: Architectural Aluminum Series, Model 904 manufactured by Clopay.

3.04 COMPONENTS

- A. Track: Rolled galvanized steel, 0.090 inch minimum thickness; 2 inch wide, continuous one piece per side; galvanized steel mounting brackets 1/4 inch thick.
- B. Hinge and Roller Assemblies: Heavy duty hinges and adjustable roller holders of galvanized steel; floating hardened steel bearing rollers, located at top and bottom of each panel, each side.
- C. Lift Mechanism: Torsion spring on cross head shaft, with braided galvanized steel lifting cables.
 - 1. For Manual Operation: Requiring maximum exertion of 25 lbs force to open.
 - 2. Spring Cycle: 10,000 cycle standard.
- D. Sill Weatherstripping: Resilient hollow rubber strip, one piece; fitted to bottom of door panel, full length contact.
- E. Jamb Weatherstripping: Roll formed steel section full height of jamb, fitted with resilient weatherstripping, placed in moderate contact with door panels.
- F. Head Weatherstripping: EPDM rubber seal, one piece full length.
- G. Panel Joint Weatherstripping: Neoprene foam seal, one piece full length.
- H. Lock: Inside center mounted, adjustable keeper, spring activated latch bar with feature to retain in locked or retracted position; interior and exterior handle.

3.05 ELECTRIC OPERATION

- A. Operator, Controls, Actuators, and Safeties: Comply with UL 325; provide products listed by ITS (DIR), UL (DIR), or testing agency acceptable to authorities having jurisdiction.
 - 1. Provide interlock switches on motor operated units.
- B. Electric Operators:
 - 1. Mounting: Side mounted on cross head shaft.
 - 2. Motor Enclosure:
 - a. Exterior Doors: NEMA MG 00001, Type 4; open drip proof.
 - b. Interior Doors: NEMA MG 00001, Type 1; open drip proof.
 - 3. Motor Rating: 1/2 hp; continuous duty.
 - 4. Motor Voltage: 120 volts, single phase, 60 Hz.
 - 5. Motor Controller: NEMA ICS 2, full voltage, reversing magnetic motor starter.
 - 6. Controller Enclosure: NEMA EN 10250, Type 1.
 - 7. Opening Speed: 12 inches per second.
 - 8. Brake: Adjustable friction clutch type, activated by motor controller.
 - 9. Manual override in case of power failure.
 - 10. Refer to Section 26 0583 for electrical connections.
- C. Wiring Terminations: Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated; enclose terminal lugs in terminal box sized to comply with NFPA 70.
- D. Control Station: Provide standard three button (Open-Close-Stop) momentary-contact control device for each operator complying with UL 325.
 - 1. 24 volt circuit.
 - 2. Surface mounted, at interior door jamb.

3. Entrapment Protection Devices: Provide sensing devices and safety mechanisms complying with UL 325.
 - a. Primary Device: Provide electric sensing edge, wireless sensing, NEMA 1 photo eye sensors, or NEMA 4X photo eye sensors as required with momentary-contact control device.
- E. Safety Edge: Located at bottom of sectional door panel, full width; electro-mechanical sensitized type, wired to stop and reverse door direction upon striking object; hollow neoprene covered to provide weatherstrip seal.

PART 3 EXECUTION

4.01 EXAMINATION

- A. Verify that wall openings are ready to receive work and opening dimensions and tolerances are within specified limits.
- B. Verify that electric power is available and of the correct characteristics.

4.02 PREPARATION

- A. Prepare opening to permit correct installation of door unit to perimeter air and vapor barrier seal.
- B. Apply primer to wood frame.

4.03 INSTALLATION

- A. Install door unit assembly in accordance with manufacturer's instructions.
- B. Anchor assembly to wall construction and building framing without distortion or stress.
- C. Securely brace door tracks suspended from structure. Secure tracks to structural members only.
- D. Fit and align door assembly including hardware.
- E. Coordinate installation of electrical service. Complete power and control wiring from disconnect to unit components.
- F. Install perimeter trim.

4.04 TOLERANCES

- A. Maximum Variation from Plumb: 1/16 inch.
- B. Maximum Variation from Level: 1/16 inch.
- C. Longitudinal or Diagonal Warp: Plus or minus 1/8 inch from 10 ft straight edge.
- D. Maintain dimensional tolerances and alignment with adjacent work.

4.05 ADJUSTING

- A. Adjust door assembly for smooth operation and full contact with weatherstripping.

4.06 CLEANING

- A. Clean doors and frames and glazing.
- B. Remove temporary labels and visible markings.

4.07 PROTECTION

- A. Protect installed products from damage until Date of Substantial Completion.
- B. Do not permit construction traffic through overhead door openings after adjustment and cleaning.

END OF SECTION

SECTION 08 4113
ALUMINUM-FRAMED ENTRANCES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Aluminum-framed entrances.

1.02 REFERENCE STANDARDS

- A. AAMA 1503 - Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections; 2009.
- B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.
- C. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2024.
- D. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2021a.
- E. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.
- F. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2024.
- G. ASTM E283/E283M - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Skylights, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2019.
- H. FM (AG) - FM Approval Guide; Current Edition.
- I. NEMA MG 00001 - Motors and Generators; 2024.
- J. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- K. NFRC 100 - Procedure for Determining Fenestration Product U-factors; 2023.
- L. NFRC 200 - Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence; 2023.
- M. NFRC 201 - Procedure for Interim Standard Test Method for Measuring the Solar Heat Gain Coefficient of Fenestration Systems Using Calorimetry Hot Box Methods; Current Edition.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Conference: Refer to Section 08 4413 - Glazed Aluminum Curtain Walls for requirements
- B. Coordinate with work specified in Section 08 4413 - Glazed Aluminum Curtain Walls.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Door manufacturer shall confirm that they have received approved hardware shop drawings and associated cut outs and templates for proper door preparation.
- C. Product Data: Provide manufacturer's specifications, technical product data, performance values, standard details for the products specified and manufacturer's recommendation for installation and certification of the Installation Subcontractor.
- D. Shop Drawings: Submit shop drawings prepared by the aluminum entrance manufacturer for each type of product. Include the following:
 - 1. Indicate location of each door type, component dimensions and field verified openings. Continue the door numbering system established in the Architectural Drawings.
 - 2. Elevations of each unit, drawn at 1/2" = 1'-0" scale. Indicate frame joinery.

3. Full size section details of every typical member.
 4. Anchorage fastener type and location, straps/plates, and reinforcing steel as required by structural calculations.
 5. Glass and glazing.
 6. Perimeter sealants.
 7. Provide four (4) final, complete, shop drawing sets to the A/E, Owner's Representative, and Owner (2 copies), in addition to a PDF via the EPMS (e-Builder) prior to the start of fabrication. These sets shall incorporate all review comments and notations from previous shop drawing submittals.
- E. Test Reports: The Contractor shall submit test reports on each entrance type, if applicable. Each report shall be complete, prepared by an independent testing laboratory certified by AAMA and/or NFRC, and shall indicate that each entrance type has been evaluated in accordance with these Specifications and performance criteria established in this Section.
- F. Door manufacturer shall confirm that they have received approved hardware shop drawings and associated cut outs and templates for proper door preparation.
- G. Manuals (O&M): Submit manufacturer's operating and maintenance manuals for entrance hardware per requirements of Division 1.
- H. Contract Close-Out Submittals: As-built set of shop drawings, prepared by the aluminum entrance manufacturer, showing the final configuration of the entrance installation per requirements of Division 1.

