COOPER UNIVERSITY HEALTH CARE
COOPER UNIVERSITY HOSPITAL - TOWER A
CAMDEN, NEW JERSEY

SECTION 071326

SHEET WATERPROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Sheet waterproofing systems and supplementary items necessary for installation at the following applications

1. Vertical post-applied modified bituminous sheet waterproofing at foundation walls.
2. Horizontal post-applied modified bituminous sheet waterproofing at above grade split slabs.
3. Vertical pre-applied (blindside) sheet waterproofing at retention system walls.
4. Vertical pre-applied (blindside) sheet waterproofing at retention system walls with shotcrete foundation walls.
5. Horizontal pre-applied (blindside) sheet waterproofing below slabs-on-grade over mud slab or prepared subgrade.

B. Related Requirements:

1. Foundation Drainage System: Refer to Division 33 Section Foundation Drainage System.

1.2 ACTION SUBMITTALS

A. Product Data: Manufacturer's technical literature for each product and system indicated.

1. Include construction details, material descriptions, tested physical and performance properties, and installation instructions for waterproofing.
2. Include manufacturer's written instructions for evaluating, preparing, and treating substrate.

B. Shop Drawings: Show locations and extent of waterproofing and details of installation, including plans, elevations, sections, details of components and attachments to other work.

1. Include details of substrate joints and cracks, expansion joints, sheet flashings, penetrations, inside and outside corners, tie-ins with adjoining waterproofing, and other termination conditions.
2. Include manufacturer's written approval of shop drawings prior to submission.

C. Samples: For each exposed product and for each color and texture specified, including the following products:

1. 8-by-8-inch (200-by-200-mm) square of waterproofing and flashing sheet.
2. 4-by-4-inch (100-by-100-mm) square of drainage panels.

1.3 INFORMATIONAL SUBMITTALS

A. Manufacturer's Project Acceptance Document: Certification by the manufacturer that its product(s) are approved, acceptable, suitable for use in specific locations, for specific details, and for applications indicated, specified, or required, and that a warranty will be issued.

1. Provide written confirmation by the manufacturer that Geotechnical Report has been reviewed and that manufacturer takes no exception to the design of the below grade waterproofing system.

B. Field quality-control reports: Written report of testing and inspection required by "Field Quality Control".

C. Warranties:

1. Provide manufacturer's written warranty covering materials and installation (labor) stating obligations, remedies, limitations and exclusions.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer with not less than 10 years of experience in the successful production and in-service performance of products and systems similar to scope of this Project.

B. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by waterproofing manufacturer.

1. Experience: Installer's personnel with not less than 5 years of experience in the successful performance of Work similar to scope of this Project.
2. Supervision: Installer shall maintain a competent supervisor at Project while the Work is in progress, and who has not less than 5 years of experience installing products and systems similar to scope of this Project.
3. Manufacturer Acceptance: Installer shall be certified, approved, licensed, or acceptable to manufacturer to install products.

C. Pre-Construction Subsoil Water Testing: Provide subsoil water testing as recommended or required by waterproofing manufacturer.

1. General Requirements: Test subsoil water for compatibility with waterproofing materials.
2. Test Method: Use manufacturer's standard test method to test for acids, alkalis, brine, or other contaminants that may inhibit performance of waterproofing materials.
3. Specimen Quantity: Obtain and submit as many subsoil water samples required from Project at approximate locations where waterproofing will be installed.
4. Reports: Interpret test results and certify reports indicating requirements for use of waterproofing materials and for corrective measures necessary.

D. Mockups: Build mockups to verify selections made under Sample submittals and to set quality standards for installation.

1. Build for each typical waterproofing installation including accessories to demonstrate surface preparation, sealing at penetrations, crack and joint treatments, inside and outside corner treatments, and protection.

a. Size: 100 sq. ft. (9.3 sq. m) in area.
b. Description: Each type of wall and deck installation.

2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

a. If Architect determines mock-up does not comply with requirements, reconstruct mock-ups until accepted.

3. Accepted mock-ups may become part of completed Work if undisturbed at time of Substantial Completion.

1.5 PRE-INSTALLATION CONFERENCE

A. Pre-Installation Conference: Before Work begins, conduct conference at Project site.

1. Participants:

a. Architect.
b. Contractor, including superintendent.
c. Installer, including project manager and supervisor.
d. If requested, Manufacturer's qualified technical representative.
e. Installers of other construction interfaced with Work.

2. Minimum Agenda: Installer shall demonstrate understanding of the Work required by describing detailed procedures for preparing, installing, and cleaning the Work. Demonstration shall include, but not be limited to, following topics:

a. Tour representative areas of Work, inspect and discuss condition of substrate, and other preparatory work performed by other trades.
b. Review Contract Document requirements.
c. Review approved submittals.
d. Review inspection and testing requirements.
e. Review environmental conditions and procedures for coping with unfavorable conditions.
f. Resolve deviations or differences between Contract Documents and the manufacturer's specifications.

B. Record discussions, including decisions and agreements, and prepare report.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver liquid materials to Project site in original packages with seals unbroken, labeled with manufacturer's name, product brand name and type, date of manufacture, and directions for storing and mixing with other components.

B. Store liquid materials in their original undamaged packages in a clean, dry, protected location and within temperature range required by waterproofing manufacturer.

C. Remove and replace liquid materials that cannot be applied within their stated shelf life.

D. Store rolls according to manufacturer's written instructions.

E. Protect stored materials from direct sunlight.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Apply waterproofing within the range of ambient and substrate temperatures recommended in writing by waterproofing manufacturer. Do not apply waterproofing to a damp or wet substrate.

1. Do not apply waterproofing in snow, rain, fog, or mist.

B. Maintain adequate ventilation during preparation and application of waterproofing materials.

1.8 COORDINATION

A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.

1.9 WARRANTY

A. Manufacturer's Warranty: Furnish manufacturer's written material and labor warranty signed by an authorized representative using manufacturer's standard form agreeing to furnish materials and labor required to repair or replace work which exhibits material defects caused by manufacture or design and installation of product. "Defects" is defined to include but not limited to deterioration or failure to perform as required.

1. Warranty Period: Manufacturer shall warrant the products to be free from material and labor Defects for a period of 10 years from date of Substantial Completion.

a. Warranty includes waterproofing, flashings, counter-flashings, insulation, below grade expansion joints and other components of waterproofing system necessary to provide a complete installation.

B. Installer's Warranty: Furnish installer's written workmanship warranty signed by an authorized representative using installer's standard form agreeing to provide labor required to repair or replace work which exhibits workmanship defects. "Defects" is defined to include but not limited to deterioration or failure to perform as required.

1. Warranty Period: Installer shall warrant the installation to be free from workmanship Defects for a period of 2 years from date of Substantial Completion.

a. Warranty includes removing and reinstalling protection board, drainage panels, insulation, pedestals, and pavers on plaza decks.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers and Products: Subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of manufacturers listed. If not listed, submit as substitution according to the Conditions of the Contract and Division 01 Section "Substitution Procedures".

B. Basis of Design (Product Standard): Contract Documents are based on products and systems specified to establish a standard of quality. Other manufacturers offering products having equivalent characteristics may be considered, provided deviations are minor and comply with requirements of Contract Documents as judged by the Architect.

1. Post-Applied Sheet Waterproofing:

   a. Basis of Design: GCP Applied Technologies; Bituthene 3000 or 4000.

2. Pre-Applied Sheet Waterproofing for Vertical Applications:

   a. Basis of Design: GCP Applied Technologies; Preprufe 160R Plus.

3. Pre-Applied Sheet Waterproofing for Grout-Injected Shotcrete Applications, Hydrostatic Non-Drained Conditions:

   a. Basis of Design: GCP Applied Technologies; Preprufe SCS Waterproofing.

4. Pre-Applied Sheet Waterproofing for Horizontal Applications:

   a. Basis of Design: GCP Applied Technologies; Preprufe 300R Plus.

2.2 MATERIALS, GENERAL

A. Single Source Responsibility: Furnish each type of product from single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials.

1. Provide waterproofing materials, protection course, and molded-sheet drainage panels from single source from single manufacturer.
2. Furnish liquid-type auxiliary materials that comply with VOC limits of authorities having jurisdiction.

2.3 PERFORMANCE REQUIREMENTS

A. General: Provide sheet waterproofing systems that prevent the passage of liquid water.

B. Material Compatibility: Provide waterproofing materials that are compatible with one another under conditions of service and application required, as demonstrated by manufacturer based on testing and field experience.

2.4 POST-APPLIED SHEET WATERPROOFING

A. Post-Applied Sheet Waterproofing: Minimum 60-mil (1.5-mm) nominal thickness, self-adhering sheet consisting of 56-mils (1.4 mm) of rubberized asphalt laminated on one side to a 4-mil-(0.10-mm-) thick, polyethylene-film reinforcement, and with release liner on adhesive side.

1. Manufacturers and Products:

   a. AVM Industries Inc.; Aussie Mate 580 AL.
   b. Carlisle Coatings & Waterproofing Inc.; CCW MiraDRI 860/861.
   c. CETCO Building Materials Group; Envirosheet.
   d. GCP Applied Technologies; Bituthene 3000 or 4000.
   e. Meadows, W. R., Inc.; Mel-Rol.
   f. Polyguard Products, Inc.; Polyguard 650.
   g. Sika Corporation; SikaShield S-60.
   h. Soprema; Colphene 3000.

2. Sheet Strips: Self-adhering, rubberized-asphalt strips of same material and thickness as sheet waterproofing.

2.5 PRE-APPLIED (BLINDSIDE) SHEET WATERPROOFING

A. Pre-Applied (Blindside) Sheet Waterproofing for Vertical Applications: Uniform, flexible, multilayered-composite sheet membrane that forms a permanent bond with fresh concrete placed against it; complete with accessories and preformed shapes for an unbroken waterproofing assembly.

1. Self-Adhering HDPE Sheet Waterproofing:

   a. Description: Minimum 73-mils (1.85 mm) thick, uniform, flexible sheet membrane consisting of high-density polyethylene film laminated to a layer of waterproofing adhesive and nonwoven geotextile fabric.

      1) Manufacturer and Product: AVM Industries Inc.; Aussie Skin 550G Blindside Waterproofing Membrane.

   b. Description: Minimum 32-mils (0.8 mm) thick, uniform, flexible sheets consisting of 16-mils (0.4 mm) thick HDPE sheet coated with pressure-sensitive rubber adhesive, protective adhesive coating, and release liner.

      1) Manufacturer and Product: GCP Applied Technologies; Preprufe 160R Plus.

   c. Description: Minimum 73-mils (1.85 mm) thick, uniform, flexible sheet membrane consisting of high-density polyethylene film laminated to a layer of waterproofing adhesive and nonwoven geotextile fabric.

      1) Manufacturer and Product: Polyguard Products Inc.; Underseal Blindside Waterproofing Membrane.

2. Self-Adhering TPO Sheet Waterproofing:

a. Description: Minimum 70-mils (1.78 mm) thick, uniform, flexible sheets consisting of 45-mils (1.14 mm) thick reinforced TPO backing sheet with 25-mil (0.64 mm) butyl alloy membrane / adhesive.

1) Manufacturer and Product: Carlisle Coatings & Waterproofings; MiraPly V Vertical Blindside Waterproofing.

b. Description: Minimum 1.10-mm thick, uniform, flexible composite sheet consisting of 0.50 mm thick polyolefin membrane with non-woven polypropylene fleece.

1) Manufacturer and Product: Sika; SikaProof A-05.

3. Self-Adhering SBS Modified Bitumen Sheet Waterproofing:

a. Description: Minimum 120-mils (3.0 mm) thick, uniform, flexible sheets consisting of self-adhesive SBS modified bitumen with composite reinforcement and release film.

1) Manufacturer and Product: Soprema; Colphene BSW V.

4. Self-Adhering Composite Sheet Waterproofing:

a. Description: Minimum 73-mils (1.85 mm) thick, uniform, flexible composite sheet membrane consisting of an elastomeric membrane bonded to a multi-ply plasmatic matrix and non-woven geotextile fabric.

1) Manufacturer and Product: W.R. Meadows; PRECON Vertical Blindside Waterproofing Membrane.

5. Thermoplastic Sheet Waterproofing:

a. Description: Minimum 60-mil (1.5 mm) nominal thick PVC, Elvaloy KEE thermoplastic membrane reinforced with 5 oz. (385 mL) weft inserted knit polyester fabric integrally bonded to an Active Polymer Core (APC)

1) Manufacturer and Product: CETCO Building Materials Group; Coreflex 60.

B. Pre-Applied (Blindside) Sheet Waterproofing for Grout-Injected Shotcrete Applications, Hydrostatic Non-Drained Conditions:

1. Description: Minimum 0.17 in (4.3 mm) thick, uniform, flexible composite sheets consisting of a polymer mesh-reinforced cavity backed by a plastic film and faced with a non-woven, semipermeable geotextile barrier.

a. Manufacturer and Product: GCP Applied Technologies; Preprufe SCS Waterproofing.

C. Pre-Applied (Blindside) Sheet Waterproofing for Horizontal Applications: Uniform, flexible, multilayered-composite sheet membrane that forms a permanent bond with fresh concrete placed against it; complete with accessories and preformed shapes for an unbroken waterproofing assembly.

1. Adhesive-Coated HDPE Sheet Waterproofing:

   a. Description: Minimum 73-mils (1.85 mm) thick, uniform, flexible sheet membrane consisting of high-density polyethylene film laminated to a layer of waterproofing adhesive and nonwoven geotextile fabric.

      1) Manufacturer and Product: AVM Industries Inc.; Aussie Skin 550G Blindside Waterproofing Membrane.

   b. Description: Minimum 46-mils (1.2 mm) thick, uniform, flexible sheets consisting of 30-mils (0.76 mm) thick HDPE sheet coated with pressure-sensitive rubber adhesive, protective adhesive coating, detackifying surface treatment, an uncoated self-adhering side lap strip, and release liner.

      1) Manufacturer and Product: GCP Applied Technologies; Preprufe 300R Plus.

   c. Description: Minimum 85-mils (2.0 mm) thick, uniform, flexible sheet membrane consisting of high-density polyethylene film laminated to a layer of waterproofing adhesive and nonwoven geotextile fabric.

      1) Manufacturer and Product: Polyguard Products Inc.; Underseal Underslab Waterproofing Membrane.

2. Adhesive-Coated TPO Sheet Waterproofing:

   a. Description: Minimum 70-mils (1.78 mm) thick, uniform, flexible sheets consisting of 45 mils (1.14 mm) thick reinforced TPO backing sheet with 25-mil (0.64 mm) butyl alloy membrane / adhesive.

      1) Manufacturer and Product: Carlisle Coatings & Waterproofings; MiraPly H Horizontal Blindside Waterproofing.

   b. Description: Minimum 68-mils (1.72 mm) thick, uniform, flexible polyolefin membrane with hybrid bonding layer, mechanical adhesive bond.

      1) Manufacturer and Product: Sika; SikaProof A+ 12.

3. SBS Modified Bitumen Sheet Waterproofing:

   a. Description: Minimum 140-mils (3.5 mm) thick, uniform, flexible sheets consisting of SBS modified bitumen with polyester reinforcement.

      1) Manufacturer and Product: Soprema; Colphene BSW H.

4. Self-Adhering Composite Sheet Waterproofing:

   a. Description: Minimum 73-mils (1.85 mm) thick, uniform, flexible composite sheet membrane consisting of an elastomeric membrane bonded to a multi-ply plasmatic matrix and non-woven geotextile fabric.

1) Manufacturer and Product: W.R. Meadows; PRECON Below Grade Underslab Waterproofing Membrane.

5. Thermoplastic Sheet Waterproofing:

a. Description: Minimum 60-mil (1.5 mm) nominal thick PVC, Elvaloy KEE thermoplastic membrane reinforced with 5 oz. (385 mL) weft inserted knit polyester fabric integrally bonded to an Active Polymer Core (APC).

1) Manufacturer and Product: CETCO Building Materials Group; Coreflex 60.

2.6 AUXILIARY MATERIALS

A. General: Furnish auxiliary materials recommended by waterproofing manufacturer for intended use and compatible with sheet waterproofing.

1. When required by waterproofing manufacturer, obtain Engineer of Record's approval to use manufacturer's recommended waterstops to meet warranty requirements.

B. Primer: Liquid primer recommended for substrate by sheet-waterproofing material manufacturer.

C. Surface Conditioner: Liquid, waterborne surface conditioner recommended for substrate by sheet-waterproofing material manufacturer.

D. Liquid Membrane: Elastomeric, two-component liquid, cold fluid applied, of trowel grade or low viscosity, provided by waterproofing manufacturer.

E. Substrate Patching Membrane: Low-viscosity, two-component, modified asphalt coating, provided by waterproofing manufacturer.

F. Mastic and Adhesives: Liquid mastic and adhesives, and adhesive tapes provided by waterproofing manufacturer.

G. Detail Tape: Two-sided, pressure-sensitive, self-adhering reinforced tape, 4-1/2 in (112 mm) wide, with tack-free protective adhesive coating on one side and release film on self-adhering side; provided by waterproofing manufacturer.

H. Termination Bars: Aluminum bars or stainless steel bars ASTM A 666, Type 304; 2 types, one flat and one flat with upper flange shaped to receive sealant, locations as indicated; 1 in by 1/8 in (25 mm by 3 mm) thick; predrilled at 8 in (200 mm) centers; with stainless steel fasteners.

I. Epoxy Grout: High performance, solvent free, impermeable three-part epoxy grout designed to maintain continuity of waterproofing system at structural penetrations.

1. Basis of Design: GCP Applied Technologies; Grout EG 75.

a. Locations: Piles, piers, and similar structural penetrations, other locations recommended by waterproofing manufacturer.

J. Injectable Waterstop: As required by waterproofing manufacturer to ensure watertight installation.

1. Basis of Design: GCP Applied Technologies; INJECTO Tube Groutable Hose Waterstop used with Flex SLV, LV PURe, and CFL pure hydrophobic polyurethane chemical grout as recommended by waterproofing manufacturer for this application.

a. Locations: Concrete cold joints at base of foundation, around block-out openings, other locations recommended by waterproofing manufacturer.

1) Flex LV PURe at new micro pile caps to existing concrete slab amd micro piles.
2) CI-SLV Super-Low-Viscosity for cracks in existing concrete slab.
3) CFL Pure Hydrophopic Polyurethane insected below existing slab to seal existing waterproofing membrane to new micropiles

K. Waterstop: Polymer/butyl rubber waterstop strip that expands when in contact with water.

1. Basis of Design: GCP Applied Technologies; Adcor 500S.

a. Locations: All typical concrete to concrete cold joints.

L. Expansion Joint System: Heavy-duty, double-celled, thermoplastic extruded sealing gland flanked by integral side flashing sheets. System shall include manufacturer's standard termination bars and anchors. For blind-side below grade applications.

1. Basis of Design: Sika Corp.; Emseal BG System.

M. Tieback Covers: Cover system used to maintain waterproofing integrity at soil retention tieback heads. Provide detail components as recommended by manufacturer for application conditions.

N. Protection Course: As recommended by waterproofing manufacturer for this application.

1. ASTM D6506, semirigid sheets of fiberglass or mineral-reinforced-asphaltic core, pressure laminated between two asphalt-saturated fibrous liners and as follows:

a. Thickness: Nominal 1/8 inch (3 mm) for vertical applications; 1/4 inch (6 mm) elsewhere.
b. Adhesive: Rubber-based solvent type recommended by waterproofing manufacturer for protection course type.

O. Hydrophilic Grout: Two-component grout with associated activator components as recommended by manufacturer for application conditions.

1. Port Patch: Rapid curing, portland cement-based product used to repair port holes after injection.

P. Hydrophilic Sealant: Manufacturer's recommended gun-applied moisture-activated swelling mastic for sealing around pipe penetrations, reinforcing steel, utility conduits, and other waterproofing system penetrations.

Q. Grout Injection Tube Components: Provide grout injection tube components furnished by composite sheet waterproofing manufacturer.

1. Injection Base: Specially designed component used to mechanically attach the injection tube to the membrane.
2. Injection Tube: Flexible tube used to deliver grout to the membrane after shotcrete placement.

R. Injection Packer: Button-head, backflow prevention packer used to connect the grout pump to the injection tube.

2.7 MOLDED-SHEET DRAINAGE PANELS

A. Molded-Sheet Drainage Panel with Polymeric Film, Vertical Applications: Composite subsurface drainage panel acceptable to waterproofing manufacturer and consisting of a studded, nonbiodegradable, molded-plastic-sheet drainage core; with a nonwoven, needle-punched geotextile facing laminated to one side of the core and a polymeric film bonded to the other side (facing waterproofing).

1. Drainage Core: Three-dimensional, non-biodegradable, molded polypropylene or polystyrene.

a. Minimum Compressive Strength: 15,000 lbf/sf (718 kPa) according to ASTM D 1621.
b. Minimum In-Plane Flow Rate: 15 gpm/ft (188 L/min per m) of unit width at hydraulic gradient of 1.0 and compressive stress of 25 psi (172 kPa) according to ASTM D 4716.

2. Manufacturers and Products:

a. AVM Industries Inc.; Drain Board 6020 XL.
b. CETCO Building Materials Group; 15XP Prefabricated Drainage Composite.
c. GCP Applied Technologies; Hydroduct 220.
d. Carlisle Coatings & Waterproofings; CCW MiraDRAIN 6200.
e. Polyguard Products Inc.; Polyflow 15P.
f. Sika Corporation; SikaDrainage Mat 420.
g. Soprema; Sopradrain 15G.
h. W.R. Meadows; Mel-Drain 5035 B.

B. Molded-Sheet Drainage Panel with Polymeric Film, Horizontal Applications: Composite subsurface drainage panel acceptable to waterproofing manufacturer and consisting of a studded, nonbiodegradable, molded-plastic-sheet drainage core; with a woven-geotextile facing laminated to one side of the core and a polymeric film bonded to the other side (facing waterproofing).

1. Drainage Core: Three-dimensional, non-biodegradable, molded polypropylene or polystyrene.

a. Minimum Compressive Strength: 18,000 lbf/sf (862 kPa) according to ASTM D 1621.

b. Minimum In-Plane Flow Rate: 18 gpm/ft (225 L/min per m) of unit width at hydraulic gradient of 1.0 and compressive stress of 25 psi (172 kPa) according to ASTM D 4716.

2. Manufacturers and Products:

a. AVM Industries Inc.; Drain Board 6020 XL.
b. CETCO Building Materials Group; 15XP Prefabricated Drainage Composite.
c. GCP Applied Technologies; Hydroduct 660.
d. Carlisle Coatings & Waterproofings; CCW MiraDRAIN 9000.
e. Polyguard Products Inc.; Flow 18-H.
f. Sika Corporation; SikaDrainage Mat 720.
g. Soprema; Sopradrain 18G.
h. W.R. Meadows; Mel-Drain 7055.

C. High-Capacity, Molded-Sheet Collector-Panel System Wrapped with Geotextile: Composite subsurface collector-panel system by same manufacturer as primary molded-sheet drainage panels; consisting of a high-profile, studded, nonbiodegradable, molded-plastic-sheet drainage core; wrapped with a nonwoven-geotextile facing. Provide system with manufacturer's outlets, connectors, tapes, and other accessories to connect primary molded-sheet drainage panels with piped sub-drainage system.

1. Compressive Strength per ASTM D1621: 9000 psf (431 kPa) minimum.
2. Flow Rate per ASTM D4716: 17 to 80 gpm per ft. (211 to 994 L/min. per m) minimum.
3. Manufacturers and Products:

a. AVM Industries Inc.; Bottom Drain.
b. CETCO Building Materials Group; Aquadrain 100BD.
c. GCP Applied Technologies; Hydroduct Coil 600.
d. Carlisle Coatings & Waterproofings; CCW MiraDRAIN HC.
e. Polyguard Products Inc.; Totalflow.

D. Drainage Panel Auxiliary Materials.

1. Adhesive for Bonding Drainage Panels: Product compatible with drainage panels being bonded and with demonstrated capability to bond securely to substrates indicated without damaging substrates.
2. Miscellaneous Accessories: As required by manufacturer for complete installation assembly, including flanges around piping penetrations and expanded base and tie-in fittings as necessary to coordination with foundation drainage system.

2.8 INSULATION PANELS

A. Insulation: Comply with Division 7 Section 072100 Thermal Insulation for general building insulation.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Acceptance of Surfaces and Conditions: Examine substrates to receive products and systems and associated work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions.

B. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of waterproofing.

1. Verify that concrete has cured and aged for minimum time period recommended in writing by waterproofing manufacturer.
2. Verify that substrate is visibly dry and within the moisture limits recommended in writing by manufacturer. Test for capillary moisture by plastic sheet method according to ASTM D4263.
3. Verify that compacted subgrade or mud slab is dry, smooth, sound, and ready to receive waterproofing sheet.

C. Excavation Support and Protection System:

1. Fill minor gaps and spaces 1/2 in (12 mm) wide or wider with wood, metal, concrete, or other appropriate filling material.
2. Cover or fill large voids and crevices with cement mortar.
3. Encase tieback rods, nuts, and plates with detail tape and prepare for covering with waterproofing.

3.2 INSTALLATION, GENERAL

A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:

1. ASTM D 6135.
2. Respective manufacturer's written installation instructions.
3. Accepted submittals.
4. Contract Documents.

3.3 PREPARATION

A. General: Comply with manufacturer's instructions, recommendations, and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants, or errors which would result in poor or potentially defective installation or would cause latent defects in Work.

B. Excavation Dewatering: Verify that the waterproofing application area is dry and free of standing and uncontrolled water. Should the dewatering system fail at any time during application of waterproofing system, the materials shall be completely removed and work shall start over with new materials once the area is dry and free of water.

C. Clean, prepare, and treat substrates according to manufacturer's written instructions. Provide clean, dust-free, and dry substrates for waterproofing application.

D. Mask off adjoining surfaces not receiving waterproofing to prevent spillage and overspray affecting other construction.

E. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.

F. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids.

G. Prepare, fill, prime, and treat joints and cracks in substrates. Remove dust and dirt from joints and cracks according to ASTM D4258.

1. Install sheet strips of width according to manufacturer's written instructions and center over treated construction and contraction joints and cracks exceeding a width of 1/16 inch (1.6 mm).

H. Bridge and cover isolation joints, expansion joints, and discontinuous deck-to-wall and deck-to-deck joints with overlapping sheet strips of widths according to manufacturer's written instructions.

1. Invert and loosely lay first sheet strip over center of joint. Firmly adhere second sheet strip to first and overlap to substrate.

I. Corners: Prepare, prime, and treat inside and outside corners according to ASTM D6135.

1. Install membrane strips centered over vertical inside corners. Install 3/4-inch (19-mm) fillets of liquid membrane on horizontal inside corners and as follows:

a. At footing-to-wall intersections, extend liquid membrane in each direction from corner or install membrane strip centered over corner.
b. At plaza-deck-to-wall intersections, extend liquid membrane or sheet strips onto deck waterproofing and to finished height of sheet flashing.

J. Prepare, treat, and seal vertical and horizontal surfaces at terminations and penetrations through waterproofing and at drains and protrusions according to ASTM D6135.

3.4 INSTALLATION OF POST-APPLIED SHEET WATERPROOFING

A. Install modified bituminous sheets according to waterproofing manufacturer's written instructions and per recommendations in ASTM D6135.

B. Primer: Apply primer to substrates at required rate and allow it to dry. Limit priming to areas that will be covered by sheet waterproofing in same day. Reprime areas exposed for more than 24 hours.

C. Apply and firmly adhere sheets over area to receive waterproofing. Accurately align sheets and maintain uniform 6-inch- (150-mm-) minimum lap widths and end laps. Overlap and seal seams with liquid membrane, and stagger end laps to ensure watertight installation. Roll membrane and seams with a hard neoprene roller.

1. When ambient and substrate temperatures range between 25 and 40 deg F (minus 4 and plus 5 deg C), install self-adhering, modified bituminous sheets produced for low-temperature application. Do not use low-temperature sheets if ambient or substrate temperature is higher than 60 deg F (16 deg C).
2. Apply sheets so that direction of flow of water is over and not against laps.
3. Apply sheet strips under waterproofing membrane at, but not limited to, the following locations:

    a. Expansion joints.
    b. Discontinuous deck-to-wall and deck-to-deck joints.
    c. Under clamping ring at drains.
    d. Wall angles and corners.
    e. Substrate cracks.
    f. Penetrations.
    g. Isolation, construction and contraction joints.
    h. Locations where waterproofing membrane may be subjected to unusual strain.

D. Two-Ply Application: Install sheets to form a membrane with lap widths not less than 50 percent of sheet widths, to provide a minimum of two thicknesses of sheet membrane over areas to receive waterproofing.

E. Horizontal Application: Apply sheets from low to high points of decks to ensure that laps shed water.

F. Apply continuous sheets over already-installed sheet strips, bridging substrate cracks, construction, and contraction joints.

G. Waterproofing Tie-Ins: Install waterproofing and accessories to tie into adjacent waterproofing to ensure watertight installation.

H. Termination and Penetration Treatment: Prepare vertical and horizontal surfaces at terminations and penetrations through waterproofing and at expansion joints, drains, and sleeves.

1. Unless indicated otherwise, terminate top edges of sheets under metal counterflashings or with metal termination bars and sealants.
2. Seal all exposed sheet edges at terminations, vertical and horizontal, not concealed by metal counterflashings or metal termination bars and sealants with liquid membrane or mastic.

I. Damaged Waterproofing: Repair tears, voids, and lapped seams in waterproofing not complying with requirements. Tape perimeter of damaged or nonconforming area extending 6 inches (150 mm) beyond repaired areas in all directions. Apply a patch of sheet waterproofing and firmly secure with detail tape.

1. Patch tears, voids, misaligned or inadequately lapped seams.
2. Slit fishmouths and blisters, overlap flaps, and patch.

J. Immediately install protection course with butted joints over waterproofing membrane.

1. Molded-sheet drainage panels or insulation panels may be used in place of a separate protection course to vertical applications when approved by waterproofing manufacturer and installed immediately.

3.5 INSTALLATION OF PRE-APPLIED (BLINDSIDE) SHEET WATERPROOFING

A. Install blindside sheet waterproofing according to manufacturer's written instructions.

B. Molded-Sheet Drainage Panels at Vertical Applications: Place and secure over substrate with adhesive, with geotextile filter fabric facing excavation support and protection system. Lap edges and ends of geotextile filter fabric to maintain continuity. Protect installed drainage panels during subsequent construction.

C. Vertical Applications: Install sheet with appropriate face against substrate. Accurately align sheets and maintain uniform side and end laps of minimum dimensions required by membrane manufacturer. Overlap and seal seams, and stagger and tape end laps to ensure watertight installation. Mechanically fasten to substrate.

1. Seams and Laps: Install 12-inch strip of post-applied membrane sheet strips behind laps and 4-inch strip of membrane detail tape over front of lap. Additionally at field cut seams, provide a 6-inch overlap with a full bed of liquid membrane. Roll membrane and seams with hard neoprene roller.
2. Securely fasten top termination of membrane with continuous metal termination bar anchored into substrate and cover with detail tape.

D. Horizontal Applications: Install sheet with face against substrate. Accurately align sheets and maintain uniform side and end laps of minimum dimensions required by membrane manufacturer. Overlap and seal seams, and stagger and tape end laps to ensure watertight installation.

1. Seams and Laps: Install 12-inch strip of post-applied membrane sheet strips behind laps and 4-inch strip of membrane detail tape over front of lap. Additionally at field cut seams, provide a 6-inch overlap with a full bed of liquid membrane. Roll membrane and seams with hard neoprene roller.

E. Corners: Seal lapped terminations and cut edges of sheet waterproofing at inside and outside corners with detail tape.

F. Seal penetrations through sheet waterproofing to provide watertight seal with detail tape patches or wraps and a liquid-membrane troweling.

G. Waterproofing Tie-Ins: Install waterproofing and accessories to tie into adjacent waterproofing to ensure watertight installation.

H. Termination and Penetration Treatment: Prepare vertical and horizontal surfaces at terminations and penetrations through waterproofing and at expansion joints, drains, and sleeves.

I. Damaged Waterproofing: Repair tears, voids, and lapped seams in waterproofing not complying with requirements. Tape perimeter of damaged or nonconforming area extending 6 inches (150 mm) beyond repaired areas in all directions. Apply a patch of sheet waterproofing and firmly secure with detail tape.

3.6 INSTALLATION OF INSULATION PANEL

A. Install insulation panels over waterproofed surfaces. Cut and fit to within 3/4 inch (19 mm) of projections and penetrations.

B. On vertical surfaces, set insulation drainage panels in adhesive or tape applied according to manufacturer's written instructions.

1. Install board insulation before installing molded sheet drainage panels.

C. On horizontal surfaces, loosely lay insulation drainage panels according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.

3.7 INSTALLATION OF MOLDED-SHEET DRAINAGE PANEL

A. Place and secure molded-sheet drainage panels, with geotextile facing away from wall or deck substrate, according to manufacturer's written instructions. Use adhesive or another method that does not penetrate waterproofing. Lap edges and ends of geotextile to maintain continuity. Protect installed molded-sheet drainage panels during subsequent construction.

3.8 GROUT-INJECTION

A. After assembly of shotcrete bar reinforcement, attach injection port components to composite sheet. Secure injection port tube on steel reinforcement with wire ties.

B. Following application and curing of shotcrete, inject hydrophilic grout into composite sheet cavity in accordance with manufacturer's instructions. Completely fill cavity; avoid overfilling.

1. Do not inject grout until strength of shotcrete exceeds 1500 psi (10.35 MPa) or 7 days have elapsed from time of application.
2. Maintain grout at minimum temperature of 50 deg. F (10 deg. C) for 24 hours prior to use. Do not exceed product temperature of 90 deg. F (32 deg. C).

C. Upon completing injection and curing of grout, cut injection tubes flush with face of shotcrete and patch with port patch.

3.9 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Manufacturer's qualified technical representative shall periodically inspect Work to ensure installation is proceeding in accordance with manufacturer's designs, recommendations, instructions, and warranty requirements. Representative shall submit written reports of each visit indicating observations, findings, and conclusions of inspection.

1. Manufacturer's Technical Representative Qualifications: Direct employee of technical services department of manufacturer with experience in providing recommendations, observations, evaluations, and problem diagnostics.

B. Testing Agency: The Owner may employ and pay a qualified independent testing agency to perform field quality control.

1. Agency shall be certified by waterproofing manufacturer to provide observations and inspections required to provide warranty indicated.

a. Agency shall prepare reports and digital photographs documenting observations. Reports shall be made available to the Contractor, waterproofing installer, waterproofing manufacturer and Architect.

2. Pre-Applied Sheet Waterproofing: Including but not limited to the following:

a. Prior to beginning concrete slab reinforcing installation, inspect waterproofing membrane for rips, tears, and punctures.
b. Prior to concrete placement work, inspect concrete installer's tools and notify Contractor to have tools with spikes or other sharp surfaces that could inflict intentional or unintentional damage on the installed waterproofing membrane removed from work area.
c. Immediately prior to concrete placement work, inspect waterproofing membrane for rips, tears, and punctures, inspect penetrations at columns and mechanical and electrical piping.
d. Continuously inspect concrete placement work, watching for damage to waterproofing membrane.
e. Periodically inspect portions of slab that were not placed (block-outs, voids, and leave-outs) for water infiltration of subgrade until concrete is subsequently placed.

C. Flood Testing: Flood test each deck area for leaks, according to procedures in ASTM D5957, after completing waterproofing but before placing overlying construction. Install temporary containment assemblies, plug or dam drains, and flood with potable water.

1. Flood to an average depth of 2-1/2 inches (64 mm) with a minimum depth of 1 inch (25 mm) and a maximum depth of 4 inches (100 mm). Maintain 2 inches (51 mm) of clearance from top of sheet flashings.
2. Flood each area for 24 hours.
3. Examine underside of decks and terminations for evidence of leaks during flood testing.
4. After flood testing, repair leaks, repeat flood tests, and make further repairs until waterproofing installation is watertight.

D. Electronic Leak-Detection Testing, Electronic Field Vector Mapping (EFVM): Perform leak testing by an electronic detection process to verify entire waterproofing membrane is free of defects. EFVM shall be performed by a qualified testing agency.

1. Test each deck area for leaks using an electronic leak-detection method that locates discontinuities, holes, open seams, and capillary defects in the waterproofing membrane.

a. Perform leak detection of horizontal waterproofing membrane prior to placement of protection board and remaining system components

2. Perform tests on abutting or overlapping smaller areas as necessary to cover entire test area.
3. Create a conductive electronic field over the area of waterproofing to be tested and electronically determine locations of discontinuities or leaks, if any, in the waterproofing.
4. Provide survey report indicating locations of discontinuities, if any.

E. Correction of Deficiencies: Waterproofing will be considered defective if it does not pass tests and inspections.

1. Correct deficiencies in or remove waterproofing that does not comply with requirements: repair substrates, reapply waterproofing, and repair flashing until waterproofing installation is watertight.
2. Materials and installation failing to meet specified requirements shall be replaced at Contractor's expense. Retesting of materials and installations failing to meet specified requirements shall be performed at Contractor's expense.

F. Final Inspection: Arrange for waterproofing system manufacturer's qualified technical representative to inspect waterproofing installation on completion of waterproofing membrane and flashing. Notify Architect and Owner 48 hours in advance of date and time of final inspection.

G. Prepare test and inspection reports.

3.10 PROTECTION, REPAIR, AND CLEANING

A. Do not permit foot or vehicular traffic on unprotected membrane.

B. Protect waterproofing from damage and wear during remainder of construction period.

C. Protect installed insulation panels from damage due to UV light, harmful weather exposures, physical abuse, and other causes. Provide temporary coverings where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

D. Correct deficiencies in or remove waterproofing that does not comply with requirements; repair substrates, reapply waterproofing, and repair sheet flashings.

E. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended in writing by manufacturer of affected construction.

END OF SECTION

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SECTION 071413

HOT FLUID-APPLIED RUBBERIZED ASPHALT WATERPROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Hot fluid-applied, reinforced rubberized asphalt waterproofing system and supplementary items necessary for installation.

B. Related Sections:

1. Refer to Owner Building Enclosure Commissioning Plan for Field Observations and Performance Testing Activities.
2. Refer to Division 07 Section Thermal Insulation for board insulation requirements.

1.2 ACTION SUBMITTALS

A. Product Data: Manufacturer's technical literature for each product and system indicated.

1. Include manufacturer's specifications for materials, finishes, construction details, installation instructions, and recommendations for maintenance.
2. Include manufacturer's written instructions for evaluating, preparing, and treating substrate.

B. Shop Drawings: Show locations and extent of waterproofing and details for each condition encountered in Work.

1. Include substrate joints and crack treatments, flashing sheets, penetrations, inside and outside corners, vertical intersections, slope, expansion joints, tie-ins with adjoining waterproofing, transitions and other membrane terminations.
2. Include waterproofing manufacturer written approval of Shop Drawings prior to submission.

C. Samples for Verification: For each of the following components, 12 by 12 inches (300 by 300 mm) or manufacturer's standard size.

1. Membrane: Cured membrane on solid backing layered to indicate various components, including reinforcing.
2. Rigid and flexible protection boards.
3. Flashing sheet.
4. Root barrier.
5. Prefabricated drainage course.
6. Extruded board insulation.
7. Air layer.
8. Drainage Panel.
9. Filter fabrics.

1.3 INFORMATIONAL SUBMITTALS

A. Manufacturer's Project Acceptance Document: Certification by the manufacturer that its product(s) are approved, acceptable, suitable for use in specific locations, for specific details, and for applications indicated, specified, or required, and that a warranty will be issued.

1. Submit the following certifications prior to installation:

a. Concrete Substrate: Waterproofing manufacturer shall certify that concrete substrate condition and corrections, if necessary, comply with roofing manufacturer installation guidelines.

B. Field Quality Control Reports: Written report of testing and inspection required by "Field Quality Control".

C. Warranty:

1. Provide manufacturer's written warranty covering materials and installation (labor) stating obligations, remedies, limitations and exclusions.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: To include in maintenance manuals.

1.5 QUALITY ASSURANCE

A. Installer Qualifications:

1. Experience: Installer's personnel with not less than 5 years of experience in the successful performance of Work similar in scope of this Project.
2. Supervision: Installer shall maintain a competent supervisor at Project while the Work is in progress, and who has not less than 5 years of experience installing products and systems similar in scope of this Project.
3. Manufacturer Acceptance: Installer shall be certified, approved, licensed, or acceptable to manufacturer to install products.

B. Quality Standards:

1. Unless otherwise recommended by waterproofing system manufacturer, provide waterproofing system in accordance with recommendations of the NRCA "Roofing and Waterproofing Manual" for roofing type indicated.

C. Mock-ups: Prior to fabrication and installation, build mock-up for each form of construction and finish required to verify selections made under sample Submittals and to demonstrate qualities of materials and execution. Build mock-up using materials indicated for the completed Work.

1. Build mock-up in the location and of the size indicated or, if not indicated, as directed by Architect.

a. Size: 100 sq. ft. (9.3 sq. m) in area.
b. Description: Each type of wall and deck installation.

2. Include accessories and demonstrate surface preparation, sealing at penetrations, crack and joint treatments, inside and outside corner treatments, and protection.

    a. Include adhesion testing on mock up area.

3. Notify Architect seven days in advance of the dates and times when mock-up will be installed.
4. Obtain Architect's acceptance of mock-ups before starting fabrication or installation.
5. Acceptance of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

    a. If Architect determines mock-up does not comply with requirements, reconstruct mock-ups until accepted.

6. Demolish and remove mock-ups when directed by Architect unless accepted to become part of the completed Work.

1.6 PRE-INSTALLATION CONFERENCE

A. Pre-Installation Conference: Before Work begins, conduct conference at Project site.

1. Participants:

    a. Architect.
    b. Contractor, including superintendent.
    c. Installer, including project manager and supervisor.
    d. If requested, Manufacturer's qualified technical representative.
    e. Installers of other construction interfaced with Work.
    f. Testing agency.

2. Minimum Agenda: Installer shall demonstrate understanding of the Work required by describing detailed procedures for preparing, installing, and cleaning the Work. Demonstration shall include, but not be limited to, following topics:

    a. Tour representative areas of Work, inspect and discuss condition of substrate, and other preparatory work performed by other trades.
    b. Review Contract Document requirements.
    c. Review approved submittals.
    d. Review inspection and testing requirements.

        1) Review field quality control requirements for adhesion testing and water testing.

    e. Review environmental conditions and procedures for coping with unfavorable conditions.
    f. Resolve deviations or differences between Contract Documents and the manufacturer's specifications.
    g. Review deck substrate requirements for conditions and finishes, including presence of moisture.

1) Review curing compounds, form release agents and concrete mix design for compatibility with membrane manufacturer.

h. Review base flashings, special details, drainage, penetrations, equipment curbs, and condition of other construction that affects system.
i. Review governing regulations and requirements for insurance and certificates if applicable.
j. Review temporary protection requirements for waterproofing during and after installation.
k. Review observation and repair procedures after installation.

3. Record discussions, including decisions and agreements, and prepare report.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver liquid materials to Project site in original packages with seals unbroken, labeled with manufacturer's name, product brand name and type, date of manufacture, and directions for storing and mixing with other components.

B. Store liquid materials in their original undamaged packages in a clean, dry, protected location and within temperature range required by waterproofing manufacturer.

C. Remove and replace liquid materials that cannot be applied within their stated shelf life.

D. Store rolls according to manufacturer's written instructions.

E. Protect stored materials from direct sunlight.

1.8 PROJECT CONDITIONS

A. Environmental Limitations: Apply waterproofing within the range of ambient and substrate temperatures recommended by manufacturer.

1. Do not apply waterproofing to a damp or wet substrate or during high humidity conditions including snow, rain, fog, or mist.

B. Maintain adequate ventilation during application and curing of waterproofing materials.

1.9 COORDINATION

A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.

1.10 WARRANTY

A. Manufacturer Warranty: Furnish manufacturer's written "Total System" warranty signed by an authorized representative using manufacturer standard form, without monetary limitation (NDL), agreeing to provide materials and labor required to repair or replace Work which exhibits defects in materials or workmanship within specified warranty period. "Defects" is defined to include, but not limited to, deterioration or failure to perform as required.

1. Warranty Period: Manufacturer shall warrant the products to be free from material and labor Defects for a period of 15 years from date of Substantial Completion.

    a. Warranty includes removing and reinstalling waterproofing, flashings, counter-flashings, insulation, accessories, other components of waterproofing system and overburden.
    b. Warranty includes flashings integral with waterproofing system specified in Division 07 Section Sheet Metal Flashing and Trim.

B. Installer Warranty: Furnish installer written warranty signed by an authorized representative using installer standard form agreeing to provide materials and labor required to repair or replace Work which exhibit defects in materials or workmanship within specified warranty period. "Defects" is defined to include, but not limited to, deterioration or failure to perform as required.

1. Warranty Period: Installer shall warrant the installation to be free from workmanship Defects for a period of 2 years from date of Substantial Completion.

    a. Warranty includes removing and reinstalling waterproofing, flashings, counter-flashings, insulation, accessories, other components of waterproofing system and overburden.
    b. Warranty includes flashings integral with waterproofing system specified in Division 07 Section Sheet Metal Flashing and Trim.

PART 2 - PRODUCTS

2.1 MANUFACTURERS AND PRODUCTS

A. Acceptable Manufacturers and Products: Subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of manufacturers listed. If not listed, submit as substitution according to the Conditions of the Contract and Division 01 Section "Substitution Procedures".

B. Basis of Design (Product Standard): Contract Documents are based on products and systems specified to establish a standard of quality. Other available manufacturers offering products having equivalent characteristics may be considered, provided deviations are minor and comply with requirements of Contract Documents as judged by the Architect.

2.2 MATERIALS, GENERAL

A. Single Source Responsibility: Furnish each type of product from single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials.

1. Provide waterproofing materials, protection course, and molded-sheet drainage panels from single source from single manufacturer.
2. Furnish liquid-type auxiliary materials that comply with VOC limits of authorities having jurisdiction.

B. Material Compatibility: Provide waterproofing materials that are compatible with one another under conditions of service and application required, as demonstrated by manufacturer based on testing and field experience.

2.3 PERFORMANCE REQUIREMENTS

A. General: Provide hot fluid applied waterproofing systems that prevent the passage of liquid water. Waterproofing shall accommodate normal substrate movement and seal expansion and control joints, construction material transitions, opening transitions, penetrations, and perimeter conditions without deterioration.

2.4 HOT FLUID APPLIED WATERPROOFING MEMBRANE

A. Hot Fluid-Applied Rubberized Asphalt Waterproofing: Single-component, 100 percent solids, polymer modified asphalt, 215 mils minimum thickness with continuous reinforcement.

1. Manufacturers and Products:

a. Sika Corp.; American Hydrotech Monolithic Membrane 6125.
b. Barrett Company; Ram-Tough 250.
c. Carlisle Coatings & Waterproofing Inc.; CCW-500R.
d. Cetco; Strataseal HR.
e. Henry Company; Elasto-Seal 790-11 or 790-11 EV.
f. Tremco Incorporated; Tremproof 6100.

B. Reinforcing Fabric: Manufacturer's recommended, spun-bonded polyester fabric.

2.5 AUXILIARY MATERIALS

A. General: Furnish accessory materials recommended by waterproofing system manufacturer for intended use and compatible with waterproofing.

1. Substrate Repair Materials: As recommended by waterproofing manufacturer.

B. Primer: ASTM D 41, asphaltic primer, provided by waterproofing manufacturer.

C. Elastomeric Flashing Sheet: 60 mils (1.5 mm) minimum thickness, non-staining, uncured sheet neoprene.

1. Manufacturers and Products:

a. Sika Corp.; American Hydrotech Flex-Flash UN.
b. Barrett Company; Ram-Flash 327 HDR.
c. Carlisle Coatings & Waterproofing Inc.; CCW Uncured Neoprene Flashing.
d. Cetco; N-Flash.
e. Henry Company; Neoflash.
f. Tremco Incorporated; Elastomeric Sheeting.

D. Liquid Applied Reinforced Membrane Flashing: Two component, fast cure, poly methyl-methacrylate resin combined with fleece reinforcement to form a monolithic, self-adhering and self-flashing reinforced flashing membrane as recommended by waterproofing manufacturer.

1. Basis of Design: Sika Corp.; American Hydrotech Hydroseal PMMA.

E. Flexible Protection Course: Manufacturer's standard, 80- to 90-mil- (2.0- to 2.3-mm-) thick, fiberglass-reinforced rubberized asphalt or modified bituminous sheet or as recommended by waterproofing manufacturer for intended use.

1. Basis of Design: Sika Corp.; American Hydrotech Hydroflex 30.

F. Rigid Protection Course: ASTM D6506, semirigid sheets of fiberglass or mineral-reinforced-asphaltic core, pressure laminated between two asphalt-saturated fibrous liners and as follows:

1. Thickness: 1/8 inch (3 mm), nominal, for vertical applications; 1/4 inch (6 mm), nominal, elsewhere.

G. Rigid Protection Course: Semi-rigid sheets of fiberglass reinforced asphaltic core, pressure laminated between two polypropylene liners.

1. Basis of Design: Sika Corp.; American Hydrotech Permaboard.

H. Termination Bars: Aluminum bars or ASTM A 666, Type 304 formed stainless steel bars; 2 types, one flat and one flat with upper flange shaped to receive sealant, locations as indicated; 1 in by 1/8 in (25 mm by 3 mm) thick; predrilled at 8 in (200 mm) centers; with stainless steel fasteners. Plastic bars allowed.

I. Sealants and Accessories: Waterproofing manufacturer's recommended sealants and accessories.

J. Root Barrier: Manufacturer standard plastic sheet manufactured from polyethylene or polypropylene plastic; formulated to resist root growth and bacteria.

1. Basis of Design: Sika Corp.; American Hydrotech Root Stop HD with Root Stop Tape.

K. Air Layer at Concrete Toppings or Mortar Setting Beds: Waterproofing manufacturer plastic geonet type core with geo-textile filter fabric bonded to one side.

1. Basis of Design: Sika Corp.; American Hydrotech Hydrodrain AL.

L. Waterproofing Expansion Joint System: Elastomeric expansion joint sealing system, approved by waterproofing manufacturer, designed to provide total expansion joint protection for waterproofing membrane.

1. Basis of Design: Situra Inc.; RedLine.

M. Miscellaneous Accessories: Provide preformed inside and outside corner sheet flashings, T-joint covers, termination reglets, cover strips, stainless steel draw bands and other accessories required for complete installation.

2.6 MOLDED-SHEET DRAINAGE PANELS

A. Molded-Sheet Drainage Panels; Vertical Applications:

1. Description: Pre-fabricated composite with drainage core faced with geotextile filter fabric on dimpled side (facing earth) and protective covering on flat side (facing waterproofing).
2. Protective Covering: Smooth polymeric film.
3. Drainage Core: Three-dimensional, non-biodegradable, molded polypropylene or polystyrene.

    a. Minimum Compressive Strength: 15,000 lbf/sf (718 kPa) according to ASTM D 1621.
    b. Minimum In-Plane Flow Rate: 15 gpm/ft (188 L/min per m) of unit width at hydraulic gradient of 1.0 and compressive stress of 25 psig (172 kPa) according to ASTM D 4716.

4. Geotextile Filter Fabric: Non-woven needle-punched geotextile, manufactured for subsurface drainage, made from polypropylene, polyolefin, or polyester; complying with following properties according to AASHTO M 288:

    a. Survivability: Class 2.
    b. Permittivity: 0.1 per second, minimum.

5. Manufacturers and Products:

    a. Sika Corp.; American Hydrotech Hydrodrain 420.
    b. Carlisle Coatings & Waterproofings; CCW MiraDRAIN 6200.
    c. Cetco; Aquadrain 15XP.
    d. Henry Company; DB 520.
    e. Tremco Commercial Sealants & Waterproofing; TREMDrain 1000.

B. Molded-Sheet Drainage Panels; Horizontal Applications:

1. Description: Pre-fabricated composite with drainage core faced with geotextile filter fabric on dimpled side (facing earth) and protective covering on flat side (facing waterproofing).
2. Protective Covering: Smooth polymeric film.
3. Drainage Core: Three-dimensional, non-biodegradable, molded polypropylene or polystyrene.

    a. Minimum Compressive Strength: 18,000 lbf/sf (862 kPa) according to ASTM D 1621.
    b. Minimum In-Plane Flow Rate: 18 gpm/ft (225 L/min per m) of unit width at hydraulic gradient of 1.0 and compressive stress of 25 psig (172 kPa) according to ASTM D 4716.

4. Filter Fabric: Non-woven needle-punched geotextile, manufactured for subsurface drainage, made from polypropylene, polyolefin, or polyester; complying with following properties according to AASHTO M 288:

   a. Survivability: Class 2.
   b. Permittivity: 0.1 per second, minimum.

5. Manufacturers and Products:

   a. Sika Corp.; American Hydrotech Hydrodrain 700.
   b. Carlisle Coatings & Waterproofings; CCW MiraDRAIN 9800.
   c. Cetco; Aquadrain 18H.
   d. Henry Company; DB 650n with G100s/s base/protection sheet.
   e. Tremco Commercial Sealants & Waterproofing; TREMDrain 2000.

C. Adhesive for Bonding Drainage Panels: Product compatible with drainage panels being bonded and with demonstrated capability to bond securely to substrates indicated without damaging substrates.

D. Miscellaneous Accessories: As required by manufacturer for complete installation assembly, including flanges around piping penetrations and expanded base and tie-in fittings as necessary to coordination with foundation drainage system.

2.7 BOARD INSULATION

A. Extruded Polystyrene Board Insulation: As specified in Division 07 Section "Thermal Insulation".

2.8 CONCRETE TOPPINGS

A. Concrete Toppings: As specified in Division 03 Section "Concrete Toppings".

PART 3 - EXECUTION

3.1 EXAMINATION

A. Acceptance of Surfaces and Conditions: Examine substrates to receive products and systems and associated work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions.

1. Verify that openings and penetrations are in place and set and braced and that drains are securely clamped in place.
2. Verify that concrete has cured and aged for minimum time period recommended in writing by waterproofing manufacturer.
3. Verify that substrate is visibly dry and within the moisture limits recommended in writing by manufacturer. Test for capillary moisture by plastic sheet method according to ASTM D 4263 or as recommended by manufacturer.

4. Verify that concrete curing compounds and form oils that will impair adhesion of roofing components to roof deck have been removed.

3.2 INSTALLATION, GENERAL

A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:

1. Respective manufacturer's written installation instructions.
2. Accepted submittals.
3. Contract Documents.

3.3 PREPARATION

A. General: Comply with manufacturer's instructions, recommendations, and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants, or errors which would result in poor or potentially defective installation or would cause latent defects in Work.

B. Dewatering: Verify that the waterproofing application area is dry and free of standing and uncontrolled water. Should the dewatering system fail at any time during application of waterproofing system, the materials shall be completely removed and work shall start over with new materials once the area is dry and free of water again.

C. Clean, prepare, and treat substrates according to manufacturer's written instructions. Provide clean, dust-free, and dry substrates for waterproofing application.

D. Mask off adjoining surfaces not receiving waterproofing to prevent spillage and overspray affecting other construction.

E. Close off deck drains and other deck penetrations to prevent spillage and migration of waterproofing fluids.

F. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.

1. When recommended by waterproofing manufacturer, abrasive blast clean concrete surfaces uniformly to expose top surface of fine aggregate according to ASTM D4259 with a self-contained, recirculating, blast-cleaning apparatus. Remove material to provide a sound surface free of laitance, glaze, efflorescence, curing compounds, concrete hardeners, or form-release agents. Remove remaining loose material and clean surfaces according to ASTM D4258.

a. Adhesion Testing: Prior to installation of membrane, test adhesion to substrate using manufacturer's recommended test procedure.

G. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids.

3.4 PREPARATION AT TERMINATIONS, PENETRATIONS, AND CORNERS

A. Prepare surfaces at terminations and penetrations through waterproofing and at expansion joints, drains, sleeves, and corners according to waterproofing manufacturer's written instructions.

B. Waterproofing Tie-Ins: Install waterproofing and accessories to tie into adjacent waterproofing to ensure watertight installation.

C. Termination and Penetration Treatment: Prepare vertical and horizontal surfaces at terminations and penetrations through waterproofing and at expansion joints, drains, and sleeves according to installation quality standards.

1. Unless indicated otherwise, terminate top edges of sheets under metal counterflashings or with metal termination bars and sealants.