1.05 QUALITY ASSURANCE

- A. Manufacturer's Certification: Submit written certification that the Installation Subcontractors have been approved by the Manufacturer to install their products
1. The aluminum-framed entrances manufacturer shall certify in writing that the completed aluminum-framed entrances have been fabricated and shop assembled in the manufacturer's authorized plant in accordance with the Specifications and final approved shop drawings.
- B. Installer Certifications: The Installation Subcontractor shall be a firm with a minimum of five (5) years of documented experience specializing in the proper installation of the specified aluminum entrance assemblies.

1.06 WARRANTY

- A. See Section 01 7800 - Closeout Submittals for additional requirements.
- B. The aluminum entrance manufacturer shall certify in writing, separate from the all-inclusive warranty, that entrances meet or exceed specified criteria; that component parts were properly designed and selected for locale and installation intended; that installation was made in accordance with manufacturer's instructions. If the door fabricator is different from the curtain wall system manufacturer, submit certification on compatibility with curtain wall system Manufacturer if door fabricator is different.
- C. Provide written all-inclusive warranty to the Owner, executed by the Contractor, the Installation Subcontractors and the respective manufacturers of each product, that all parts of Work in this Section, including insulating glass units, shall be free from defects in materials, workmanship and installation for a period of three (3) years from the date of Substantial Completion. Should any defect develop during warranty period, such defects shall, upon request, be repaired or replaced at no additional cost to the Owner. Cost of such Work shall be borne by the Contractor.

- D. Provide written all-inclusive warranty to the Owner, executed by the Installation Subcontractor and the respective manufacturers of each product, that all parts of Work in this Section, including insulating glass units, shall be free from defects in materials, workmanship and installation for a period of seven (7) years from the expiration of noted warranty in the above paragraph. Should any defect develop during warranty period, such defects shall, upon request, be repaired or replaced at no additional cost to the Owner. Cost of such Work shall be borne by the Installation Subcontractor.
- E. Warranties shall be dated on the date of Substantial Completion and notarized by a duly authorized Notary Public of the State of Minnesota

PART 2 PRODUCTS

2.01 PERFORMANCE CRITERIA

- A. If any changes have been made to the product within the past ten years, submit a Manufacturer's test report on a representative entrance assembly of the type, size and model proposed for this Project.
- B. Air Infiltration: Manufacturer's testing shall be in accordance with ASTM E283/E283M for compliance with maximum permissible air infiltration rate of 1.0 cfm/sq. ft. when tested at a minimum pressure differential of 1.567 lbs/sq. ft. based on requirements of the Minnesota Energy Code.
- C. Thermal Movements: Provide entrance systems, including anchorage, that accommodates thermal movements of system and supporting elements when subjected to a temperature differential from -30 degrees F to +180 degrees F without buckling, damaging stresses on glazing, failure of sealant joints, overstressing of components, damaging loads on fasteners, noise or vibrations, and other detrimental effects.
- D. Thermal Transmittance:
 - 1. When tested in accordance with AAMA 1503, thermal performance for each type of fixed lites of aluminum-framed entrance shall not exceed a maximum U-value of 0.36 of BTU/hr. /sq. ft./ degree F.
 - 2. When tested in accordance with AAMA 1503, thermal performance for each type of aluminum entrance doors with glazing shall not exceed a maximum U-value of 0.77 of BTU/hr. / sq. ft./ degree F.
 - 3. As required by the Minnesota State Energy Code, the Solar Heat Gain Coefficients (SHGC) for the fixed lite area of the aluminum-framed entrances when tested in accordance with National Fenestration Ratings Council NFRC 201 test method shall be:
 - a. SHGC all: .40.
 - 4. Test results may be derived by computer simulations for compliance with AAMA 507 or NFRC U-Factor, Solar Heat Gain Coefficient, Visible Transmittance, and Condensation Resistance Value. Simulations shall comply with NFRC 100 - Procedure for Determining Fenestration Product U-Factors; NFRC 200 - Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence

2.02 MANUFACTURERS

- A. Single Source Responsibility: Provide aluminum entrances produced by a single manufacturer of units identical to those specified.
- B. Glazed Doors with 6" wide stiles:
 - 1. Tru-Therm/Interclad; Endura II Series.
 - 2. W.L. Hall; Tubecraft 60M Series.
- C. Substitutions: Not permitted.

2.03 MATERIALS

- A. Extruded aluminum prime billet 6063T6, ASTM B221. Aluminum sheet 5005 H34 (anodic), ASTM B209/B209M.

- B. Steel, conforming to ASTM A36/A36M, hot-dipped galvanized in accordance with ASTM A123/A123M.
- C. Nonferrous, nonmagnetic stainless steel, Type 304.
- D. Finishes:
 - 1. Exposed surfaces of all aluminum shall receive an anodized color finish conforming to the Aluminum Association Designation, Architectural Class 1, AA-M10C22 and the following:
 - a. The anodic coating shall be continuous, fully sealed and free from powdery surfaces.
 - b. Coating thickness shall be a minimum of 0.7 mils when tested in accordance with ASTM B244.
 - c. Anodic coating shall be A44- Electrolytically Deposited Color: Dark Bronze

2.04 FABRICATION

- A. Aluminum Entrance Doors:
 - 1. Aluminum entrance doors shall be monumental quality, with seamless, hollow tube section stiles and rails not less than 2" deep and a minimum wall thickness of not less than 3/16".
 - 2. Each corner of the door shall be factory welded inside the tubes allowing stiles and rails to be accurately fitted to flush hairline joints. Ends of rails shall be sealed prior to abutting stiles for a weather tight connection.
 - 3. Entrance doors shall be reinforced with a stainless steel tie rod of 3/8" diameter running full width of top and bottom rails and fixed with stainless steel nuts and lock washers against extruded aluminum lugs. Lock nuts shall be cadmium plated steel.
 - 4. Hinge stile shall be reinforced for door hinge anchorage with a hot-dipped galvanized, 1-1/4" by 1/4" thick steel bar, which runs continuously for full height and is mechanically fastened for the full height of stile. Hinges shall be anchored directly into steel reinforcing.
 - 5. Doors shall be shop mortised and reinforced per hardware manufacturer's templates for specified hardware items such as pulls, exit devices, closers and overhead stops. Reinforcing shall be hot-dipped galvanized 3/16" thick steel.
 - 6. Door glazing channel shall be snapped in and be made non-removable from the exterior, without visible fasteners. Minimum wall thickness shall be 0.060". Glazing channels shall be sized accordingly to accommodate 1" laminated insulating safety glass units and single pane glass units in thickness specified and where required. Glazing channels butting against door members and butt joints between glazing channel members shall be backsealed to prevent air and water intrusion to the interior. Allow glazing channel to weep infiltrating water to the exterior.
 - 7. Vision lights shall be glazed with a wet/dry glazing system using wet silicone sealant glazing at the exterior and dry gasket glazing at the interior.
- B. Aluminum Entrance Frames:
 - 1. Provide framing with 2" by 4-1/2" extruded aluminum profiles.
 - 2. Curtain wall frames shall be of thermal break construction; Perimeter inset door frames are not thermally broken. Frames shall have a minimum wall thickness of 1/8" at hinge locations.
 - 3. Hinge jamb shall be reinforced by a hot-dipped galvanized 1-1/4" by 1-1/4" by 3/16" steel angle which runs continuously full height of the jamb and is mechanically fastened to the jamb. Hinges shall be anchored directly into steel reinforcing.
 - 4. Intermediate jamb frames shall be screwed to floor mounted hot-dipped galvanized steel support angles concealed within the frame.
 - 5. Frames shall be shop mortised and reinforced per hardware manufacturer's templates for specified hardware items. Reinforcing shall be hot-dipped galvanized 3/16" thick steel.
 - 6. Weather-stripping shall be polypropylene pile inserted into extruded races in the door stops. Weather-stripping for exterior doors shall be continuous at head and jambs. Door bottoms shall be weather-stripped.
- C. Glazed Aluminum Curtain Wall Door Frame Inserts/Sub-Frames