D. Flexible Flashings: Install elastomeric flashing sheet at all inside and outside corners and transitions in plane, extending a minimum 6 in (150 mm) onto deck and minimum 8 in (200 mm) onto wall and parapet substrates in 90 mil layer of hot rubberized asphalt.

1. Install elastomeric flashing sheet at all transitions such as curbs, other steps, terminations, penetrations, rebar penetrations, drain locations and other locations where additional reinforcement is needed.

a. Install target patches of elastomeric sheet set in 90 mil hot rubberized asphalt around penetrations, extending 6 inches beyond penetration and at least 6 inches up penetration.
b. Apply 215 mil reinforced membrane assembly over elastomeric sheet and 6 in. up penetration or 4 in. above finished surface, whichever is higher. Install a stainless steel drawband around the top edge of the membrane.
c. Install 36 in by 36 in elastomeric flashing sheet set in 90 mil layer of hot rubberized asphalt at drain penetrations, extending a minimum of 12 in (300 mm) beyond the drain body.

E. Metal Termination Bars: Install and mechanically fasten to top of elastomeric flashing sheet at terminations and perimeter of waterproofing.

3.5 JOINT AND CRACK TREATMENT

A. Prepare, treat, rout, and fill joints and cracks in substrate according to waterproofing manufacturer's written instructions. Before coating surfaces, remove dust and dirt from joints and cracks according to ASTM D4258.

1. Comply with ASTM C1193 for joint-sealant installation.

B. Install sheet flashing and bond to deck and wall substrates where required according to waterproofing manufacturer's written instructions.

1. Extend sheet flashings onto perpendicular surfaces and items penetrating substrate as recommended by waterproofing manufacturer.

2. Moving Joints and Construction Joints: Adhere strip of elastomeric sheet to substrate in a layer of hot rubberized asphalt. Extend elastomeric sheet a minimum of 6 in (150 mm) on each side of moving joints and cracks or joints and cracks exceeding 1/8 in (3 mm) thick, and beyond deck drains and penetrations. Apply hot fluid-applied, reinforced rubberized asphalt membrane over elastomeric sheet.
3. Non-Moving Joints: Embed strip of reinforcing fabric into a layer of hot rubberized asphalt. Extend reinforcing fabric a minimum of 6 in (150 mm) on each side of nonmoving joints and cracks not exceeding 1/8 in (3 mm) thick, and beyond roof drains and penetrations. Apply hot fluid-applied, reinforced rubberized asphalt membrane over reinforcing fabric.

3.6 INSTALLATION OF WATERPROOFING

A. Apply waterproofing according to manufacturer's written instructions.

B. Primer: Apply primer, at manufacturer's recommended rate, over prepared substrate and allow to dry. Limit priming to areas that will be covered by waterproofing in same day. Reprime areas exposed for more than 24 hours.

C. Application for Reinforced Membrane: Heat and apply rubberized asphalt according to manufacturer's written instructions.

1. Heat rubberized asphalt in an oil- or air-jacketed melter with mechanical agitator specifically designed for heating rubberized asphalt.
2. Apply hot rubberized asphalt to substrates and adjoining surfaces indicated.
3. Spread to a thickness of 90 mils (2.3 mm); embed reinforcing fabric, overlapping sheets 2 in (50 mm); spread another 125 mil (3.2 mm) thick layer to provide uniform, reinforced, seamless membrane 215 mils (5.5 mm) thick.
4. Apply over prepared joints and up wall terminations and vertical surfaces to heights indicated or required by manufacturer.

D. Cover waterproofing with protection course with overlapped joints before membrane is subject to backfilling, construction or vehicular traffic.

E. Damaged Waterproofing: Repair waterproofing not complying with requirements.

1. Repair damaged waterproofing in accordance with the manufacturer's written repair procedures. Apply a patch of 215 mil fully reinforced hot rubberized asphalt over the damaged area, extending a minimum of 6 inches beyond damaged area in each direction.

3.7 WATERPROOFING EXPANSION JOINT SYSTEM INSTALLATION

A. Install in accordance with waterproofing and expansion joint system manufacturers recommendations. Install in lengths recommended to allow full contact with hot asphalt.

3.8 MOLDED-SHEET DRAINAGE PANEL INSTALLATION

A. Root Barrier at Planters: Install root barrier over protection course, lapping adjacent sheets as recommended by manufacturer. Turn up root barrier at vertical, roofed/flashed surfaces to completely protect waterproofing and flashings. Seal all seams with root stop tape.

B. Installation: Place and secure molded-sheet drainage panels with adhesive, with geotextile filter fabric facing away from waterproofing. Lap edges and ends of geotextile filter fabric to maintain continuity. Protect installed molded-sheet drainage panels during subsequent construction.

3.9 BOARD INSULATION INSTALLATION

A. Install board installation over waterproofed area designated on the Drawings in accordance with Division 07 Section "Thermal Insulation".

B. Install air layer between board insulation and concrete toppings or reinforced mortar setting beds. Overlap geotextile fabric with adjacent sheets as recommended by manufacturer.

3.10 CONCRETE TOPPINGS INSTALLATION

A. Install concrete toppings over waterproofed area designated on the Drawings in accordance with Division 03 Section "Concrete Toppings".

3.11 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Manufacturer's qualified technical representative shall periodically inspect Work to ensure installation is proceeding in accordance with manufacturer's designs, recommendations, instructions, and warranty requirements. Representative shall submit written reports of each visit indicating observations, findings, and conclusions of inspection.

1. Manufacturer's Technical Representative Qualifications: Direct employee of technical services department of manufacturer with experience in providing recommendations, observations, evaluations, and problem diagnostics.

B. Testing Agency: The Owner may employ and pay a qualified independent testing agency to perform field quality control. Materials and installation failing to meet specified requirements shall be replaced at Contractor's expense. Retesting of materials and installations failing to meet specified requirements shall be done at Contractor expense.

1. Refer to Owner's Building Enclosure Commissioning Plan for Field Observations and Performance Testing Activities.

C. Adhesion Testing: Perform adhesion testing at designated locations or one test per 1000 sq ft. Contractor, manufacturer's technical representative, Architect and Waterproofing Consultant shall mutually agree upon adhesion test methods during pre-construction meeting.

1. Repair membrane damage resulting from testing per manufacturer recommendations.

D. Electronic Leak-Detection Testing, Electronic Field Vector Mapping (EFVM): Perform leak testing by an electronic detection process to verify entire waterproofing membrane is free of defects. EFVM shall be performed by a qualified testing agency.

1. Test each deck area for leaks using an electronic leak-detection method that locates discontinuities, holes, open seams, and capillary defects in the waterproofing membrane.

a. Perform leak detection of horizontal waterproofing membrane prior to placement of remaining system components

2. Perform tests on abutting or overlapping smaller areas as necessary to cover entire test area.

a. Perform flood test at drains and penetrations for 48 hours per ASTM D 5957.

3. Create a conductive electronic field over the area of waterproofing to be tested and electronically determine locations of discontinuities or leaks, if any, in the waterproofing.
4. Provide survey report indicating locations of discontinuities, if any.

E. Correction of Deficiencies: Waterproofing will be considered defective if it does not pass tests and inspections.

1. Correct deficiencies in or remove waterproofing that does not comply with requirements: repair substrates, reapply waterproofing, and repair flashing until waterproofing installation is watertight.
2. Materials and installation failing to meet specified requirements shall be replaced at Contractor's expense. Retesting of materials and installations failing to meet specified requirements shall be performed at Contractor's expense.

F. Final Inspection: Arrange for waterproofing system manufacturer's qualified technical representative to inspect waterproofing installation on completion of waterproofing membrane and flashing. Notify Architect and Owner 48 hours in advance of date and time of final inspection.

G. Prepare test and inspection reports.

3.12 PROTECTION, REPAIR, AND CLEANING

A. Do not permit foot or vehicular traffic on unprotected membrane.

B. Protect waterproofing from damage and wear during remainder of construction period.

C. Protect installed insulation panels from damage due to UV light, harmful weather exposures, physical abuse, and other causes. Provide temporary coverings where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

D. Correct deficiencies in or remove waterproofing that does not comply with requirements; repair substrates, reapply waterproofing, and repair sheet flashings.

E. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION

SECTION 074213

FORMED METAL WALL PANELS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Factory-formed metal wall panels and supplementary items necessary for installation.

B. Related Requirements:

1. Refer to Division 01 Section Field Test for Air and Water Leakage.

2. Refer to Division 01 Building Enclosure Commissioning for Field Observations and Performance Testing.

1.2 DEFINITIONS

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

1.3 DELEGATED ENGINEERING REQUIREMENTS

A. Contract Documents Design Intent: Drawings and Specifications indicate design intent for products and systems and do not necessarily indicate or specify total Work required. Contract Documents shall not be construed as an engineered design; furnish and install all Work required for a complete installation.

B. Delegated Engineering Responsibility: Contractor shall employ a qualified professional engineer to provide engineering for products and systems including attachment to building structure required to meet design intent of Contract Documents.

1. Preparation of structural analysis data including engineering calculations, shop drawings and other submittals signed and sealed by the qualified professional engineer.

C. Delegated Engineering Professional Qualifications: Professional engineer legally authorized to practice in jurisdiction where Project is located and experienced in providing engineering services of kind indicated for products and systems similar to this Project and has a record of successful in-service performance.

D. Coordination of Work:

1. Product Variations: In the event of minor differences between products and systems of acceptable or available manufacturers, Contractor shall notify Architect of such differences and resolve conflicts in a timely manner. Failure of Contractor to provide notification shall be construed as acceptance of conditions indicated, and changes caused by minor differences between products and Contract Documents shall be included in the Work at no additional cost to Owner.

2. Allowable Adjustments: Minor dimension and profile adjustments may be made in interest of fabrication or erection methods or techniques or ability to satisfy design intent, provided design intent is maintained as determined by Architect. Proposed deviations shall include a detailed analysis of impact to adjacent substrates or other building systems, including related design or construction cost impacts. If accepted by Architect, deviations causing changes in materials, constructability, substrates, or conditions shall be included in the Work at no additional cost to Owner.

1.4 ACTION SUBMITTALS

A. Product Data: Manufacturer's technical literature for each product and system indicated.

1. Include manufacturer's specifications for materials, finishes, construction details, installation instructions, and recommendations for maintenance.

B. Shop Drawings: Show details of fabrication and installation, including plans, elevations, sections, details of components and attachments to other work. Distinguish between shop and field-assembled work. Include the following:

1. Show fabrication and installation layouts of metal wall panels.
2. Show details and locations of edge conditions, side-seam and end-lap joints, panel profiles, corners, anchorages, trim, flashings, closures, and terminations.
3. Show details for securing metal wall panel assembly, including layout of fasteners and other attachments.
4. Show details of wall panel penetrations.
5. Show details of connections to adjoining work.
6. Indicate where and how the system deviates from Contract Documents.
7. Shop drawings shall contain seal of a professional engineer currently registered in licensing jurisdiction of the project and a written statement that the framing system conforms to project requirements, applicable codes, and specified conditions.
8. Provide for information only, material properties and other information needed for structural analysis including computations, prepared, signed, or, and sealed by a professional engineer licensed to practice in the jurisdiction where the project is located.
9. Submittal shall contain statement explaining how proposed system design will accommodate infiltrated and condensate water.
10. Design Modifications: If design modifications are proposed to meet performance requirements and field conditions, submit design calculations and Shop Drawings. Do not adversely affect the appearance, durability, or strength of units when modifying details or materials and maintain the general design concept.

C. Coordination Drawings: Exterior elevations drawn to scale and coordinating penetrations and wall-mounted items. Show the following:

1. Wall panel assembly and attachments.
2. Girts and framing.
3. Wall-mounted items including doors, windows, louvers, and lighting fixtures.
4. Penetrations of wall panels by pipes and utilities.

D. Samples for Verification Purposes: For each type of exposed finish required, prepared on samples of size indicated below.

1. Metal Wall Panels: 12 in (300 mm) long by actual panel width. Include fasteners, closures, and other metal wall panel accessories.

2. Trim and Closures: 12 in (300 mm) long. Include fasteners and other exposed accessories.
3. Accessories: 12 in (300 mm) long samples for each type of accessory.
4. Exposed Sealants: For each type and color of joint sealant required. Install joint sealants in 1/2 in (12 mm) wide joints formed between two 6 in (150 mm) long strips of material matching the appearance of metal-faced composite wall panels adjacent to joint sealants.

1.5 INFORMATIONAL SUBMITTALS

A. Manufacturer's Project Acceptance Document: Certification by the manufacturer that its products and systems are approved, acceptable, suitable for use in specific locations, for specific details, and for applications indicated, specified, or required, and that a warranty will be issued.

B. Delegated Engineering Calculations: Informational submittal for products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation; test reports are not acceptable substitute for calculations.

C. Field Quality Control Reports: Written report of testing and inspection required by Field Quality Control.

D. Warranty:

1. Provide manufacturer's written warranty covering materials and installation (labor) stating obligations, remedies, limitations and exclusions.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: To include in maintenance manuals.

1.7 QUALITY ASSURANCE

A. Installer Qualifications:

1. Experience: Installer's personnel with not less than 5 years of experience in the successful performance of Work similar to scope of this Project.
2. Supervision: Installer shall maintain a competent supervisor at Project while the Work is in progress, and who has not less than 5 years of experience installing products and systems similar to scope of this Project.
3. Manufacturer Acceptance: Installer shall be certified, approved, licensed, or acceptable to manufacturer to install products.

1.8 MOCKUPS

A. Mock-ups: Prior to fabrication and installation, build mock-up for each form of construction and finish required to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution. Build mock-up using materials indicated for the completed Work.

1. Build mock-up in the location and of the size indicated or, if not indicated, as directed by Architect. Contractor shall provide structural support framework.

    a. Show typical components, attachments to building structure, and requirements of installation.

2. Notify Architect seven days in advance of the dates and times when mock-up will be installed.
3. Obtain Architect's acceptance of mock-ups before starting fabrication or installation.
4. Acceptance of mock-ups does not constitute acceptance of deviations from the Contract Documents contained in mock-ups unless such deviations are specifically noted by Contractor and accepted by Architect in writing.
5. Demolish and remove mock-ups when directed by Architect unless accepted to become part of the completed Work.

1.9 PRE-INSTALLATION CONFERENCE

A. Pre-Installation Conference: Before Work begins, conduct conference at Project site.

1. Participants:

    a. Architect.
    b. Contractor, including superintendent.
    c. Installer, including project manager and supervisor.
    d. If requested, Manufacturer's qualified technical representative.
    e. Installers of other construction interfaced with Work.

2. Minimum Agenda: Installer shall demonstrate understanding of the Work required by describing detailed procedures for preparing, installing, and cleaning the Work. Demonstration shall include, but not be limited to, following topics:

    a. Tour representative areas of Work, inspect and discuss condition of substrate, and other preparatory work performed by other trades.
    b. Review Contract Document requirements.
    c. Review approved submittals.
    d. Review inspection and testing requirements.
    e. Review environmental conditions and procedures for coping with unfavorable conditions.
    f. Resolve deviations or differences between Contract Documents and the manufacturer's specifications.

3. Record discussions, including decisions and agreements, and prepare report.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, sheets, metal wall panels, and other manufactured items so as not to be damaged or deformed. Package metal wall panels for protection during transportation and handling.

B. Unload, store, and erect metal wall panels in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack metal wall panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal wall panels to ensure dryness, with positive slope for drainage of water. Do not store metal wall panels in contact with other materials that might cause staining, denting, or other surface damage.

D. Retain strippable protective covering on metal wall panel for period of metal wall panel installation.

1.11 PROJECT CONDITIONS

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

B. Field Measurements: Where products and systems are indicated to fit walls and other construction, verify dimensions by field measurements before fabrication.

1.12 COORDINATION

A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.

1.13 WARRANTY

A. Manufacturer's Warranty: Furnish manufacturer written material and labor warranty signed by an authorized representative using manufacturer's standard form agreeing to furnish materials and labor required to repair or replace work which exhibits material defects caused by manufacture or design and installation of product. "Defects" is defined to include but not limited to deterioration or failure to perform as required.

1. Failures include, but are not limited to, the following:

a. Structural failures including, but not limited to, excessive deflection.
b. Noise or vibration created by wind and thermal and structural movements.
c. Deterioration of metals and other materials beyond normal weathering.

2. Warranty Period: Manufacturer shall warrant the products to be free from material and labor Defects for a period of 5 years from date of Substantial Completion

B. Installer's Warranty: Furnish installer written workmanship warranty signed by an authorized representative using installer's standard form agreeing to provide labor required to repair or replace work which exhibits workmanship defects. "Defects" is defined to include but not limited to deterioration or failure to perform as required.

1. Warranty Period: Installer shall warrant the installation to be free from workmanship Defects for a period of 2 years from date of Substantial Completion.

C. Factory Applied Finish Warranty for Fluoropolymer Finishes: Furnish manufacturer written warranty signed by an authorized representative using manufacturer's standard form agreeing to repair finish or replace work which exhibits finish defects. "Defects" is defined to include but not limited to deterioration or failure of finish to perform as required.

1. Coverage includes, but is not limited to, the following:

   a. Color fading more than 5 Delta E units when tested according to ASTM D2244.
   b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
   c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Warranty Period: Manufacturer shall warrant the installation to be free from finish defects for a period of 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS AND PRODUCTS

A. Acceptable Manufacturers and Products: Subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of manufacturers listed. If not listed, submit as substitution according to the Conditions of the Contract and Division 01 Section "Substitution Procedures".

1. American Building Components.
2. ATAS International, Inc.
3. Berridge Manufacturing Company.
4. Kalzip.
5. Kingspan.
6. CENTRIA Architectural Systems.
7. MBCI

B. Basis of Design (Product Standard): Contract Documents are based on products and systems specified to establish a standard of quality. Other manufacturers offering products having equivalent characteristics may be considered, provided deviations are minor and comply with requirements of Contract Documents as judged by the Architect.

2.2 MATERIALS, GENERAL

A. Single Source Responsibility: Furnish each type of product from single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials.

2.3 PERFORMANCE REQUIREMENTS

A. General Performance: Comply with performance requirements specified, as determined by testing of products and systems representing those indicated for this Project, without failure due to defective manufacture, fabrication, installation, or other defects in construction.

B. Structural Loads: Engineer products and systems to withstand loads within limits of allowable working stresses of the materials involved under conditions indicated including, but not limited to gravity, wind, seismic, and erection design loads and thermal movements established by authorities having jurisdiction, applicable building codes, and as indicated.

1. Wind Loads: As indicated on Drawings or Wind Analysis Report.
2. Other Loads: As indicated on Drawings.

C. Structural Movement: Engineer system to withstand movements of supporting structure including, but not limited to inter-story drift, twist, column shortening, long-term creep and deflection from uniformly distributed and concentrated live loads:

1. Live Load Deflection: Accommodate differential vertical deflection of floors:

a. Deflection: As indicated on Drawings.

2. Inter-story Drift: Accommodate inter-story drift between adjacent floors perpendicular and/or parallel to the wall:

a. Design Displacement: As indicated on Drawings.

D. Seismic Performance: Systems shall withstand the effects of earthquake motions determined in accordance with ASCE/SEI 7, the building code and authorities having jurisdiction.

E. Deflection of Framing Members and Panels: At design wind pressure.

1. Deflection of Framing Members Normal to Wall Plane (Panel Perimeter): Limited to 1/175 of clear span.
2. Deflection of Panels: For short side panel edge dimension (L), limit center-of-panel deflection to not greater than L/100 or 1 in (25mm), whichever is less.

F. Structural-Test Performance: Provide metal wall panel assemblies capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated, based on testing according to ASTM E 1592 or ASTM E 330 as follows:

1. When tested at 150 percent of positive and negative wind-load design pressures, assemblies, including anchorage, do not evidence material failures, structural distress, and permanent deformation of main framing members exceeding 0.2 percent of the clear span.

G. Water Penetration under Static Pressure: Test in accordance with ASTM E 331 as follows:

1. No evidence of water penetration for the system when tested in accordance with a minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sf (300 Pa).

H. Energy Performance:

1. Air Leakage: Test in accordance with ASTM E 283 as follows:

a. Air leakage for the system of not more than 0.06 cfm/sf (0.30 L/s/sm) at a minimum static-air-pressure differential of 6.24 lbf/sf (300 Pa) when tested in accordance with ASTM E 283.

I. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes:

1. Temperature Change (Range): 120 deg F (49 deg C), ambient; 180 deg F (82 deg C), material surfaces.

2. Thermal Cycling: No buckling, damaging stresses, damaging loads on fasteners, and other detrimental effects.

J. Dimensional Tolerances: Engineer products and systems to accommodate dimensional tolerances of framing members and adjacent construction.

2.4 EXPOSED-FASTENER, LAP-SEAM METAL WALL PANELS

A. General: Provide factory-formed metal wall panels designed to be field assembled by lapping side edges of adjacent panels and mechanically attaching panels to supports using exposed fasteners in side laps. Include accessories required for weathertight installation.

B. Corrugated-Profile, Exposed-Fastener Metal Wall Panels: Formed with alternating curved ribs spaced at 2.67 in (68 mm) on center across width of panel.

1. Basis of Design: CENTRIA; Econolap
2. Material: Aluminum-zinc alloy-coated steel sheet, standard of manufacturer; 22 gage, 0.034 in (0.8 mm) nominal minimum thickness.
3. Panel Coverage: 34-2/3 in (880 mm).
4. Panel Height: 3/4 in (19 mm).
5. Finish: Duraguard, color as selected from Manufacturer's standard colors.

2.5 PANEL ACCESSORIES

A. Fasteners for Sub-framing and Furring: Self-tapping screws, bolts, nuts, and other suitable fasteners, Series 300 stainless steel of size, corrosion resistance, holding power, and other properties required to comply with performance requirements.

1. Provide fasteners with EPDM or PVC sealing washers.

B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.

1. Closures: Provide closures fabricated of same metal as metal wall panels.
2. Closure Strips: Closed-cell, expanded, cellular, rubber or cross-linked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1 in (25 mm) thick, flexible closure strips; cut or pre-molded to match metal wall panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
3. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.

C. Flashing and Trim: Provide flashing and trim formed from same material as metal composite material panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, bases, drips, sills, jambs, corners, endwalls, framed openings, rakes, fasciae, parapet caps, soffits, reveals, and fillers. Finish flashing and trim with same finish system as adjacent metal panels.

D. Panel Fasteners: Self-tapping screws, bolts, nuts, and other suitable fasteners, Series 300 stainless steel of size, corrosion resistance, holding power, and other properties required to comply with performance requirements. Provide exposed fasteners with heads matching color of metal panels factory-applied coating.

1. Provide fasteners with EPDM or PVC sealing washers.

E. Panel Sealants: Provide the following as recommended by metal wall panel assembly manufacturer for installation indicated.

1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, non-sag, nontoxic, non-staining tape 1/2 in (12 mm) wide and 1/8 in (3 mm) thick.
2. Elastomeric Joint Sealant: ASTM C 920; elastomeric silicone polymer sealant; of type, grade, class, and use classifications required to seal exposed joints in metal wall panels and remain weathertight; and as recommended in writing by metal wall panel manufacturer.
3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for concealed hooked-type expansion joints with limited movement.

F. Self-Adhering, High-Temperature Rubberized Asphalt Flashing: Minimum 30 mils to 40 mils (0.76 mm to 1.00 mm) thick, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.

1. Thermal Stability: ASTM D 1970; stable after testing at 240 deg F (116 deg C).
2. Low-Temperature Flexibility: ASTM D 1970; passes after testing at minus 20 deg F (-6.7 deg C).
3. Manufacturers and Products:

a. Carlisle Coatings & Waterproofing; CCW WIP 300HT.
b. GCP Applied Technologies; Ultra.
c. Henry Company; Blueskin PE200 HT.
d. Metal-Fab Manufacturing, LLC; MetShield.
e. Owens Corning; WeatherLock Metal High Temperature Underlayment.

G. Barrier Flashing Tape: Air-barrier manufacturer standard adhesive and pressure-sensitive adhesive tape. Refer to Division 07 Section "Air and Water Barriers".

H. Maintenance Equipment Anchors: As specified in Division 11 Section Building Maintenance Equipment.

2.6 SECONDARY STEEL SUPPORT STRUCTURE

A. Comply with Division 05 Section Structural Steel Framing.

1. Refer to Structural Documents for secondary steel support substructure.

B. Support Structure Finish:

1. Shop-Applied or Field-Applied Coatings: Refer to Division 9 Section High Performance Coatings applied to all secondary steel support structure.

2.7 FABRICATION

A. General: Fabricate and finish metal wall panels and accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

B. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.

C. Fabricate metal wall panel joints with factory-installed captive gaskets or separator strips that provide a tight seal and prevent metal-to-metal contact, and that will minimize noise from movements within panel assembly.

D. Sheet Metal Accessories: Fabricate flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of item indicated.

1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
2. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
3. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
4. Sealed Joints: Form non-expansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.
5. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
6. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended by metal wall panel manufacturer.

    a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal wall panel manufacturer for application but not less than thickness of metal being secured.

2.8 FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of accepted Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of accepted Samples and are assembled or installed to minimize contrast.

D. Finish Selections: As scheduled from the Manufacturer's standard colors.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Acceptance of Surfaces and Conditions: Examine substrates to receive products and systems and associated work for compliance with requirements for installation tolerances, metal wall panel supports, and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions.

1. Examine wall framing to verify that girts, angles, channels, studs, and other structural panel support members and anchorage have been installed within alignment tolerances required by metal wall panel manufacturer.
2. Examine wall sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal wall panel manufacturer.
3. Verify that air- or water-resistive barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.

B. Examine roughing-in for components and systems penetrating metal wall panels to verify actual locations of penetrations relative to seam locations of metal wall panels before installation.

3.2 INSTALLATION, GENERAL

A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:

1. Respective manufacturer’s written installation instructions.
2. Accepted submittals.
3. Contract Documents.

B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by isolating metals and other materials from direct contact with incompatible materials.

3.3 PREPARATION

A. General: Comply with manufacturer instructions, recommendations and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants, or errors which would result in poor or potentially defective installation or would cause latent defects in Work.

B. Subframing and Supports: Install subframing, subgirts, base angles, closure channels, sills, furring, and other miscellaneous panel support members and anchorages according to ASTM C754 and metal composite material panel manufacturer's written recommendations.

3.4 ASSEMBLY INSTALLATION

A. General: Install metal wall panels according to manufacturer written instructions in orientation, sizes, and locations indicated on Drawings.

B. Wall Panels: Install wall panels perpendicular to girts and subgirts unless otherwise indicated. Anchor metal wall panels and other components of the Work securely in place, with provisions for thermal and structural movement.

1. Shim or otherwise plumb substrates receiving metal wall panels.
2. Flash and seal metal wall panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until weather barrier and flashings that will be concealed by metal wall panels are installed.
3. Install screw fasteners in predrilled holes.

    a. Air and Water Barrier: Install a strip of barrier flashing tape behind through-wall attachments that penetrate air and water barrier. Seal all penetrations with weather barrier sealant.

4. Locate and space fastenings in uniform vertical and horizontal alignment.
5. Install flashing and trim as metal wall panel work proceeds.
6. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
7. Apply elastomeric sealant continuously between metal base channel (sill angle) and concrete and elsewhere as indicated or, if not indicated, as necessary for waterproofing.
8. Align bottom of metal wall panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.
9. Provide weathertight escutcheons for pipe and conduit penetrating exterior walls.

C. Fasteners: Use stainless-steel fasteners.

D. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.

E. Attachment Assembly, General: Install attachment assembly required to support metal wall panels and to provide a complete weathertight wall system, including subgirts, perimeter extrusions, tracks, drainage channels, panel clips, and anchor channels.

1. Include attachment to supports, panel-to-panel joinery, panel-to-dissimilar-material joinery, and panel-system joint seals.
2. Do not begin installation until weather barrier and flashings that will be concealed by panels are installed.

F. Lap-Seam Metal Wall Panels: Fasten metal wall panels to supports with fasteners at each lapped joint at location and spacing recommended by manufacturer.

1. Lap ribbed or fluted sheets one full rib corrugation. Apply panels and associated items for neat and weathertight enclosure. Avoid "panel creep" or application not true to line.
2. Provide metal-backed washers under heads of exposed fasteners bearing on weather side of metal wall panels.
3. Locate and space exposed fasteners in uniform vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of washer.
4. Install screw fasteners with power tools having controlled torque adjusted to compress washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.
5. Provide sealant tape at lapped joints of metal wall panels and between panels and protruding equipment, vents, and accessories.
6. Apply a continuous ribbon of sealant tape to weather-side surface of fastenings on end laps; on side laps of nesting-type panels; on side laps of corrugated nesting-type, ribbed, or fluted panels; and elsewhere as needed to make panels weathertight.
7. At panel splices, nest panels with minimum 6 in (150 mm) end lap, sealed with butyl-rubber sealant and fastened together by interlocking clamping plates.

G. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weathertight performance of metal wall panel assemblies. Provide types of gaskets, fillers, and sealants indicated or, if not indicated, types recommended by metal wall panel manufacturer.

1. Seal metal wall panel end laps with double beads of tape or sealant, full width of panel. Seal side joints where recommended by metal wall panel manufacturer.
2. Prepare joints and apply sealants to comply with requirements in Division 07 Section "Joint Sealants".

3.5 ACCESSORY INSTALLATION

A. General: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete metal wall panel assembly including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.

    a. Provide types indicated by metal panel manufacturer; or, if not indicated, provide types recommended in writing by metal panel manufacturer.

B. Flashing and Trim: Comply with performance requirements, manufacturer written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

1. Install exposed flashing and trim that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in weathertight and weather-resistant performance.

    a. Install escutcheons for pipe and conduit penetrating exterior walls.

2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 ft (3 m) with no joints allowed within 24 in (600 mm) of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently weather resistant and weathertight, form expansion joints of intermeshing hooked flanges, not less than 1 in (25 mm) deep, filled with mastic sealant (concealed within joints).

3.6 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Manufacturer qualified technical representative shall periodically inspect Work to ensure installation is proceeding in accordance with manufacturer's designs, recommendations, instructions, and warranty requirements. Representative shall submit written reports of each visit indicating observations, findings, and conclusions of inspection.

1. Manufacturer Technical Representative Qualifications: Direct employee of technical services department of manufacturer with experience in providing recommendations, observations, evaluations, and problem diagnostics.

B. Testing Agency: The Owner may employ and pay a qualified independent testing agency to perform field quality control. Materials and installation failing to meet specified requirements shall be replaced at Contractor's expense. Retesting of materials and installations failing to meet specified requirements shall be done at Contractor expense.

1. Refer to Division 01 Section Field Test for Air and Water Leakage.
2. Refer to Division 01 Building Enclosure Commissioning for Field Observations and Performance Testing.

C. Metal panels will be considered defective if they do not pass test and inspections.

D. Prepare test and inspection reports.

3.7 CLEANING AND PROTECTION

A. Remove temporary protective coverings and strippable films, if any, as metal wall panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal wall panel installation, clean finished surfaces as recommended by metal wall panel manufacturer. Maintain in a clean condition during construction.

B. After metal wall panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.

C. Replace metal wall panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION

SECTION 074213.24

ALUMINUM METAL PLATE WALL PANELS

PART 1 - GENERAL

1.1 SUMMARY

A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the special function doors as shown on the drawings and/or specified herein, including, but not necessarily limited to, the following:

1. Aluminum metal plate wall panels.

1.2 RELATED SECTIONS

A. Section 054000 – Cold-Formed Metal Framing: Wall panel substrates support framing.

B. Section 061643 – Exterior Gypsum Sheathing.

C. Section 072716 – Self-Adhering Air and Water Barriers: Air and moisture barrier required as part of metal wall panel assembly.

D. Section 076200 – Sheet Metal Flashing and Trim: Field formed flashings and other sheet metal work.

E. Section 079200 – Joint Sealants: Perimeter sealant.

1.3 ACTION SUBMITTALS

A. Product Data: Submit for each type of product indicated, include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of metal plate wall panel and accessory.

B. Shop Drawings: Submit fabrication and installation layouts of metal plate wall panels; including details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, accessories, and special details.

1. Provide distinction between factory-assembled, shop-assembled, and field-assembled work.
2. Provide details of following items at full scale.

a. Manufacturer's standard sheet metal trims.
b. Components of wall panel construction, anchorage methods, and hardware.

C. Coordination Drawings: Submit exterior elevations, drawn to scale, that have the following items shown and coordinated with each other, using input from installers of these items as follows:

1. Metal plate wall panels and attachments.
2. Girts.
3. Wall-mounted items including doors, windows, louvers, and lighting fixtures.
4. Penetrations of wall by pipes and utilities.

D. Samples: Submit for each type of exposed finish required, and prepared on samples of size as follows:

1. Aluminum Metal Plate Wall Panels: At least 6 inches by 6 inches for each color.

1.4 INFORMATIONAL SUBMITTALS

A. Manufacturer's recommended installation procedures.

B. Maintenance Data: Submit maintenance data for metal plate wall panels.

C. Manufacturer's Project Acceptance Document: Certification by the manufacturer that its product(s) are approved, acceptable, suitable for use in specific locations, for specific details, and for applications indicated, specified, or required, and that a warranty will be issued.

D. Product Test Reports: Written reports based on evaluation of comprehensive tests performed by qualified testing agency indicating that each product complies with requirements.

E. Field Quality Control Reports: Written report of testing and inspection required by "Field Quality Control".

F. Qualification Data:

1. For firms and persons specified in "Quality Assurance" to demonstrate their capabilities and experience. Include list of completed projects.

G. Warranty: Sample of warranty.

1. Provide manufacturer's written warranty covering materials and installation (labor) stating obligations, remedies, limitations and exclusions.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with at least five years of documented experience.

B. Installer: Company specializing in performing work of this section and approved by manufacturer.

1. Install system in strict compliance with manufacturer’s installation instructions.
2. Any deviations need to be approved by the Manufacturer’s Representative in writing.

C. Source Limitations: Obtain each type of metal plate wall panel from single source and from single manufacturer.

1.6 MOCK-UPS

A. |Mock-ups: Provide mock-ups to verify selections made under sample submittals and to demonstrate aesthetic effects and to establish quality standards for fabrication and installation.

1. Build mock-up of typical wall panel assembly as shown on Drawings, including corner, supports, attachments, and accessories.

a. Include at least four panels to represent a four-way panel joint and showing full thickness.

2. Water Spray Test: Conduct water-spray test of mock-up metal panel assembly, test water penetration in accordance with AAMA 501.2.
3. Approval of mock-ups does not constitute approval of deviation from Contract Documents within mock-ups unless these deviations are approved by Architect in writing.
4. Subject to compliance with requirements, approved mock-ups may not become part of completed Work if undisturbed upon Date of Substantial Completion. Location of mock-up on site to be determined jointly between the Contractor and Architect.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Replacements: In the event of damage, immediately make all repairs and replacements necessary.

B. Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.

C. Storage and Handling: Store materials in clean, dry, interior area in accordance with manufacturer's instructions.

D. Deliver panels, components, and other manufactured items without damage or deformation.

E. Protect panels during transportation, handling, and installation from weather, excessive temperatures and construction operations.

F. Handle panels in strict compliance with manufacturer's instructions and recommendations, and in a manner to prevent bending, warping, twisting, and surface damage.

1. Store panels vertically with top of panel down, storage of panels horizontally is not permitted.

G. Store panels covered with suitable weather tight and ventilated covering.

H. Provide storage of panels to ensure dryness, with positive slope for drainage of moisture.

I. Do not store panels in contact with other materials that might cause staining, denting, or other surface damage.

J. Remove strippable protective covering from zinc alloy panel only after installation.

1.8 SITE CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of this Work to be performed according to manufacturer's installation instructions and warranty requirements.

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

1. Coordinate with construction schedule.

1.9 PRE-INSTALLATION CONFERENCE

A. Pre-Installation Conference: Before Work begins, conduct conference at Project site.

1. Participants:

a. Architect.
b. Contractor, including superintendent.
c. Installer, including project manager and supervisor.
d. If requested, Manufacturer's qualified technical representative.
e. Installers of other construction interfaced with Work.

2. Minimum Agenda: Installer shall demonstrate understanding of the Work required by describing detailed procedures for preparing, installing, and cleaning the Work. Demonstration shall include, but not be limited to, following topics:

a. Tour representative areas of Work, inspect and discuss condition of substrate, and other preparatory work performed by other trades.
b. Review Contract Document requirements.
c. Review approved submittals.
d. Review inspection and testing requirements.
e. Review environmental conditions and procedures for coping with unfavorable conditions.
f. Resolve deviations or differences between Contract Documents and the manufacturer's specifications.

3. Record discussions, including decisions and agreements, and prepare report.

1.10 WARRANTY

A. Wall System Warranty: Provide wall panel manufacturer warranty, agreeing to correct defects in manufacturing of materials within one year period after Date of Substantial Completion.

1. Failures include, but are not limited to, the following:

a. Structural failures, including rupturing, cracking, or puncturing.
b. Deterioration: Beyond normal weathering of wall system metals and other materials.

B. Panel Material Warranty: Provide panel material manufacturer warranty, agreeing to repair metal plate wall panels that show evidence of corrosive deterioration within specified warranty period.

1. Finish Warranty Period: 10 years from Date of Substantial Completion.
2. Warranty Coverage: In accordance with AAMA 2605 for 70 percent PVDF resin on aluminum finish requirements.

a. Fading, Loss of Color Retention: Loss of 5 Delta E units (Hunter) or less, in accordance with ASTM D2244.
b. Chalking, Chalky White Powder on Panel Surface: Chalking at No. 8 or less for colors, or No. 6 for white, in accordance with ASTM D4214.
c. Loss of Adhesion: Loss of 10 percent due to cracking, checking or peeling, or failure to adhere to bare metal.
d. Gloss Retention: 50 percent or less in accordance with ASTM D523.
e. Salt Spray, Accelerated: At least 4,000 hours in accordance with ASTM B117.
f. Humidity Testing, Accelerated: At least 4,000 hours in accordance with ASTM D2247.