1. Provide extruded aluminum door frame inserts/sub-frame with applied extruded aluminum stop, approximately 7/8" x 4" deep. Hardware reinforcement on door frame inserts/sub-frames shall be completely concealed and fastened in-place without the method of attachment being visible. Hardware attachment to door frames inserts/sub-frames shall also be completely concealed. Weather stripping shall be polypropylene pile insert. Insert into keyway grooves on the stops of the jambs and head sections of the frame. Coordinate door size, hardware locations and requirements with aluminum entrance shop drawings and the manufacturer.
2. Internal Reinforcement at Door Frame Inserts/Sub-Frames: Door frame inserts/sub-frames shall be reinforced by a hot dipped galvanized 1-1/4" x 1/4" thick steel bar which runs continuously full height of the insert and is mechanically fastened to the insert. All fasteners, nuts and washers used to secure reinforcement shall be stainless steel.
3. Base of curtain wall jamb frames receiving door frame inserts/sub-frames shall be anchored to prevent movement.

2.05 ACCESSORIES

- A. Frame Anchors: Anchors, heavy duty sleeve or expansion style, vibration resistant and removable, used to secure frame to concrete and grout filled concrete block shall be stainless steel. Type, size and spacing shall be per Project's structural requirements.
- B. Shims: PVC horseshoe shims in non-load bearing conditions and Korolath multipolymer plastic bearing shims per structural calculations and final shop drawing set.
- C. Provide insulation in tops of door stiles to retard air movements. Cap seal with compatible silicone sealant to provide an air and water tight seal.
- D. Provide extruded aluminum rain drips above exit only, non-vestibule door locations. Finish shall match doors.

2.06 HARDWARE

- A. Continuous hinges are preferred for main entrance doors.
- B. Entrance doors using butt hinges for support in its frame, shall have hinges of stainless steel with a non-rising pin and a minimum of four ball bearing supports.
- C. Provide a minimum of 3 hinges per door for doors up to 7'-0" in height. Provide a minimum of four hinges per door for doors up to 8'-0" in height.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Thresholds shall be set in a full bed of sealant.
- B. The entrance Installation Subcontractor shall furnish and supply all isolation, caulking, and sealant materials required to caulk all joints between entrance frames and other construction to provide a complete thermal broken, weather-tight installation.

3.02 TOLERANCES

- A. Erection Tolerances: Permissible dimensional tolerances in the building frame and other work adjacent to the aluminum-framed entrances are specified in Section IV, Division 3 and 4 of the Design Standards. The aluminum-framed entrance assemblies shall be designed to accommodate these tolerances. Provided irregularities do not exceed them, and clearance shown on approved shop drawings are maintained, all parts of the aluminum-framed entrance assemblies when completed, shall be within the following tolerances:
 1. Maximum variation from plane or location shown on approved shop drawings: 1/8 inch per 12 feet of length or 1/2 inch in any total length.
 2. Maximum offset from true alignment between two identical members abutting end to end in line: 1/16 inch.

END OF SECTION

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SECTION 08 4413
GLAZED ALUMINUM CURTAIN WALLS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Aluminum-framed curtain wall, with vision glazing and glass infill panels.

1.02 REFERENCE STANDARDS

- A. AAMA CW-10 - Care and Handling of Architectural Aluminum from Shop to Site; 2015.
- B. AAMA 501.2 - Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls, and Sloped Glazing Systems; 2025.
- C. AAMA 503 - Voluntary Specification for Field Testing of Newly Installed Storefronts, Curtain Walls and Sloped Glazing Systems; 2014.
- D. AAMA 1503 - Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections; 2009.
- E. ASHRAE Std 90.1 - Energy Standard for Buildings Except Low-Rise Residential Buildings; 2010, Including All Amendments and Errata.
- F. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.
- G. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2021a.
- H. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
- I. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.
- J. ASTM E283/E283M - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Skylights, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2019.
- K. ASTM 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; 2004 (Reapproved 2012).
- L. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014 (Reapproved 2021).
- M. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000 (Reapproved 2023).
- N. NFRC 100 - Procedure for Determining Fenestration Product U-factors; 2023.
- O. NFRC 200 - Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence; 2023.
- P. NFRC 500 - Procedure for Determining Fenestration Product Condensation Index Ratings; 2023.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data: Submit the manufacturer's specifications, technical product data, performance values, standard details of the products specified and the manufacturer's certification of the Installation Subcontractor and the manufacturer's recommendation for installation.
- C. Test Report: If the Manufacturer has updated the product within the past ten years, submit a Manufacturer's test report on a representative curtain wall assembly, identical in all appropriate functional and technical aspects to the model and type proposed for the Project.

- D. Shop Drawings: Submit shop drawings prepared by the curtain wall manufacturer or exclusively authorized installation Subcontractors/fabrication shop, under the guidance of the Manufacturer and approved by their structural engineer for each type of product. Include the following:
1. Indicate layout and location of each curtain wall and door type, component dimensions and field verified openings. Continue the curtain wall designation established in the Architectural Drawings.
 2. Elevations of each unit, drawn at 1/2" = 1'-0" scale. Indicate frame joinery.
 3. Full size section details of every composite member.
 4. Anchorage fastener types and locations, clips/straps/plates and reinforcing steel as required by structural calculations.
 5. Anodized finish.
 6. Installation and glazing instructions.
 7. Glass and glazing.
 8. Sealants, including those selected by the curtain wall manufacturer.
 9. Vapor containment systems, if applicable.
 10. Submit four (4) final, complete, shop drawing sets to the Architect, the Owner's Representative and the Owner (two (2) copies) and one PDF copy via the EPMS (e-Builder) prior to the start of fabrication. These final shop drawing sets shall incorporate all review comments and notations from previous shop drawing submittals. Submit final shop drawings a minimum of ten (10) work-days prior to the Pre-Installation Conference.
- E. Samples: Submit one (1) curtain wall assembly sample showing typical joints, weep system, anchorage at corner section of typical curtain wall sill/jamb intersection. The Architect shall retain samples to verify installed units are in conformance with the Construction Documents and the approved final shop drawings.
- F. Test Reports / Calculations: The Contractor shall submit test reports on each curtain wall type. Each report shall be complete, prepared by an independent testing laboratory certified by AAMA and/or NFRC, and shall indicate that each curtain wall type has been evaluated in accordance with these Specifications and performance criteria established in Item 2.02 of this Section. Previous independent test reports on curtain wall systems identical to the specified product and model are acceptable if no changes have been made to the product or the referenced tests have not changed.
- G. Structural Calculations (SC): Submit structural calculations and anchorage details prepared by an independent structural engineer licensed in the State of Minnesota, indicating adequacy of all installed materials, including glass and glazing, to meet the structural load requirements as required by the uniform load structural test and the uniform load deflection test and dead load and framing criteria of the Minnesota Building Code.
- H. Compatibility: Submit written statement from the Manufacturer of the curtain wall materials that the Manufacturer has reviewed the all materials proposed for use for cleaning, for use on the window opening substrates, and the materials used to adhere and seal to the underlying substrates, are chemically and adhesively compatible with, materials used in their curtain wall assemblies and other products they may contact within the curtain wall assembly.
- I. Certifications, Lists, and Warranties:
1. Installer's Certification of Experience stating the minimum 5 years' experience installing the specified windows.
 2. Manufacturer's Certification of approval of the Installation Subcontractor to install the specified curtain wall products.
 3. Manufacturer's Certification of Approved Plant Fabrication according to Project specifications and approved final shop drawings.
 4. List of Key Installation Personnel proposed to be present throughout Project.

- J. Contract Close-Out Submittals: As-built set of shop drawings, prepared by the curtain wall manufacturer, showing the final configuration of the curtain wall installation per requirements of Section 01 7800 - Closeout Submittals.

1.04 QUALITY ASSURANCE

- A. Manufacturer's Certification: Submit written certification that the Installation Subcontractors have been approved by the Manufacturer to install their products.
- B. Manufacturer's Confirmation: Manufacturer's with products listed on the Approved Manufacturer's Product List and utilizing a manufacturer's sole, exclusively authorized installation Subcontractors/fabrication shop to provide curtain wall framing for this project, shall submit written confirmation that final shop drawings and structural calculations have been reviewed and approved; that the curtain wall frames and components shall be identical to curtain wall products listed and that the curtain wall fabrication has been reviewed and approved. All assembly shall be done per the manufacturer's procedures and tolerances.
- C. The curtain wall manufacturer shall certify in writing, separate from the all-inclusive warranty, that the curtain wall system meets or exceeds specified criteria; that component parts were properly designed and selected for locale and installation intended; that installation was made in accordance with the manufacturer's instructions, that a vapor tight barrier has been installed preventing the formation of condensation, and that installation of aluminum doors is compatible with installation of curtain wall system.
- D. Installer's Certification: The curtain wall Installation Subcontractor shall be a firm with a minimum of five (5) years of experience specializing in the proper installation of the specified aluminum curtain wall assembly.
- E. Contractor shall provide certification that welders to be employed for this Work have satisfactorily passed AWS qualification tests. Fabricator(s) and erector(s) shall submit current welding certifications, for fabrication plant and field welding, to the A/E for written approval prior to the start of welding. If re-certification of welders is required, retesting shall be the Contractor's responsibility.
- F. Contractor shall provide written confirmation, ten (10) work-days prior to scheduling a curtain wall pre-installation conference, from the curtain wall installation subcontractor that the wall openings conforms to the construction documents and have been reviewed and are acceptable for commence the pre-installation conference trial installation.
- G. The Contractor shall note that all building façade work is complete, including brick cleaning, air barrier, installation of cavity wall sealant joints, and all roofing work prior to convening the Pre-Installation Conference.
- H. Framing fabricated by the Manufacturer's sole exclusive authorized installation Subcontractors/fabrication shop shall be installed by that authorized installation Subcontractors.

1.05 CURTAIN WALL PRE-INSTALLATION CONFERENCE AND TRIAL INSTALLATION

- A. There shall be a Pre-Installation Conference requiring two phases of work for each location noted below. A conference then trial installation(s) and tests.
 - 1. Trial Installation A: Curtainwall installed in insulated concrete panel.
 - 2. Trial Installation B: Curtainwall installed in masonry wall with precast concrete backup wall.
- B. In the First Phase, the Contractor shall schedule a Conference in accordance with requirements of Section 01 7000 – Execution and Closeout Requirements, after shop drawing review and prior to the trial installation(s). Attendees shall include the Owner, the Contractor, the A/E, Installation Subcontractors, curtain wall manufacturer's representative and other representatives directly associated with performance of the Work. Attendance shall be in person or virtually.

1. The Contractor shall provide a minimum of ten (10) working days written notice to all required attendees to schedule the Conference and ten (10) working days written notice for re-scheduled meetings.
 2. All curtain wall materials shall be on-site prior to commencing the Conference.
 3. The Conference shall include review of: Specifications; final shop drawings; objectives of trial installations and testing; identification of trial installations; test procedures; and installation schedule.
- C. The Second Phase requires curtain wall trial installation(s) and tests. Trial installations and tests shall be completed and performed for each type of curtain wall unit, with the Owner retaining the right to randomly select units for installation. The completed trial installation(s) become part of the completed work, subject to compliance with the Project Specifications and successful testing.
1. The Contractor shall schedule the trial installation(s) a minimum of ten (10) working days after the Conference and provide written notice to all required attendees directly associated with performance of the Work. The Contractor shall provide ten (10) working days written notice for re-scheduled installation(s).
 2. The Contractor shall confirm that trial installation(s) shall be complete in every detail, conforming to final installation(s) and shall serve as test demonstration installation(s) for the remaining Work. Curtain wall anchorage system, specified curtain wall components, glass and glazing, weeps, exterior perimeter sealant and primary sealant joint shall all be included in trial installation(s). The Owner and/or A/E shall list additional project specific items like split mullions, spandrel panels, fire-resistance rated construction requirements, vapor containment, etc. for inclusion in trial installation(s).
 3. The Contractor shall assist with trial installation(s) and testing procedures by providing all necessary scaffolding, lifts, enclosures, temporary heat and other equipment and utilities, including water and power to facilitate trial installation(s) and testing. Enclosures and temporary heat shall maintain a minimum temperature of 40 degrees F. for air and substrates.
- D. The Owner, upon written request from the Contractor, will engage an independent, AAMA accredited testing agency to field test completed trial installation(s). Testing shall confirm compliance with specified performance criteria for air leakage and resistance to water penetration. Trial installation testing shall be per AAMA 503 Specification for Field Testing and per additional requirements, definitions and criteria listed in Field Quality Control Testing in Part 3 this section.
1. Where trial installation(s) exceed 100 sq. ft. maximum test areas, the minimum amount of testing shall include one sill/jamb corner; one head/jamb corner; and a minimum of one intermediate interlocking vertical mullion stack joint to constitute one field test.
 2. Where trial installation(s) occur at multi-story curtain wall assemblies, two interior test chambers may be required. Install the first interior test chamber to one sill/jamb corner and at a minimum, one adjacent intermediate interlocking vertical mullion stack joint for the first segment of testing. Install the second interior test chamber to the head/jamb corner immediately above and at a minimum, one adjacent intermediate interlocking vertical mullion stack joint for the second segment of testing. Both segments constitute one field test for this type of curtain wall assembly.
 3. Contractor shall assist testing agency in compartmentalizing air chambers and cavities to allow for air leakage and water penetration testing.
 4. Testing shall occur prior to interior finish work, including interior perimeter sealant joint installation, to allow visual access to areas undergoing testing, to check for water penetration.