C. Installer's Warranty: Furnish installer's written workmanship warranty signed by an authorized representative using installer's standard form agreeing to provide labor required to repair or replace work which exhibits workmanship defects. "Defects" is defined to include but not limited to deterioration or failure to perform as required.

1. Warranty Period: Installer shall warrant the installation to be free from workmanship Defects for a period of 2 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Dri-Design – Aluminum Metal Plate Wall Panels System.

1. Address: 12480 Superior Court, Holland, Michigan 49424.
2. Mailing Address: P.O. Box 1286, Holland, Michigan 49422.
3. Phone: (616) 355-2970; Website: www.dri-design.com.

2.2 PERFORMANCE REQUIREMENTS

A. Metal Plate Wall Panel Assemblies: Comply with performance requirements without failure due to defective manufacturing, fabrication, installation, or other construction defects.

B. Design, fabricate, and erect a dry joint, pressure equalized rainscreen zinc alloy wall panel system without use of sealants, gaskets, or butyl tape, tested as installed in compliance with AAMA 508, and as follows:

1. Cyclic Static Air Pressure Differential: Pass cycled pressure loading at 25 psf in 100 three-second cycles in accordance with ASTM E1233/E1233M.
2. Air Infiltration: Pass when tested at 1.57 psf (25 mph) in accordance with ASTM E283/E283M.
3. Water Penetration:

a. Static: Pass water penetration test under 6.24 psf positive static air pressure difference for at least 15 minutes with 5 gallons per sf per hour of water applied in accordance with ASTM E331.
b. Dynamic: Pass water penetration test under 6.24 psf dynamic pressure difference for at least 15 minutes with 5 gallons per sf per hour of water applied in accordance with AAMA 501.1.

4. Structural: Provide systems tested in accordance with ASTM E330/E330M and certified to be without permanent deformation or failure of structural members.

C. High Velocity Hurricane Zone (HVHZ): Comply with ASTM E8/E8M test methods and performance requirements of Florida Building Code and Miami-Dade County test protocols TAS-202 and TAS-203 for HVHZ with at least plus 61 psf to minus 80 psf design pressure rating.

1. Application: For aluminum plate thickness of at least 0.080 inch, 12 gauge.

2.3 MATERIALS

A. Aluminum Plate: Alloy and temper as recommended by manufacturer for application and in compliance with manufacturers design requirements.

1. Aluminum Material: Tension-leveled, flouropolymer PVDF painted finish, 3003-H14 manganese alloy.
2. Thickness: 12 gauge, 0.080 inch, minimum.
3. Weight: Less than 2 lbs. per sf.
4. Finish: Two-Coat Mica Fluoropolymer.

B. Panel Depth: 1 1/4 inch, nominal.

C. Panel Size: As indicated on Drawings.

D. Panel Joints: As indicated on Drawings.

2.4 FABRICATION

A. Fabricate and finish wall panels within manufacturer’s facilities and fulfill indicated performance requirements demonstrated by laboratory testing.

1. Comply with indicated profiles and with dimensional and structural requirements.

B. Provide post-finishing of panels, paint aluminum wall panels only after completion of panel fabrication and ensure exposed edges are coated.

C. Provide post anodizing of panels, anodize aluminum wall panels only after completion of panel fabrication and ensure exposed edges are anodic coated without crazing of surface at formed edges.

2.5 FINISHES

A. Comply with NAAMM's - Metal Finishes Manual for Architectural and Metal Products, for recommendations and classification designation for finishes.

B. Superior Performance Organic Coating System: AAMA 2605 multiple coat, thermally cured polyvinylidene fluoride (PVDF) resin system.
   1. Two-Coat Mica Fluoropolymer: AAMA 2605, fluoropolymer finish with suspended mica flakes containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pre-treat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' installation instructions.

C. Field Touch-Up Materials: As recommended by coating manufacturer for field application.

2.6 ACCESSORIES

A. Metal Plate Wall Panel Accessories: Provide components required for a complete metal plate wall panel assembly including trim, copings, fascia, mullions, sills, corner units, flashings, and similar items. Match material and finish of panels unless otherwise indicated.

B. Provide integral drainage system and manufactures standard extrusions at termination of dissimilar materials.

C. Flashing and Trim: Match material, finish, and color of adjacent wall panels.

   1. Thickness: At least 18 gauge, 0.040 inch.
   2. See Section 076200 for additional information.

D. Panel Fasteners: Designed to withstand design loads, with at least 7/16 inch diameter head and neoprene washer.

   1. Material: Provide stainless steel fasteners, or coated fastener approved by panel manufacturer or project wall consultant.

E. Sub-Girts: Galvanized, provide size and gauge in accordance with project requirements.

   1. Furring Channel: Provide Hat, C, U or Z type as recommended by manufacturer.
   2. Flat Strap: Steel sheet at least 14 gauge, 0.0747 inch thick.
   3. See Section 054000 for additional information.

F. Substrate Wall Sheathing: Plywood, PS 1, Grade C-D, Exposure I, at least 5/8 inch thick.

   1. Refer to Drawings and see Section 061000 for additional information.

G. Weather Barriers: Provide climate specific weather barrier with performance characteristics for air penetration, water vapor transmission, and water penetration resistance.

   1. See Section 072716 for additional information.

H. Sealants: As recommended by metal panel manufacturer for openings within wall panels and perimeter conditions.

   1. See Section 079200 for additional information.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, and Work areas and conditions with Installer present for compliance with requirements for installation tolerances, wall panel supports, and other conditions affecting performance of this Work.

B. Examine wall framing to verify that girts, angles, channels, studs, and other structural wall panel support members and anchorage have been installed within alignment tolerances required by wall panel manufacturer.

C. Verify that weather barrier has been installed over sheathing or substrate to prevent air infiltration or water penetration.

D. Examine rough-in for components and systems penetrating wall panels to coordinate actual penetration locations relative to wall panel joint locations prior to installation.

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

3.2 PREPARATION

A. Miscellaneous Framing: Install sub-girt, base angles, sills, furring, and other wall panel support members and provide anchorage in accordance with ASTM C754 for gypsum panel type substrates and panel manufacturer’s installation instructions.

3.3 INSTALLATION

A. Install wall panels in accordance with manufacturer's installation instructions, including pressure equalized rainscreen installation method and installation guidelines.

1. Wall panels consist of single sheets of metal formed with interlocking gutter and drainage system integral to the panel with single horizontal attachment for dry-joint rainscreen assembly.
2. Use of secondary drainage channels, brackets, support pins, joint sealants or gaskets to manage the drainage of wall panel system is not permitted.
3. Attach wall panels using progressive interlocking method, engaging bottom of panel in top of previous panel working bottom up, and left to right.
4. Install wall panels with single top attachment in pre-punched holes to allow individual panels to move due to thermal expansion.
5. Do not compromise internal gutter.

B. Install wall panels for orientation, sizes, and locations as indicated on Drawings.

C. Install wall panels with proper anchorage and other components for this Work securely in place.

D. Install wall panels with provisions for thermal and structural movement.

E. Install shims to plumb substrates as necessary for installation of wall panels.

F. Install weather tight seals at perimeter of wall panel openings.

1. Test for proper adhesion on small unexposed area of solid surfacing prior to use.
2. See Section 079200 for additional information.

G. Flashing and Trim: Comply with performance requirements, manufacturer's installation guidelines, and SMACNA - Architectural Sheet Metal Manual.

1. Provide concealed fasteners where possible, and set units true to line and level as indicated.
2. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
3. Install flashing and trim as wall panel Work proceeds.

H. Install weather tight escutcheons for pipe and conduit penetrating exterior walls.

I. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action as recommended by wall panel manufacturer.

J. Install attachment system to support wall panels and with provisions to provide a complete weather tight wall system, including sub girts, extrusions, flashings and trim.

1. Include attachment to supports and trims at locations using dissimilar materials.
2. Do not apply sealants to joints, unless noted otherwise on Drawings or Shop Drawings.
3. Install starter extrusion at base course and at cut panel locations.

K. Install accessories with positive anchorage to building and weather tight mounting and provisions for thermal expansion, and coordinate installation with flashings and other components.

1. Install components required for a complete wall panel assembly including trim, copings, flashings and other accessory items.

L. Weather Barrier: Install weather barrier behind wall panels and over substrate in accordance with requirements, and see Section 072716 for additional information.

3.4 TOLERANCES

A. Shim and align wall panel units with installed tolerances of 1/4 inch in 20 feet, non-cumulative, on level, plumb, and location lines as indicated.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing agency to perform field tests and inspections.

B. Water-Spray Test: After installation and in coordination with mock-up requirements, test area of assembly the Owner's Building Commisioning Agent for water penetration in accordance with AAMA 501.2.

3.6 CLEANING

A. Upon completion of wall panel installation, clean finished surfaces as recommended by panel manufacturer.

B. Upon completion of wall panel installation, clear weep holes and drainage channels of obstructions and dirt.

3.7 PROTECTION

A. Protect installed products from damage during subsequent construction.

B. Provide protection of wall panels as necessary due to cleaning of adjacent materials with chemicals that may harm wall panel finish.

C. Replace wall panels damaged or deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION

SECTION 074213.26

ZINC ALLOY METAL PLATE WALL PANELS

PART 1 - GENERAL

1.1 SUMMARY

A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the special function doors as shown on the drawings and/or specified herein, including, but not necessarily limited to, the following:

1. Zinc alloy metal wall panels.

1.2 RELATED SECTIONS

A. Section 054000 – Cold-Formed Metal Framing: Wall panel substrates support framing.

B. Section 061643 – Exterior Gypsum Sheathing.

C. Section 072716 – Self-Adhering Air and Water Barriers: Air and moisture barrier required as part of metal wall panel assembly.

D. Section 076200 – Sheet Metal Flashing and Trim: Field formed flashings and other sheet metal work.

E. Section 079200 – Joint Sealants: Perimeter sealant.

1.3 ACTION SUBMITTALS

A. Product Data: Submit for each type of product indicated, include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of metal plate wall panel and accessory.

B. Shop Drawings: Submit fabrication and installation layouts of metal plate wall panels; including details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, accessories, and special details.

1. Provide distinction between factory-assembled, shop-assembled, and field-assembled work.
2. Provide details of following items at full scale.

a. Manufacturer’s standard sheet metal trims.
b. Components of wall panel construction, anchorage methods, and hardware.

C. Coordination Drawings: Submit exterior elevations, drawn to scale, that have the following items shown and coordinated with each other, using input from installers of these items as follows:

1. Metal plate wall panels and attachments.

2. Girts.
3. Wall-mounted items including doors, windows, louvers, and lighting fixtures.
4. Penetrations of wall by pipes and utilities.

D. Samples: Submit for each type of exposed finish required, and prepared on samples of size as follows:

1. Zinc Alloy Metal Plate Wall Panels: At least 6 inches by 6 inches.

1.4 INFORMATIONAL SUBMITTALS

A. Manufacturer's recommended installation procedures.

B. Maintenance Data: Submit maintenance data for metal plate wall panels.

C. Manufacturer's Project Acceptance Document: Certification by the manufacturer that its product(s) are approved, acceptable, suitable for use in specific locations, for specific details, and for applications indicated, specified, or required, and that a warranty will be issued.

D. Product Test Reports: Written reports based on evaluation of comprehensive tests performed by qualified testing agency indicating that each product complies with requirements.

E. Field Quality Control Reports: Written report of testing and inspection required by "Field Quality Control".

F. Qualification Data:

1. For firms and persons specified in "Quality Assurance" to demonstrate their capabilities and experience. Include list of completed projects.

G. Warranty: Sample of warranty.

1. Provide manufacturer's written warranty covering materials and installation (labor) stating obligations, remedies, limitations and exclusions.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with at least five years of documented experience.

B. Installer: Company specializing in performing work of this section and approved by manufacturer.

1. Install system in strict compliance with manufacturer’s installation instructions.
2. Any deviations need to be approved by the Manufacturer’s Representative in writing.

C. Source Limitations: Obtain each type of metal plate wall panel from single source and from single manufacturer.

1.6 MOCK-UPS

A. |Mock-ups: Provide mock-ups to verify selections made under sample submittals and to demonstrate aesthetic effects and to establish quality standards for fabrication and installation.

1. Build mock-up of typical wall panel assembly as shown on Drawings, including corner, supports, attachments, and accessories.

    a. Include at least four panels to represent a four-way panel joint and showing full thickness.

2. Water Spray Test: Conduct water-spray test of mock-up metal panel assembly, test water penetration in accordance with AAMA 501.2.
3. Approval of mock-ups does not constitute approval of deviation from Contract Documents within mock-ups unless these deviations are approved by Architect in writing.

1.7 Subject to compliance with requirements, approved mock-ups may not become part of completed Work if undisturbed upon Date of Substantial Completion. Location of mock-up on site to be determined jointly between the Contractor and Architect.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Replacements: In the event of damage, immediately make all repairs and replacements necessary.

B. Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.

C. Storage and Handling: Store materials in clean, dry, interior area in accordance with manufacturer's instructions.

D. Deliver panels, components, and other manufactured items without damage or deformation.

E. Protect panels during transportation, handling, and installation from weather, excessive temperatures and construction operations.

F. Handle panels in strict compliance with manufacturer's instructions and recommendations, and in a manner to prevent bending, warping, twisting, and surface damage.

    1. Store panels vertically with top of panel down, storage of panels horizontally is not permitted.

G. Store panels covered with suitable weather tight and ventilated covering.

H. Provide storage of panels to ensure dryness, with positive slope for drainage of moisture.

I. Do not store panels in contact with other materials that might cause staining, denting, or other surface damage.

J. Remove strippable protective covering from zinc alloy panel only after installation.

1.9 SITE CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of this Work to be performed according to manufacturer's installation instructions and warranty requirements.

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

1. Coordinate with construction schedule.

1.10 PRE-INSTALLATION CONFERENCE

A. Pre-Installation Conference: Before Work begins, conduct conference at Project site.

1. Participants:

a. Architect.
b. Contractor, including superintendent.
c. Installer, including project manager and supervisor.
d. If requested, Manufacturer's qualified technical representative.
e. Installers of other construction interfaced with Work.

2. Minimum Agenda: Installer shall demonstrate understanding of the Work required by describing detailed procedures for preparing, installing, and cleaning the Work. Demonstration shall include, but not be limited to, following topics:

a. Tour representative areas of Work, inspect and discuss condition of substrate, and other preparatory work performed by other trades.
b. Review Contract Document requirements.
c. Review approved submittals.
d. Review inspection and testing requirements.
e. Review environmental conditions and procedures for coping with unfavorable conditions.
f. Resolve deviations or differences between Contract Documents and the manufacturer's specifications.

3. Record discussions, including decisions and agreements, and prepare report.

1.11 WARRANTY

A. Wall System Warranty: Provide wall panel manufacturer warranty, agreeing to correct defects in manufacturing of materials within one year period after Date of Substantial Completion.

1. Coverage of warranty includes but is not limited to the following:

a. Structural failures, including rupturing, cracking, or puncturing.
b. Deterioration: Beyond normal weathering of wall system metals and other materials.

B. Panel Material Warranty: Provide panel material manufacturer warranty, agreeing to repair metal plate wall panels that show evidence of corrosive deterioration within specified warranty period.

1. Warranty Period: **10** years from Date of Substantial Completion.

C. Installer's Warranty: Furnish installer's written workmanship warranty signed by an authorized representative using installer's standard form agreeing to provide labor required to repair or replace work which exhibits workmanship defects. "Defects" is defined to include but not limited to deterioration or failure to perform as required.

1. Warranty Period: Installer shall warrant the installation to be free from workmanship Defects for a period of 2 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Dri-Design – Zinc Alloy Metal Plate Wall Panels System.

1. Address: 12480 Superior Court, Holland, Michigan 49424.
2. Mailing Address: P.O. Box 1286, Holland, Michigan 49422.
3. Phone: (616) 355-2970; Website: www.dri-design.com.

B. Zinc Alloy Plate Material Supplier:

1. VM Building Solutions; Product Architectural Zinc, VMZINC.
2. Website: www.vmbuildingsolutions.com/en/.

2.2 PERFORMANCE REQUIREMENTS

A. Metal Plate Wall Panel Assemblies: Comply with performance requirements without failure due to defective manufacturing, fabrication, installation, or other construction defects.

B. Design, fabricate, and erect a dry joint, pressure equalized rainscreen zinc alloy wall panel system without use of sealants, gaskets, or butyl tape, tested as installed in compliance with AAMA 508, and as follows:

1. Cyclic Static Air Pressure Differential: Pass cycled pressure loading at 25 psf in 100 three-second cycles in accordance with ASTM E1233/E1233M.
2. Air Infiltration: Pass when tested at 1.57 psf (25 mph) in accordance with ASTM E283/E283M.
3. Water Penetration:

    a. Static: Pass water penetration test under 6.24 psf positive static air pressure difference for at least 15 minutes with 5 gallons per sf per hour of water applied in accordance with ASTM E331.
    b. Dynamic: Pass water penetration test under 6.24 psf dynamic pressure difference for at least 15 minutes with 5 gallons per sf per hour of water applied in accordance with AAMA 501.1.

4. Structural: Provide systems tested in accordance with ASTM E330/E330M and certified to be without permanent deformation or failure of structural members.

2.3 MATERIALS

A. Zinc Alloy Plate: Alloy and temper as recommended by manufacturer for application, Architectural Rolled Zinc, Type 1-Cut from Strip, in accordance with ASTM B69 and manufacturers performance requirements.

1. Thickness: 0.059 inch (1.5 mm), minimum.
2. Tensile Strength: Range of 14 to 38 ksi, in accordance with ASTM B69.
3. Hardness: Range of 54 to 74, in accordance with ASTM E18 test methods for Rockwell Superficial 15T Hardness Scale.

B. Panel Depth: 1 1/4 inch, nominal.

C. Panel Size: As indicated on Drawings.

D. Panel Joints: As indicated on Drawings.

E. Color:

1. Preweathered Zinc:
   a. Anthra Zinc; zinc with black aspect.

2.4 FABRICATION

A. Fabricate and finish wall panels within manufacturer's facilities and fulfill indicated performance requirements demonstrated by laboratory testing.

1. Comply with indicated profiles and with dimensional and structural requirements.

2.5 ACCESSORIES

A. Metal Plate Wall Panel Accessories: Provide components required for a complete metal plate wall panel assembly including trim, copings, fascia, mullions, sills, corner units, flashings, and similar items. Match material and finish of panels unless otherwise indicated.

B. Provide integral drainage system and manufactures standard extrusions at termination of dissimilar materials.

C. Flashing and Trim: Match material, finish, and color of adjacent wall panels.

1. Thickness: At least 18 gauge, 0.040 inch.
2. See Section 076200 for additional information.

D. Panel Fasteners: Designed to withstand design loads, with at least 7/16 inch diameter head and neoprene washer.

1. Material: Provide stainless steel fasteners, or coated fastener approved by panel manufacturer or project wall consultant.