5. The Contractor shall provide an uninterrupted power supply and uninterrupted water flow that delivers water uniformly against the test area at a minimum rate of 5.0 gal/sq. ft./hr. with a minimum water line pressure necessary to deliver 12 PSI for the entire test area with a maximum test area of 100 sq. ft. The Contractor shall make provisions with the local fire department /public works department to rent or utilize adjacent fire hydrants to provide required water supply when required.
6. Following the trial installation, the Contractor may continue the curtain wall installation with the erection and anchoring of curtain wall frames. There shall be no sealant installation; no zone dam installation; no glazing; and no setting of glass. In continuing the curtain wall installation, the Contractor assumes all risk associated with this work. If testing results in a failure of the trial installation, the Contractor shall provide corrective work at their expense to remedy all installed work.
7. If failures develop under testing, Contractor shall identify the reasons for failures, repair and retest the failed installation until the installation is completely free of defects. All retests shall be by the Owner's testing agency. The Contractor shall notify the Owner and the A/E as to when corrective work will be undertaken. The Owner and AE will determine if their presence is required to observe the corrective work. All re-observation, re-testing and associated costs shall be the responsibility of the Contractor and deducted from the Contract Sum by Change Order.
8. The Owner will not make payment, partial or otherwise, for curtain wall products until trial installation(s) have passed testing.
9. Verify that all key personnel who participate in the Conference and trial installations are committed to complete the remainder of the curtain wall installation for the Project.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Handle products of this section in accordance with AAMA CW-10.
- B. Make no deliveries to the Project until ready to install or until approved storage is provided. Where this provision is neglected and materials are delivered to the Project site prior to the Project being ready for installation, such materials shall be safely stored elsewhere at the expense of the Contractor with adequate insurance coverage provided for the off-site storage.
- C. Deliver materials in original, un-opened containers with labels intact and legible.
- D. Provide above-grade platform storage for materials and that will protect the materials from moisture damage and minimize damage to ground surfaces. Use tarpaulins to provide protection of stored materials. Factory raps alone are not sufficient. This protection also includes materials required for fire resistive assemblies.
- E. Store materials and provide and operate material handling equipment in a manner as to not damage existing or new construction.

1.07 WARRANTY

- A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.
- B. Provide written all-inclusive warranty to the Owner, executed by the Contractor, the Installation Subcontractors and the respective manufacturers of each product, that all parts of Work in this Section, including insulating glass units, shall be free from defects in materials, workmanship and installation for a period of three (3) years from the date of Substantial Completion. Should any defect develop during warranty period, such defects shall, upon request, be repaired or replaced at no additional cost to the Owner. Cost of such Work shall be borne by the Contractor.

- C. Provide written all-inclusive warranty to the Owner, executed by the Installation Subcontractor and the respective manufacturers of each product, that all parts of Work in this Section, including insulating glass units, shall be free from defects in materials, workmanship and installation for a period of seven (7) years from the expiration of noted warranty in the above paragraph. Should any defect develop during warranty period, such defects shall, upon request, be repaired or replaced at no additional cost to the Owner. Cost of such Work shall be borne by the Installation Subcontractor.
- D. Warranty shall be dated and notarized by a duly authorized Notary Public of the State of Minnesota
- E. Provide copies of warranties as specified under provisions of Section 01 7800 - Closeout Submittals.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Glazed Aluminum Curtain Walls:
 - 1. Basis of Design: Wausau Window and Wall Systems: Wausau 7250 Superwall (2-1/2" Face) www.wausauwindow.com/#sle
 - 2. Tru-Therm 25000 by Interclad (2½" Face) Pressure Wall System.
 - 3. Zero Net by Fremarq Innovations.
 - 4. Substitutions not permitted.
- B. Primary Sealant Joints :
 - 1. Silicone Sealants are required. As a minimum, the Curtain Wall Manufacturer is responsible for selecting the sealant manufacturer whose products can be warranted with the sealant products used in conjunction with curtain wall frame assembly, curtain wall frame installation at interlocking male/female stack joints, and decorative perimeter joints. Contractor shall be responsible for selecting sealants that are compatible with the curtain wall's primary sealant joint at cavity wall sealant work, any stainless-steel, drip tray, or sealant work, and related building sealant work. No sealants or primers shall not be applied when the air or substrate temperatures are 40 degrees F or below.

2.02 PERFORMANCE REQUIREMENTS

- A. After application of positive and negative Design Test Pressures during testing procedures, no air and water infiltration in excess of specified performance requirements, no breakage, no damage, or disengagement is allowed.
- B. Air Infiltration: Manufacturer's testing shall be in accordance with ASTM E283/E283M for compliance with maximum permissible air infiltration rate using the following criteria:
 - 1. Maximum rate of 0.06 cfm /sq. ft.
 - 2. All testing at a minimum of 6.24 lbs. /sq. ft. pressure differential.
- C. Water Resistance: Manufacturer's lab testing shall be in accordance with ASTM E331 for water resistance with no leakage as defined by the following criteria: No water shall penetrate through the perimeter framing or primary sealant joint; be visible on interior surfaces; be visible on sub-sill flashing; pass beyond the vertical plane intersecting the innermost framing member; or be present within or enter the wall cavity during the water resistance test. All testing will be performed at a minimum of 12 lbs/sq. ft. differential pressure.
- D. Uniform Load Deflection: Uniform load deflection test of the curtain wall system shall be conducted in accordance with ASTM E330/E330M. The deflection of any framing member in a direction normal to the plane of the wall when subjected at both a positive and negative load of 60 PSF (design test pressure), shall not exceed L/175 of its clear span except for the following:
 - 1. When a plastered surface or drywall subjected to bending is affected, deflection shall not exceed L/360 of the span.

2. When a framing member overhangs an anchor point, deflection shall be limited to $2L/175$, where L is the length of the cantilevered member. When a plaster surface or gypsum wallboard subjected to bending on a cantilevered member is affected, deflection shall not exceed $2L/360$."
 3. At perimeter frames, deflection shall be limited to $1/2$ the perimeter sealant joint width (assuming a Class 50 or better sealant is used in the joint) minus anticipated movement from thermal and other movement, unrelated to deflection related loads, from adjacent materials and the curtain wall."
 4. For spans greater than 13'-6" deflections at design wind pressure shall be limited to $L/240 + 1/4"$, but not exceed a maximum deflection of 1"
 5. No air and water infiltration in excess of specified performance requirements, no breakage, no damage, or disengagement allowed after application of positive and negative Design Test Pressure.
- E. Design Wind Loads - Allowable Stress Design (ASD)
1. The design wind pressure for the project as determined in accordance with ASCE 7 for 10 square feet
 - a. The design wind pressure for the project will be: _____
 - b. _____ psf positive and negative.
 - c. _____ psf positive and negative at corner zones.
- F. Uniform Load Structural: Uniform load structural tests of the curtain wall system shall be conducted in accordance with ASTM E330/E330M. The curtain wall system shall be subjected to inward and outward acting uniform loads equal to 1.5 times the design test pressure. After each specified loading, there shall be no: glass damage or breakage; damage to fasteners or anchors; malfunctioning of doors and operating hardware; or permanent deformation or set of any framing member in excess of 0.2% of its span.
- G. Dead Load: Under dead load, for horizontal framing members which support glass, deflection of those members in the direction parallel to the plane of the wall shall not exceed an amount which will reduce the glass bite below 75% of the design dimension, nor an amount which would infringe upon necessary glazing clearances below. Deflection shall also be limited in this direction to provide at least 1/8" minimum clearance between the member and the top of the fixed glazed panel, glass or other fixed part immediately below. The clearance between the frame member and an operable window or door below shall be at least 1/16".
- H. Framing: Framing members for each individual glass pane shall be designed so the deflection perpendicular to the glass plane shall not exceed $1/175$ of the glass edge length or $3/4"$, whichever is less, when subjected to loads specified in the current Minnesota State Building Code.
- I. Condensation Resistance: When evaluated in accordance with AAMA 1503, the condensation resistance factor for each type of curtain wall shall be not less than the following minimum levels of thermal performance on unit size as required to produce representative areas of framing, vision glass and spandrel glass
1. Condensation Resistance Factor for each curtain wall type, in accordance with AAMA 1503, using 99.6% Exterior Design Temperature listed in ASHRAE Std 90.1 shall be 83.42.
 2. Except for size, test units shall contain the same assembly and weep holes configurations as the specified curtain wall.
 3. Data from calculations or simulations, such as NNFRC 500 -2010, test results on units of different size or unrepresentative framing/glass proportions are unacceptable
- J. Thermal Transmittance Performance Requirements:
1. Thermal performance for each type of curtain wall shall not exceed a U-value of 0.36.
 2. The Solar Heat Gain Coefficients (SHGC) shall not exceed 0.40

3. Test results may be derived by computer simulations for compliance with NFRC U-Factor, Solar Heat Gain Coefficient, Visible Transmittance, and Condensation Resistance Value. Simulations shall comply with NFRC 100 - Procedure for Determining Fenestration Product U-Factors; NFRC 200 - Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence; and NFRC 500 - Procedures for Determining Fenestration Product Condensation Resistance Values. (Note that NFRC's Condensation Resistance Value is not equivalent to a Condensation Resistance Factor (CRF) determined by AAMA 1503.)
 4. Curtain wall assemblies shall have a VT of 0.70. Visible Transmittance (VT) shall conform to the Minnesota Energy Code.
 5. Test procedures shall be by an accredited, independent laboratory and labeled and certified by the Manufacturer.
- K. Movements: Provide glazed curtain wall systems, including anchorage, that can accommodate thermal movements of curtain wall system and supporting elements when subjected to a temperature differential from -30 degrees F to +180 degrees F without buckling, damaging stresses on glazing, failure of sealant joints, overstressing of components, damaging loads on fasteners, noise or vibrations, reduction in performance and other detrimental effects.

2.03 FABRICATION:

- A. Fabrication shall not proceed until masonry details and field conditions have been verified and accepted by the curtain wall manufacturer, and the final review of shop drawings has been completed.
- B. Curtain Wall:
1. Fabricate framing members into unitized assemblies of the largest possible expanse, in curtain wall manufacturer's plant or in a manufacturer's exclusively authorized fabrication shop, approved by the Owner. Provide basic rectangular units sized for ease of erection and transportation. Entire finishing, fabrication and assembly operations shall be produced by a single manufacturer of units identical to those specified.
 2. The curtain wall manufacturer shall certify in writing that the completed curtain wall systems have been fabricated and shop assembled in the manufacturer's plant or by the manufacturer's exclusively authorized installation Subcontractors/fabrication shop, as authorized by the Owner, in accordance with the Specifications and the final approved shop drawings. Curtain wall and related components shall be from the same manufacturer. The manufacturer shall stand behind their product by issuing warranties per Part 1 above.
 3. Systems using individual field fabricated, field assembled or installer fabricated assemblies are not acceptable.
 4. Shear block connections shall not be used between horizontal and vertical framing members.
 5. Provide grid frame curtain wall members and components with joints neatly made, free of burrs, and assembled using extruded screw spline frame joinery resulting in tight fitting hairline joints fastened or joined in the factory to develop full structural value of members and provide permanent air and watertight joints.
 6. Provide interlocking male/female type splice and stack joints between adjacent grid frame members to allow for expansion and contraction of frame units. "Stick" system type one piece tubular members, which do not allow for expansion and contraction in members, shall not be acceptable.
 7. Interlocking joints shall be weather stripped to provide an air and watertight seal.
 8. Conceal fasteners at vertical to horizontal framing connections
- C. Drainage System:
1. Individual glass lites shall have pressure equalized weepage.
 2. Provide weep slots in pressure plates and weep slots in aluminum trim snap-on covers to drain any and all condensation or accumulating water within the system, to the exterior.

3. Provide adequate clearance at the ends of the installed snap covers to allow for thermal expansion. Center the snap covers during installation to equalize the gaps on either end

2.04 CURTAIN WALL AND COMPONENTS

A. Curtain Wall Frame:

1. Minimum principal curtain wall member wall thickness 1/8".
2. Exterior face sightlines shall be a minimum of 2".
3. 1-1/2" trim cover over pressure plate
4. Overall depth shall be as determined by structural calculations and as shown on the Drawings.
5. Provide extruded aluminum members with sharp, well-defined corners, integral screw splines for frame joinery and flush sightlines.
6. Framing members requiring use of snap-trim for closure are not acceptable.
7. Curtain wall framing shall fully capture each glass lite via pressure plate attachment, on all sides.
8. Curtain wall assemblies shall be field glazed.
9. Internal Structural Members and Reinforcement: Structural steel members and shapes to suit curtain wall framing, as required by structural calculations and as recommended and detailed by the curtain wall manufacturer, hot-dipped galvanized steel

B. Thermal-break and Zone Dams:

1. Curtain wall assembly shall be thermally broken by manufacturer's standard 3/8" thick isolator, sealing against air and water infiltration. Provide continuous, unbroken isolators in horizontal frame members.
2. Horizontal framing member intersection to vertical members shall be made air and watertight by installation of manufacturer's standard zone dam members.
3. Butter zone dams and set in place per manufacturer's printed installation instructions. The top and bottom of each zone dam shall be completely covered with sealant. Carefully tool sealant surface so sufficient area is provided to allow air and water to pass around the glass corner

C. Anchor Clips and Lateral Load Clips: Concealed and formed dimensional stainless steel or steel, hot-dipped galvanized. Shape, size and spacing shall be per final shop drawings and submitted structural calculations. Anchor clips and lateral load clips shall not penetrate the primary sealant joint nor inhibit independent frame movement. Profile anchor clips and lateral load anchor clips at sill locations to avoid conflicting with the back dam of the stainless-steel sill pans.