E. Sub-Girts: Galvanized, provide size and gauge in accordance with project requirements.

1. Furring Channel: Provide Hat, C, U or Z type as recommended by manufacturer.
2. Flat Strap: Steel sheet at least 14 gauge, 0.0747 inch thick.
3. See Section 054000 for additional information.

F. Substrate Wall Sheathing: Plywood, PS 1, Grade C-D, Exposure I, at least 5/8 inch thick.

1. Refer to Drawings and see Section 061000 for additional information.

G. Weather Barriers: Provide climate specific weather barrier with performance characteristics for air penetration, water vapor transmission, and water penetration resistance.

1. See Section 072716 for additional information.

H. Sealants: As recommended by metal panel manufacturer for openings within wall panels and perimeter conditions.

1. See Section 079200 for additional information.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, and Work areas and conditions with Installer present for compliance with requirements for installation tolerances, wall panel supports, and other conditions affecting performance of this Work.

B. Examine wall framing to verify that girts, angles, channels, studs, and other structural wall panel support members and anchorage have been installed within alignment tolerances required by wall panel manufacturer.

C. Verify that weather barrier has been installed over sheathing or substrate to prevent air infiltration or water penetration.

D. Examine rough-in for components and systems penetrating wall panels to coordinate actual penetration locations relative to wall panel joint locations prior to installation.

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

3.2 PREPARATION

A. Miscellaneous Framing: Install sub-girt, base angles, sills, furring, and other wall panel support members and provide anchorage in accordance with ASTM C754 for gypsum panel type substrates and panel manufacturer’s installation instructions.

3.3 INSTALLATION

A. Install wall panels in accordance with manufacturer's installation instructions, including pressure equalized rainscreen installation method and installation guidelines.

1. Wall panels consist of single sheets of metal formed with interlocking gutter and drainage system integral to the panel with single horizontal attachment for dry-joint rainscreen assembly.
2. Use of secondary drainage channels, brackets, support pins, joint sealants or gaskets to manage the drainage of wall panel system is not permitted.
3. Attach wall panels using progressive interlocking method, engaging bottom of panel in top of previous panel working bottom up, and left to right.
4. Install wall panels with single top attachment in pre-punched holes to allow individual panels to move due to thermal expansion.
5. Do not compromise internal gutter.

B. Installers to wear gloves and long sleeve shirts to prevent oils on fingers and skin from leaving marks on zinc alloy surfaces.

1. Use mineral oil approved by zinc alloy supplier to remove fingerprints.

C. To limit damage due to galvanic action on metal panels from water flowing over surfaces, install metals in the following order from top to bottom, aluminum, zinc, galvalume, lead, and copper.

D. Install wall panels for orientation, sizes, and locations as indicated on Drawings.

E. Install wall panels with proper anchorage and other components for this Work securely in place.

F. Install wall panels with provisions for thermal and structural movement.

G. Install shims to plumb substrates as necessary for installation of wall panels.

H. Install weather tight seals at perimeter of wall panel openings.

1. Test for proper adhesion on small unexposed area of solid surfacing prior to use.
2. See Section 079200 for additional information.

I. Flashing and Trim: Comply with performance requirements, manufacturer's installation guidelines, and SMACNA - Architectural Sheet Metal Manual.

1. Provide concealed fasteners where possible, and set units true to line and level as indicated.
2. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
3. Install flashing and trim as wall panel Work proceeds.

J. Install weather tight escutcheons for pipe and conduit penetrating exterior walls.

K. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action as recommended by wall panel manufacturer.

L. Install attachment system to support wall panels and with provisions to provide a complete weather tight wall system, including sub girts, extrusions, flashings and trim.

1. Include attachment to supports and trims at locations using dissimilar materials.
2. Do not apply sealants to joints, unless noted otherwise on Drawings or Shop Drawings.
3. Install starter extrusion at base course and at cut panel locations.

M. Install accessories with positive anchorage to building and weather tight mounting and provisions for thermal expansion, and coordinate installation with flashings and other components.

1. Install components required for a complete wall panel assembly including trim, copings, flashings and other accessory items.

N. Weather Barrier: Install weather barrier behind wall panels and over substrate in accordance with requirements, and see Section 072716 for additional information.

3.4 TOLERANCES

A. Shim and align wall panel units with installed tolerances of 1/4 inch in 20 feet, non-cumulative, on level, plumb, and location lines as indicated.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing agency to perform field tests and inspections.

B. Water-Spray Test: After installation and in coordination with mock-up requirements, test area of assembly Owner's Commisioning Agent for water penetration in accordance with AAMA 501.2.

3.6 CLEANING

A. Upon completion of wall panel installation, clean finished surfaces as recommended by panel manufacturer.

B. Clean zinc surfaces of fingerprints immediately with wall panel manufacturer approved mineral oil.

C. Upon completion of wall panel installation, clear weep holes and drainage channels of obstructions and dirt.

3.7 PROTECTION

A. Protect installed products from damage during subsequent construction.

B. Provide protection of wall panels as necessary due to cleaning of adjacent materials with chemicals that may harm wall panel finish.

C. Replace wall panels damaged or deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION

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COOPER UNIVERSITY HEALTH CARE
COOPER UNIVERSITY HOSPITAL - TOWER A
CAMDEN, NEW JERSEY

SECTION 074243

COMPOSITE METAL PANELS

PART 1 - GENERAL

1.1 SUMMARY

A. Price as alternate No. 1B

B. Section Includes: Factory-formed composite metal panels and supplementary items necessary for installation.

C. Related Requirements:

1. Refer to Division 01 Section Field Test for Air and Water Leakage.
2. Refer to Owner Building Enclosure Commissioning Plan for Field Observations and Performance Testing Activities.

1.2 DEFINITIONS

A. Metal Panel Assembly: Metal panels, attachment system components, miscellaneous metal framing, and accessories necessary for a complete panel system.

1.3 DELEGATED ENGINEERING REQUIREMENTS

A. Contract Documents Design Intent: Drawings and Specifications indicate design intent for products and systems and do not necessarily indicate or specify total Work required. Contract Documents shall not be construed as an engineered design; furnish and install all Work required for a complete installation.

B. Delegated Engineering Responsibility: Contractor shall employ a qualified professional engineer to provide engineering for products and systems including attachment to building structure required to meet design intent of Contract Documents.

1. Preparation of structural analysis data including engineering calculations, shop drawings and other submittals signed and sealed by the qualified professional engineer.

C. Delegated Engineering Professional Qualifications: Professional engineer legally authorized to practice in jurisdiction where Project is located and experienced in providing engineering services of kind indicated for products and systems similar to this Project and has a record of successful in-service performance.

D. Coordination of Contract Documents and Work:

1. Product Variations: In the event of minor differences between products and systems of acceptable or available manufacturers, Contractor shall notify Architect of such differences and resolve conflicts in a timely manner. Failure of Contractor to provide notification shall be construed as acceptance of conditions indicated, and changes caused by minor differences between products and Contract Documents shall be included in the Work at no additional cost to Owner.
2. Allowable Adjustments: Minor dimension and profile adjustments may be made in interest of fabrication or erection methods or techniques or ability to satisfy design intent, provided design intent is maintained as determined by Architect. Proposed deviations shall include a detailed analysis of impact to adjacent substrates or other building systems, including related design or construction cost impacts. If accepted by Architect, deviations causing changes in materials, constructability, substrates, or conditions shall be included in the Work at no additional cost to Owner

1.4 ACTION SUBMITTALS

A. Product Data: Manufacturer's technical literature for each product and system indicated.

1. Include manufacturer's specifications for materials, finishes, construction details, installation instructions, and recommendations for maintenance.

B. Shop Drawings: Show details of fabrication and installation, including plans, elevations, sections, details of components and attachments to other work. Distinguish between shop and field-assembled work. Include the following:

1. Show fabrication and installation layouts of metal panels.
2. Show details of edge conditions, side-seam and end-lap joints, panel profiles, corners, anchorages, trim, flashings, closures, and terminations.
3. Show details for securing metal panel assembly, including layout of fasteners and other attachments.
4. Show details of panel penetrations.
5. Show details of connections to adjoining work.
6. Indicate where and how the system deviates from Contract Documents.
7. Shop drawings shall contain seal of a professional engineer currently registered in licensing jurisdiction of the project and a written statement that the framing system conforms to project requirements, applicable codes, and specified conditions.
8. Provide for information only, material properties and other information needed for structural analysis including computations, prepared, signed, or, and sealed by a professional engineer licensed to practice in the jurisdiction where the project is located.
9. Submittal shall contain statement explaining how proposed system design will accommodate infiltrated and condensate water.
10. Design Modifications: If design modifications are proposed to meet performance requirements and field conditions, submit design calculations and Shop Drawings. Do not adversely affect the appearance, durability, or strength of units when modifying details or materials and maintain the general design concept.

C. Coordination Drawings: Exterior elevations drawn to scale and coordinating penetrations and wall-mounted items. Show the following:

1. Panel assembly and attachments.
2. Girts and framing.
3. Wall-mounted items including doors, windows, louvers, and lighting fixtures.

4. Penetrations of wall panels by pipes and utilities.

D. Samples for Verification Purposes: For each type of exposed finish required, prepared on samples of size indicated below.

1. Metal Panels: 12 in (300 mm) long by actual panel width. Include fasteners, closures, and other metal panel accessories.
2. Trim and Closures: 12 in (300 mm) long. Include fasteners and other exposed accessories.
3. Accessories: 12 in (300 mm) long samples for each type of accessory.
4. Exposed Gaskets: 12 in (300 mm) long.
5. Exposed Sealants: For each type and color of joint sealant required. Install joint sealants in 1/2 in (12 mm) wide joints formed between two 6 in (150 mm) long strips of material matching the appearance of metal-faced composite panels adjacent to joint sealants.

1.5 INFORMATIONAL SUBMITTALS

A. Manufacturer's Project Acceptance Document: Certification by the manufacturer that its product(s) are approved, acceptable, suitable for use in specific locations, for specific details, and for applications indicated, specified, or required, and that a warranty will be issued.

B. Delegated Engineering Calculations: Informational submittal for products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation; test reports are not acceptable substitute for calculations.

C. Product Test Reports: Written reports based on evaluation of comprehensive tests performed by qualified testing agency indicating that each product complies with requirements.

1. Submit NFPA 285 Compliance Report for assemblies used on this Project.

D. Field Quality Control Reports: Written report of testing and inspection required by "Field Quality Control".

E. Warranty:

1. Provide manufacturer's written warranty covering materials and installation (labor) stating obligations, remedies, limitations and exclusions.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: To include in maintenance manuals.

1.7 QUALITY ASSURANCE

A. Installer/Fabricator Qualifications:

1. Experience: Installer's personnel with not less than 5 years of experience in the successful performance of Work similar to scope of this Project.
2. Supervision: Installer shall maintain a competent supervisor at Project while the Work is in progress, and who has not less than 5 years of experience installing products and systems similar to scope of this Project

3. Manufacturer Acceptance: Installer/fabricator shall be certified, approved, licensed, or acceptable to manufacturer to install products.

1.8 MOCKUPS

A. Mock-ups: Prior to fabrication and installation, build mock-up for each form of construction and finish required to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution. Build mock-up using materials indicated for the completed Work.

1. Build mock-up in the location and of the size indicated or, if not indicated, as directed by Architect. Contractor shall provide structural support framework.

    a. Show typical components, attachments to building structure, and requirements of installation.

2. Notify Architect seven days in advance of the dates and times when mock-up will be installed.
3. Obtain Architect's acceptance of mock-ups before starting fabrication or installation.
4. Acceptance of mock-ups does not constitute acceptance of deviations from the Contract Documents contained in mock-ups unless such deviations are specifically noted by Contractor and accepted by Architect in writing.
5. Demolish and remove mock-ups when directed by Architect unless accepted to become part of the completed Work

1.9 PRE-INSTALLATION CONFERENCE

A. Pre-Installation Conference: Before Work begins, conduct conference at Project site.

1. Participants:

    a. Architect.
    b. Contractor, including superintendent.
    c. Installer/fabricator, including project manager and supervisor.
    d. If requested, Manufacturer's qualified technical representative.
    e. Installers of other construction interfaced with Work.
    f. Testing agency.

2. Minimum Agenda: Installer shall demonstrate understanding of the Work required by describing detailed procedures for preparing, installing, and cleaning the Work. Demonstration shall include, but not be limited to, following topics:

    a. Tour representative areas of Work, inspect and discuss condition of substrate, and other preparatory work performed by other trades.
    b. Review Contract Document requirements.
    c. Review approved submittals.
    d. Review inspection and testing requirements.
    e. Review environmental conditions and procedures for coping with unfavorable conditions.
    f. Resolve deviations or differences between Contract Documents and the manufacturer's specifications.

3. Record discussions, including decisions and agreements, and prepare report.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, sheets, metal panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.

B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.

D. Retain strippable protective covering on metal panel for period of metal panel installation.

1.11 PROJECT CONDITIONS

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

B. Field Measurements: Where products and systems are indicated to fit walls and other construction, verify dimensions by field measurements before fabrication.

1.12 COORDINATION

A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.

1.13 WARRANTY

A. Manufacturer's Warranty: Furnish manufacturer's written material and labor warranty signed by an authorized representative using manufacturer's standard form agreeing to furnish materials and labor required to repair or replace work which exhibits material defects caused by manufacture or design of product. "Defects" are defined to include but not limited to deterioration or failure to perform as required.

1. Coverage of warranty includes but is not limited to the following:

a. Structural failures including, but not limited to, excessive deflection.
b. Noise or vibration created by wind and thermal and structural movements.
c. Deterioration or delamination of metals and other materials beyond normal weathering.

2. Warranty Period: Manufacturer shall warrant the products to be free from material and labor Defects for a period of 5 years from date of Substantial Completion

B. Installer/Fabricator Warranty: Furnish installer/fabricator's written workmanship warranty signed by an authorized representative using installer/fabricator's standard form agreeing to provide labor required to repair or replace work which exhibits workmanship defects. "Defects" is defined to include but not limited to deterioration or failure to perform as required.

1. Warranty Period: Installer/fabricator shall warrant the installation to be free from workmanship Defects for a period of 2 years from date of Substantial Completion.

C. Factory Applied Finish Warranty for Fluoropolymer Finishes: Furnish manufacturer written warranty signed by an authorized representative using manufacturer's standard form agreeing to repair finish or replace work which exhibits finish defects. "Defects" is defined to include but not limited to deterioration or failure of finish to perform as required.

1. Coverage includes, but is not limited to, the following:

a. Color fading more than 5 Delta E units when tested according to ASTM D2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Warranty Period: Manufacturer shall warrant the installation to be free from finish defects for a period of 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS AND PRODUCTS

A. Acceptable Manufacturers: Subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of manufacturers listed. If not listed, submit as substitution according to the Conditions of the Contract and Division 01 Section "Substitution Procedures".

1. Alcoa Inc.
2. Alucobond, division of 3A Cpmposites USA, Inc.
3. ALPOLIC, division of Mitsubishi Plastic Composites America, Inc.
4. Larson, by Alucoil North America.

B. Basis of Design (Product Standard): Contract Documents are based on products and systems specified to establish a standard of quality. Other manufacturers offering products having equivalent characteristics may be considered, provided deviations are minor and comply with requirements of Contract Documents as judged by the Architect.

2.2 MATERIALS, GENERAL

A. Single Source Responsibility: Furnish each type of product from single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials.

2.3 PERFORMANCE REQUIREMENTS, EXTERIOR PANELS

A. General Performance: Comply with performance requirements specified, as determined by testing of products and systems representing those indicated for this Project, without failure due to defective manufacture, fabrication, installation, or other defects in construction.

B. Structural Loads: Engineer products and systems to withstand loads within limits of allowable working stresses of the materials involved under conditions indicated including, but not limited to gravity, wind, seismic, and erection design loads and thermal movements established by authorities having jurisdiction, applicable building codes, and as indicated.

1. Wind Loads: As indicated on Drawings or Wind Analysis Report.
2. Other Loads: As indicated on Drawings.

C. Structural Movement: Engineer system to withstand movements of supporting structure including, but not limited to inter-story drift, twist, column shortening, long-term creep and deflection from uniformly distributed and concentrated live loads:

1. Live Load Deflection: Accommodate differential vertical deflection of floors:

a. Deflection: As indicated on Drawings.

2. Inter-story Drift: Accommodate inter-story drift between adjacent floors perpendicular and/or parallel to the wall:

a. Design Displacement: As indicated on Drawings.

D. Seismic Performance: Systems shall withstand the effects of earthquake motions determined in accordance with ASCE/SEI 7, the building code and authorities having jurisdiction.

E. Deflection of Framing Members and Panels: At design wind pressure.

1. Deflection of Framing Members Normal to Wall Plane (Panel Perimeter): Limited to 1/175 of clear span.
2. Deflection of Panels: For short side panel edge dimension (L), limit center-of-panel deflection to not greater than L/100 or 1 in (25mm), whichever is less.

F. Structural-Test Performance: Provide metal panel assemblies capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated, based on testing according to ASTM E 1592 or ASTM E 330 as follows:

1. When tested at 150 percent of positive and negative wind-load design pressures, assemblies, including anchorage, do not evidence material failures, structural distress, and permanent deformation of main framing members exceeding 0.2 percent of span.

G. Water Penetration under Static Pressure: Test in accordance with ASTM E 331 as follows:

1. No evidence of water penetration for the system when tested in accordance with a minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not less than 12 lbf/sf (576 Pa).

H. Energy Performance:

1. Air Leakage: Test in accordance with ASTM E 283 as follows.

a. Air leakage for the system of not more than 0.06 cfm/sf (0.30 L/s/sm) at a minimum static-air-pressure differential of 6.24 lbf/sf (300 Pa) when tested in accordance with ASTM E 283.

I. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes:

1. Temperature Change (Range): 120 deg F (49 deg C), ambient; 180 deg F (82 deg C), material surfaces.
2. Thermal Cycling: No buckling, damaging stresses, damaging loads on fasteners, and other detrimental effects.

J. Fire Propagation Characteristics: Composite metal panel system complies with and passes NFPA 285 Standard Method of Test for the Evaluation of Fire Propagation Characteristics of Exterior Non-Load Bearing Wall Assemblies Containing Combustible Components.

K. Dimensional Tolerances: Engineer products and systems to accommodate dimensional tolerances of framing members and adjacent construction.

2.4 COMPOSITE METAL PANELS

A. General: Provide factory-formed and -assembled, metal-faced composite panels fabricated from two metal facings bonded, using no glues or adhesives, to manufacturers solid, extruded thermoplastic core; formed into profile for installation method indicated. Include attachment system components, panel stiffeners and accessories required for a complete system.

1. Fire-Retardant Core: Noncombustible, with the following Class A surface-burning characteristics as determined by testing identical products per ASTM E 84 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:

a. Flame-Spread Index: 25 or less.
b. Smoke-Developed Index: 450 or less.