D. Door Frame Inserts / Sub-Frames

1. Provide extruded aluminum door frame inserts/sub-frame with applied extruded aluminum stop, approximately 7/8" x 4" deep, at openings scheduled for aluminum doors specified in Section 08 1116.
2. Hardware reinforcement on door frame inserts / sub-frames shall be completed concealed and fastened in-place without the method of attachment being visible.
3. Hardware attachment to door frames inserts/sub-frames shall also be completely concealed.
4. Internal reinforcement at door frame inserts/sub-frames: Hot dipped galvanized 1-1/4" x 1/4" thick steel bar which runs continuously full height of the insert and is mechanically fastened to the insert. All fasteners, nuts, and washers used to secure reinforcement shall be stainless steel.
5. Base of curtain wall jamb frames receiving door frame inserts/sub-frames shall be anchored to prevent movement.

E. Formed Aluminum Sills:

1. Formed Aluminum Sills at Masonry Cavity Walls:

- a. Provide 0.090 thick formed aluminum sills in profile as shown on the Drawings. Slope sills to provide positive drainage to exterior. Furnish sills in one piece for full width of curtain wall openings when permissible.
 - b. Provide continuous anodized aluminum end caps to facilitate sealant installation and backer rod placement. Back seal for an air and watertight closure.
 - c. Provide 1/4" wide slotted weep holes in drip profile. Confirm spacing with the manufacturer. Install reticulated foam baffles over inner surface of weeps.
 - d. Provide 20-gauge, formed Type 304 stainless steel keeper strips, conforming to the sill shape and anchored with predrilled holes at 1'-0" on center. Diameter to predrilled holes shall correspond to recommendations and specifications off the anchor manufacturer.
 - e. Anchors for continuous keeper strips shall be metal alloy body with Type 304 stainless steel nail similar to the masonry through-wall flashing termination bar fastener.
 - f. Provide splice joints and expansion joints where shown on the Drawings and final approved shop drawings. At splice and expansion joints, provide 20-gauge, Type 304 stainless steel continuous backer plate formed to match the aluminum sill profile. Create a working sealant joint between sill sections and provide bond breaker tape where required.
 - g. Where support of the sill is required, provide 11-gauge stainless steel angle support brackets, 3" wide, to support formed aluminum sill. Spacing shall be per curtain wall manufacturer' recommendations. Support brackets shall be secured to the brick wall at its base and screw fastened to the formed aluminum sill at its top edge
2. Formed Aluminum Sills at Precast Sills:
 - a. Formed aluminum sills shall be 0.090 thick in profile as shown on the Drawings. Slope sills to provide positive drainage to exterior.
 - b. Provide splice joints and expansion joints where shown on the Drawings and final approve shop drawings. At splice and expansion joints, provide a 20-gauge stainless steel continuous backer plate, formed to match the aluminum sill profile. Create a working sealant joint between sill sections and provide bond breaker tape where required.
- F. Accessories:
1. Shims: PVC horseshoe shims in non-bearing locations and Korolath multipolymer plastic bearing shims per structural calculations and final shop drawing set. Horseshoe shaped Korolath shaped shims are not acceptable in dead load locations.
 2. Curtain Wall Frame Anchorage Fasteners: Provide Minnesota Building Code Compliant stainless-steel anchors, heavy duty sleeve or expansion style, vibration resistant and removable, used to secure curtain wall and associated anchor clips and lateral load clips to concrete and grout-filled concrete block. Type, size and spacing shall be per structural calculations and final shop drawings. Mechanically Galvanized or Stainless steel, heavy-duty screw fastener may be used if conditions warrant or if required to comply with the current Minnesota State Building Code.
 3. Lighter-duty fasteners like Tap Con style fasteners are not permitted.
 4. Bond Breaker Tape: As recommended by the curtain wall manufacturer.
 5. Dissimilar Metals: Dissimilar metals shall be separated to prevent galvanic action. Clearly indicate method of separation and location in the Shop Drawings.
- G. Glass and Glazing
1. Provide glazing according to the curtain wall and the glass manufacturer's recommendation for sealants, glazing gaskets and tapes.
 2. Provide setting blocks and edge blocking in material, hardness and locations according to the curtain wall and the glass manufacturer's recommendations.
 3. Interior glazing gaskets corner butt joints shall be sealed per the curtain wall manufacturer's installation instructions

2.05 MATERIALS

- A. Extruded aluminum prime billet 6063T6, ASTM B221. Aluminum sheet 5005 H34 (anodic), ASTM B209/B209M.
- B. Steel, conforming to ASTM A36/A36M, hot-dipped galvanized in accordance with ASTM A123/A123M ASTM A123.
- C. Nonferrous, nonmagnetic stainless steel, Type 304.

2.06 FINISHES

- A. Exposed surfaces of aluminum curtain wall, components and trim shall receive an anodized color finish conforming to the Aluminum Association Designation, Architectural Class 1, AA-M10C22 and the following:
 - 1. Anodize aluminum components after forming to avoid cracking or crazing of the finish.
 - 2. The anodic coating shall be continuous, fully sealed and free from powdery surfaces.
 - 3. Coating thickness shall be a minimum of 0.7 mils when evaluated in accordance with ASTM B244.
 - 4. Anodic coating shall be A44- Electrolytically Deposited Color.
 - 5. Color: Dark Bronze

PART 3 EXECUTION

3.01 EXAMINATION

- A. Construction at curtain wall openings and adjoining materials shall be verified as ready to receive the Work of this Section. Installation start-up indicates acceptance of as-built conditions.
- B. Each curtain wall opening shall be properly prepared and cleaned before installation of curtain wall system and trim. Confirm that areas shown to receive sealant joints have been cleaned according to sealant manufacturer's instructions.
- C. Wall conditions at sill, jamb, and head shall not short circuit thermal break in frame when installed

3.02 INSTALLATION

- A. Install curtain wall system in accordance with approved manufacturer's instructions.
- B. Provide anchor clips, lateral load clips, anchorage fasteners, shims and internal reinforcement as shown on the shop drawings and structural calculations, to secure and properly support the curtain wall assembly to the wall surrounds. Account for differential movement between curtain wall frame and wall surrounds caused by but not limited to: calculated thermal expansion and contraction of curtain wall frame sections; building live and dead load movement; supporting structure movement such as story drift, column shortening, or long term creep; and lateral loads while maintaining perimeter expansion tolerances and independent frame movement as shown on the final approved shop drawings.
- C. Install bond breaker tape and sealant, as recommended by the curtain wall manufacturer, such as at joint between interlocking mullions when required.
- D. No bolts, screws, or other components, shall impair independent frame movement.
- E. Sealants or other components shall not impede the removal of water from the system.
- F. No fasteners shall be permitted within the weep system.
- G. The sill frame of curtain wall shall not project towards the exterior beyond the head frame.
- H. Torque pressure plate screws to manufacturer's standard compression value.
- I. Prior to installing vapor containment assembly, continuously cap seal curtain wall frame joinery within the spandrel panel area to prevent vapor intrusion and bypass.
- J. Final installation shall provide pressure equalized conditions within spandrel cells.

- K. Vapor containment assembly installation shall provide a vapor tight barrier to prevent the formation of condensation. Install only the amount of vapor containment assembly insulation that can be protected or covered over by the end of the work day. Vapor barrier shall not be punctured.
- L. Lateral load anchor clip configurations requiring resolution for differential movements shall be made outside of the spandrel cell.
- M. Anchor clips, lateral load clips and associated anchorage fasteners that penetrate the interior perimeter sealant joint shall be cap sealed to prevent air and vapor migration.

3.03 TOLERANCES

- A. Permissible dimensional tolerances in the building frame and other work adjacent to the curtain wall assemblies are specified in Divisions 3 and 4 of the Project Specifications. Provided irregularities do not exceed them, and clearance shown on approved shop drawings are maintained, all parts of the curtain wall assemblies, when completed, shall be within the following tolerances:
 - 1. Maximum offset from true alignment between two identical members abutting end to end in line: 1/16 inch.
 - 2. Within any rectangular opening, there shall be no more than 1/8 inch difference in the measured lengths of the diagonals.
 - 3. Maximum variation of mullions from plumb or horizontals from level shall not exceed +/- 1/8 inch in 12 feet or +/- 1/4 inch in any single run.

3.04 FIELD QUALITY CONTROL

- A. The Contractor shall provide written notice to the appropriate firms and/or laboratories that all the curtain wall installation is complete and ready for field quality control testing. The Contractor shall provide a minimum of 10 working days' notice for both initial and re-scheduled testing.
- B. The Owner will engage an independent, AAMA accredited testing agency to field test the completed curtain wall installation for compliance with specified performance criteria for air infiltration, water resistance. Testing for the completed curtain wall installation testing shall be by AAMA and ASTM test standards and per additional requirements, definitions and criteria listed in the field quality control testing below. If curtain wall assembly exceeds constructibility limits for an AAMA 503 test chamber, the Owner retains option to utilize AAMA 501.2 (perimeter joint sealants) and field test standards as tabulated and defined below. Testing shall occur prior to interior finish work, including interior perimeter sealant joint, to allow visual access to areas to check for water penetration. The Owner will randomly select curtain wall to be evaluated.
- C. The Contractor shall assist with testing procedures and otherwise cooperate with the testing agency, including provide all necessary scaffolding, lifts, enclosures, temporary heat and other equipment and utilities, including water to facilitate testing. Enclosures and temporary heat shall maintain a minimum temperature of 40 degrees F. for air and substrates. The Contractor shall provide an uninterrupted power supply and uninterrupted water flow that delivers water uniformly against the test area at a minimum rate of 5.0 gal/sq. ft./hr. with a minimum water line pressure necessary to deliver 12 PSI for the entire test area with a maximum test area of 100 sq. ft. Contractor shall make provisions with the local fire department /public works department to rent or utilize adjacent fire hydrants to provide required water supply when required.
- D. Where curtain wall installation(s) exceed 100 sq. ft. maximum test areas, the minimum amount of testing shall include one sill/jamb corner; one head/jamb corner; and a minimum of one intermediate interlocking vertical mullion stack joint to constitute one field test.

- E. Where curtain wall installation(s) occur at multi-story curtain wall assemblies, two interior test chambers may be required. Install the first interior test chamber to one sill/jamb corner and at a minimum, one adjacent intermediate interlocking vertical mullion stack joint for the first segment of testing. Install the second interior test chamber to the head/jamb corner immediately above at a minimum, one adjacent intermediate interlocking vertical mullion stack joint for the second segment of testing. Both segments constitute one field test for this type of curtain wall assembly.
- F. Contractor shall assist testing agency in compartmentalizing air chambers and cavities to allow for air leakage and water penetration testing.
- G. If failures develop under testing, Contractor shall identify the reasons for failures, repair and retest the failed installation until the installation is completely free of defects. All retests shall be by the Owner's testing agency. Contractor shall notify the Owner and the Architect as to when corrective work will be undertaken. The Owner and Architect will determine if their presence is required to observe the corrective work. All re-observation, re-testing, and associated costs shall be the responsibility of the Contractor and deducted from the Contract Sum by Change Order.
- H. All re-observation, re-testing and associated costs shall be the responsibility of the Contractor and deducted from the Contract Sum by Change Order.

I. Field Quality Control Testing requirements are as follows:

Air Leakage				Method of Testing	Standard / Criteria (Pass / Fail)	Frequency	Action Required (if Failure)
Conduct air leakage test per AAMA 503, as modified by these Standards; including the adjacent wall substrate, exterior perimeter sealant joint and the primary sealant joint. Note that all air infiltration testing to be done at lab Design Pressures, with no allowance reductions in pressure or test criteria for field testing conditions. Test Chamber shall be AAMA 503, requirements and applied to the exterior of the wall except	Maximum allowable rate of air leakage shall not exceed 0.06 cfm/sq. ft. Minimum air leakage test pressure shall be 6.24 lbs./sq. ft.	10% or a minimum of 3 curtain wall assemblies, whichever is greater.	For each failed test: 1. Identify reason for failure. 2. Repair failure and retest the installation unit until it is completely free of defects. 3. Test two additional curtain wall assemblies, except at initial curtain wall installation test location. 4. The cost for all additional curtain wall tests are the responsibility of the Contractor, including costs for the Owner, the Owner's consultants, and the Architect/Engineer.				

where the testing agency determines that an interior test chamber is required.							
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Method of Testing	Standard / Criteria (Pass / Fail)	Frequency	Action Required (if Failure)
Water Penetration			
Conduct water penetration tests per AAMA 503, as modified by these Standards; including the adjacent wall substrate, exterior perimeter sealant joint and the primary sealant joint. Note that all water resistance testing to be done at lab Design Pressures, with no allowance reductions in pressure or test criteria for field testing conditions. Test chamber shall be AAMA 503, requirements and applied to the exterior of the wall except where the testing agency determines that an interior test chamber is required.	No water shall: penetrate through the perimeter frame or primary sealant joint, be visible on interior surfaces, be visible on sub-sill flashing; pass beyond the plane parallel to the glazing (the vertical plane) intersecting the innermost projection of the curtain wall: or be present within or enter the wall cavity during the water penetration test. Minimum water penetration test pressure will be 12 lbs./sq. ft.	As defined above.	As defined above.

Method of Testing	Standard / Criteria (Pass / Fail)	Frequency	Action Required (if Failure)
Owner Optional Field Tests			
Owner optional field tests shall be per AAMA 501.2 or 503. Air leakage and water penetration tests shall be per AAMA 503 with an interior test chamber. In all cases, the test chamber shall be applied to the wall construction to create a pressure differential across the exterior face of the primary sealant joint. The perimeter sealant joint shall also be evaluated per AAMA 501.2 using a brass spray nozzle.	As defined above.	As defined above.	As defined above.

3.05 CLEANING

- A. Completed systems shall be cleaned, inside and outside, promptly after erection of framing, glass, and sealants. Remove excess sealants, dirt or other contaminants from aluminum, glass surfaces and wall surrounds.

3.06 PROTECTION

- A. Contractor shall ensure that the spandrel cell insulation is kept dry at all times until it is protected by glazing.

- B. Take protective measures to assure that the installation shall be without damage or deterioration at time of acceptance other than normal weathering. Should any defect develop prior to the Date of Substantial Completion of the Work, such defects shall, upon request, be repaired or replaced at no additional cost to the Owner.

END OF SECTION

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