B. Aluminum-Faced Composite Panels: Formed with 0.020-inch- (0.50-mm-) thick, coil-coated aluminum sheet facings.

1. Panel Thickness: 0.157 inch (4 mm) minimum.
2. Core: Fire retardant.
3. Exterior Finish: Fluoropolymer finish.

a. Color: As scheduled or indicated in Design Selections.

2.5 METAL SOFFIT PANELS

A. Composite Metal Soffit Panels: Composite metal panel manufacturer's standard panel for horizontal conditions; meeting same requirements as that for specified vertical panels.

2.6 SUBFRAMING AND PANEL ACCESSORIES

A. Metal Subframing and Furring: Provide manufacturer's standard sections as required for support and alignment of metal panel system.

1. Sub-girts, Zee Clips, Base or Sill Angles or Channels: Manufacturers standard C, U or Z-shaped sections, type as recommended by panel manufacturer.

a. Metallic Coated Steel Sheet: ASTM A792/A792M, Class AZ50 (Class AZM150) aluminum-zinc-alloy coating designation.

1) Thickness: Not less than 0.063 inch, 16 gauge nominal thickness.

b. Aluminum Sheet: Clear anodized sheet, ASTM B209 (ASTM B209M), alloy as standard with manufacturer, with temper as required to suit forming operations and structural performance required.

1) Thickness: Not less than 0.051 inch, 16 gage nominal thickness.

c. Aluminum Extrusions: ASTM B 221 / B 221M, alloy and temper recommended by panel manufacturer for type of use and finish indicated.

B. Composite Metal Hybrid Subframing System: Subframing system consisting of fire retardant polyester resin girts reinforced with integral continuous metal inserts and fasteners designed to integrate cavity insulation and eliminate thermal bridging of subframing and fasteners.

1. Basis of Design: Advanced Architectural Products; SMARTci System GreenGirt CMH Sub-Framing, Z-Girt size as required for insulation thickness indicated.

C. Fasteners for Sub-framing and Furring: Self-tapping screws, bolts, nuts, and other suitable fasteners, Series 300 stainless steel of size, corrosion resistance, holding power, and other properties required to comply with performance requirements.

1. Provide fasteners with EPDM or PVC sealing washers.

D. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.

E. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, bases, drips, sills, jambs, corners, endwalls, framed openings, rakes, fasciae, parapet caps, soffits, reveals, and fillers. Finish flashing and trim with same finish system as adjacent metal composite material panels.

F. Panel Fasteners: Self-tapping screws designed to withstand design loads. Provide exposed fasteners with heads matching color of metal composite material panels by means of plastic caps or factory-applied coating. Provide EPDM or PVC sealing washers for exposed fasteners.

G. Panel Sealants: ASTM C920; silicone sealant; of type, grade, class, and use classifications required to seal joints in panels and remain weathertight; and as recommended in writing by panel manufacturer.

1. Refer to Division 07 Section Joint Sealants.

H. Self-Adhering, High-Temperature Rubberized Asphalt Flashing: Minimum 30 mils to 40 mils (0.76 mm to 1.00 mm) thick, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.

1. Thermal Stability: ASTM D 1970; stable after testing at 240 deg F (116 deg C).
2. Low-Temperature Flexibility: ASTM D 1970; passes after testing at minus 20 deg F (-6.7 deg C).
3. Manufacturers and Products:

a. Carlisle Coatings & Waterproofing; CCW WIP 300HT.
b. GCP Applied Technologies; Ultra.
c. Henry Company; Blueskin PE200 HT.
d. Metal-Fab Manufacturing, LLC; MetShield.
e. Owens Corning; WeatherLock Metal High Temperature Underlayment.

I. Barrier Flashing Tape: Air-barrier manufacturer's standard adhesive and pressure-sensitive adhesive tape. Refer to Division 07 Section Air and Water Barriers.

J. Maintenance Equipment Anchors: As specified in Division 11 Section Building Maintenance Equipment.

2.7 FABRICATION

A. General: Fabricate and finish metal panels and accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

B. Metal-Faced Composite Panels: Trim and square edges of sheets with no displacement of face sheets or protrusion of core material.

1. Form panel lines, breaks, and angles to be sharp and true, with surfaces free from warp and buckle.
2. Fabricate panels with sharply cut edges, with no displacement of face sheets or protrusion of core material.
3. Fabricate panels with panel stiffeners, as required to comply with deflection limits, attached to back of panels with structural silicone sealant or bond tape.
4. Dimensional Tolerances:

a. Panel Bow: 0.8 percent maximum of panel length or width.
b. Squareness: 0.25 in (5 mm) maximum.
c. Components curved to indicated radii.

C. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.

1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
2. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
3. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
4. Sealed Joints: Form non-expansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
5. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
6. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended by metal panel manufacturer.

a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal panel manufacturer for application but not less than thickness of metal being secured.

2.8 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of accepted Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of accepted Samples and are assembled or installed to minimize contrast.

D. Finish Selections: As scheduled or indicated in Design Selections.

2.9 ALUMINUM FINISHES

A. Finish designations comply with the systems established by the Aluminum Association and AAMA / FGIA for designating aluminum finishes.

B. Fluoropolymer Finish: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions. Provide dry film thickness, primers, color coats and clear coats required to comply with performance requirements and warranty periods indicated.

1. PVDF Fluoropolymer Finish: Fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in color coat.
2. FEVE Fluoropolymer Finish: Fluoropolymer finish complying with AAMA 2605 and containing 100 percent fluorinated ethylene vinyl ether (FEVE) resin in color coat.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Acceptance of Surfaces and Conditions: Examine substrates to receive products and systems and associated work for compliance with requirements for installation tolerances, metal panel supports, and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions.

1. Examine wall framing to verify that girts, angles, channels, studs, and other structural panel support members and anchorage have been installed within alignment tolerances required by metal panel manufacturer.
2. Examine wall sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal panel manufacturer.

3. Verify that air- or water-resistive barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.

B. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before metal panel installation.

3.2 INSTALLATION, GENERAL

A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:

1. Respective manufacturer's written installation instructions.
2. Accepted submittals.
3. Contract Documents.

B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by isolating metals and other materials from direct contact with incompatible materials.

3.3 PREPARATION

A. General: Comply with manufacturer's instructions, recommendations and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants, or errors which would result in poor or potentially defective installation or would cause latent defects in Work.

B. Subframing and Supports: Install subframing, subgirts, base angles, closure channels, sills, furring, and other miscellaneous panel support members and anchorages according to ASTM C754 and composite metal panel manufacturer's written recommendations.

3.4 ASSEMBLY INSTALLATION

A. General: Install metal panels and accessories according to manufacturer's written instructions in orientation, sizes, and locations indicated on Drawings.

B. Wall Panels: Install wall panels perpendicular to girts and subgirts unless otherwise indicated. Anchor metal wall panels and other components of the Work securely in place, with provisions for thermal and structural movement.

1. Shim or otherwise plumb substrates receiving metal wall panels.
2. Flash and seal metal wall panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until weather barrier and flashings that will be concealed by metal wall panels are installed.
3. Install screw fasteners in predrilled holes.

    a. Air and Water Barrier: Install a strip of barrier flashing tape behind through-wall attachments that penetrate air and water barrier. Seal all penetrations with weather barrier sealant.

4. Install flashing and trim as metal wall panel work proceeds.
5. Provide weathertight escutcheons for pipe and conduit penetrating exterior walls.

C. Fasteners: Use stainless-steel fasteners.

D. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.

E. Attachment Assembly, General: Install attachment assembly required to support metal composite material panels and to provide a complete weathertight system, including subgirts, perimeter extrusions, tracks, drainage channels, panel clips, and anchor channels.

1. Include attachment to supports, panel-to-panel joinery, panel-to-dissimilar-material joinery, and panel-system joint seals.
2. Do not begin installation until weather barrier and flashings that will be concealed by panels are installed.

F. Installation: Attach metal composite material panels to supports at locations, spacings, and with fasteners recommended by manufacturer to achieve performance requirements specified.

G. Closed Joint Barrier System Installation: Attach panel clips to supports at locations, spacings, and with fasteners recommended by manufacturer. Attach routed-and-returned flanges of panels to panel clips with manufacturer's standard fasteners. Seal joints as indicated on Drawings.

1. Dry Seal Systems: Seal horizontal and vertical joints between adjacent metal composite material panels with manufacturer's standard gasket system.

H. Metal Fascia Panels: Align bottom of panels and fasten with blind rivets, bolts, or self-tapping screws. Flash and seal panels with weather closures where fasciae meet soffits, along lower panel edges, and at perimeter of all openings.

I. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weathertight performance of metal panel assemblies. Provide types of gaskets, fillers, and sealants indicated or, if not indicated, types recommended by metal panel manufacturer.

1. Prepare joints and apply sealants to comply with requirements in Division 07 Section "Joint Sealants".

3.5 ACCESSORY INSTALLATION

A. General: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete metal panel assembly including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.

a. Provide types indicated by metal panel manufacturer; or, if not indicated, provide types recommended in writing by metal panel manufacturer.

B. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

1. Install exposed flashing and trim that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in weathertight and weather-resistant performance.

    a. Install escutcheons for pipe and conduit penetrating exterior walls.

2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 ft (3 m) with no joints allowed within 24 in (600 mm) of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently weather resistant and weathertight, form expansion joints of intermeshing hooked flanges, not less than 1 in (25 mm) deep, filled with mastic sealant (concealed within joints).

3.6 ERECTION TOLERANCES

A. Installation Tolerances: Shim and align metal-faced composite wall panel units within installed tolerance of 1/4 in per 20 ft (6 mm in 6 m), non-accumulative, on level, plumb, and location lines as indicated and within 1/8 in (3 mm) offset of adjoining faces and of alignment of matching profiles.

3.7 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Manufacturer's qualified technical representative shall periodically inspect Work to ensure installation is proceeding in accordance with manufacturer's designs, recommendations, instructions, and warranty requirements. Representative shall submit written reports of each visit indicating observations, findings, and conclusions of inspection.

1. Manufacturer's Technical Representative Qualifications: Direct employee of technical services department of manufacturer with experience in providing recommendations, observations, evaluations, and problem diagnostics

B. Testing Agency: The Owner may employ and pay a qualified independent testing agency to perform field quality control. Materials and installation failing to meet specified requirements shall be replaced at Contractor's expense. Retesting of materials and installations failing to meet specified requirements shall be done at Contractor expense.

1. Refer to Division 01 Section Field Test for Air and Water Leakage.
2. Refer to Owner's Building Enclosure Commissioning Plan for Field Observations and Performance Testing Activities.

C. Metal panels will be considered defective if they do not pass test and inspections.

D. Prepare test and inspection reports.

3.8 CLEANING AND PROTECTION

A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.

B. After metal panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.

C. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

3.9 ARCHITECTURAL METAL FINISH SCHEDULE

A. Finish Color: Duraguard finish, color as selected by Architect from manufacturer's standard colors.

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SECTION 074263

INSULATED-CORE METAL WALL PANELS (ALTERNATE 1B)

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Factory-formed insulated-core metal wall panels and supplementary items necessary for installation.

1.2 DEFINITIONS

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

1.3 DELEGATED ENGINEERING REQUIREMENTS

A. Contract Documents Design Intent: Drawings and Specifications indicate design intent for products and systems and do not necessarily indicate or specify total Work required. Contract Documents shall not be construed as an engineered design; furnish and install all Work required for a complete installation.

B. Delegated Engineering Responsibility: Contractor shall employ a qualified professional engineer to provide engineering for products and systems including attachment to building structure required to meet design intent of Contract Documents.

1. Preparation of structural analysis data including engineering calculations, shop drawings and other submittals signed and sealed by the qualified professional engineer.

C. Delegated Engineering Professional Qualifications: Professional engineer legally authorized to practice in jurisdiction where Project is located and experienced in providing engineering services of kind indicated for products and systems similar to this Project and has a record of successful in-service performance.

D. Coordination of Work:

1. Product Variations: In the event of minor differences between products and systems of acceptable or available manufacturers, Contractor shall notify Architect of such differences and resolve conflicts in a timely manner. Failure of Contractor to provide notification shall be construed as acceptance of conditions indicated, and changes caused by minor differences between products and Contract Documents shall be included in the Work at no additional cost to Owner.
2. Allowable Adjustments: Minor dimension and profile adjustments may be made in interest of fabrication or erection methods or techniques or ability to satisfy design intent, provided design intent is maintained as determined by Architect. Proposed deviations shall include a detailed analysis of impact to adjacent substrates or other building systems, including related design or construction cost impacts. If accepted by Architect, deviations causing changes in materials, constructability, substrates, or conditions shall be included in the Work at no additional cost to Owner.

1.4 ACTION SUBMITTALS

A. Product Data: Manufacturer's technical literature for each product and system indicated.

1. Include manufacturer's specifications for materials, finishes, construction details, installation instructions, and recommendations for maintenance.

B. Shop Drawings: Show details of fabrication and installation, including plans, elevations, sections, details of components and attachments to other work. Distinguish between shop and field-assembled work. Include the following:

1. Show fabrication and installation layouts of metal wall panels.
2. Show details of edge conditions, side-seam and end-lap joints, panel profiles, corners, anchorages, trim, flashings, closures, and terminations.
3. Show details for securing metal wall panel assembly, including layout of fasteners and other attachments.
4. Show details of wall panel penetrations.
5. Show details of connections to adjoining work.
6. Indicate where and how the system deviates from Contract Documents.
7. Shop drawings shall contain seal of a professional engineer currently registered in licensing jurisdiction of the project and a written statement that the framing system conforms to project requirements, applicable codes, and specified conditions.
8. Provide for information only, material properties and other information needed for structural analysis including computations, prepared, signed, or, and sealed by a professional engineer licensed to practice in the jurisdiction where the project is located.
9. Submittal shall contain statement explaining how proposed system design will accommodate infiltrated and condensate water.
10. Design Modifications: If design modifications are proposed to meet performance requirements and field conditions, submit design calculations and Shop Drawings. Do not adversely affect the appearance, durability, or strength of units when modifying details or materials and maintain the general design concept.

C. Coordination Drawings: Exterior elevations drawn to scale and coordinating penetrations and wall-mounted items. Show the following:

1. Wall panel assembly and attachments.
2. Girts and framing.
3. Wall-mounted items including doors, windows, louvers, and lighting fixtures.
4. Penetrations of wall panels by pipes and utilities.

D. Samples for Verification Purposes: For each type of exposed finish required, prepared on samples of size indicated below.

1. Metal Wall Panels: 12 in (300 mm) long by actual panel width. Include fasteners, closures, and other metal wall panel accessories.
2. Trim and Closures: 12 in (300 mm) long. Include fasteners and other exposed accessories.
3. Accessories: 12 in (300 mm) long samples for each type of accessory.
4. Exposed Gaskets: 12 in (300 mm) long.

5. Exposed Sealants: For each type and color of joint sealant required. Install joint sealants in 1/2 in (12 mm) wide joints formed between two 6 in (150 mm) long strips of material matching the appearance of metal-faced composite wall panels adjacent to joint sealants.

1.5 INFORMATIONAL SUBMITTALS

A. Manufacturer's Project Acceptance Document: Certification by the manufacturer that its products and systems are approved, acceptable, suitable for use in specific locations, for specific details, and for applications indicated, specified, or required, and that a warranty will be issued.

B. Delegated Engineering Calculations: Informational submittal for products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation; test reports are not acceptable substitute for calculations.

C. Field Quality Control Reports: Written report of testing and inspection required by ""Field Quality Control".

D. Manufacturer"s Project Acceptance Document: Certification by the manufacturer that its products and systems are approved, acceptable, suitable for use in specific locations, for specific details, and for applications indicated, specified, or required, and that a warranty will be issued.

E. Warranty:

1. Provide manufacturer's written warranty covering materials and installation (labor) stating obligations, remedies, limitations and exclusions.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: To include in maintenance manuals.

1.7 QUALITY ASSURANCE

A. Installer Qualifications:

1. Experience: Installer's personnel with not less than 5 years of experience in the successful performance of Work similar to scope of this Project.
2. Supervision: Installer shall maintain a competent supervisor at Project while the Work is in progress, and who has not less than 5 years of experience installing products and systems similar to scope of this Project.
3. Manufacturer Acceptance: Installer shall be certified, approved, licensed, or acceptable to manufacturer to install products.

B. Mock-ups: Prior to fabrication and installation, build mock-up for each form of construction and finish required to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution. Build mock-up using materials indicated for the completed Work.

1. Build mock-up in the location and of the size indicated or, if not indicated, as directed by Architect. Contractor shall provide structural support framework.

a. Show typical components, attachments to building structure, and requirements of installation.

2. Notify Architect seven days in advance of the dates and times when mock-up will be installed.
3. Obtain Architect's acceptance of mock-ups before starting fabrication or installation.
4. Acceptance of mock-ups does not constitute acceptance of deviations from the Contract Documents contained in mock-ups unless such deviations are specifically noted by Contractor and accepted by Architect in writing.
5. Demolish and remove mock-ups when directed by Architect unless accepted to become part of the completed Work.

1.8 PRE-INSTALLATION CONFERENCE

A. Pre-Installation Conference: Before Work begins, conduct conference at Project site.

1. Participants:

a. Architect.
b. Contractor, including superintendent.
c. Installer, including project manager and supervisor.
d. If requested, Manufacturer's qualified technical representative.
e. Installers of other construction interfaced with Work.

2. Minimum Agenda: Installer shall demonstrate understanding of the Work required by describing detailed procedures for preparing, installing, and cleaning the Work. Demonstration shall include, but not be limited to, following topics:

a. Tour representative areas of Work, inspect and discuss condition of substrate, and other preparatory work performed by other trades.
b. Review Contract Document requirements.
c. Review approved submittals.
d. Review inspection and testing requirements.
e. Review environmental conditions and procedures for coping with unfavorable conditions.
f. Resolve deviations or differences between Contract Documents and the manufacturer's specifications.

3. Record discussions, including decisions and agreements, and prepare report.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, sheets, metal wall panels, and other manufactured items so as not to be damaged or deformed. Package metal wall panels for protection during transportation and handling.

B. Unload, store, and erect metal wall panels in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack metal wall panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal wall panels to ensure dryness, with positive slope for drainage of water. Do not store metal wall panels in contact with other materials that might cause staining, denting, or other surface damage.

D. Retain strippable protective covering on metal wall panel for period of metal wall panel installation.

1.10 PROJECT CONDITIONS

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

B. Field Measurements: Where products and systems are indicated to fit walls and other construction, verify dimensions by field measurements before fabrication.

1.11 COORDINATION

A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.

1.12 WARRANTY

A. Manufacturer's Warranty: Furnish manufacturer's written material and labor warranty signed by an authorized representative using manufacturer's standard form agreeing to furnish materials and labor required to repair or replace work which exhibits material defects caused by manufacture or design and installation of product. "Defects" is defined to include but not limited to deterioration or failure to perform as required.

1. Failures include, but are not limited to, the following:

a. Structural failures including, but not limited to, excessive deflection.
b. Noise or vibration created by wind and thermal and structural movements.
c. Deterioration of metals and other materials beyond normal weathering.
d. Water penetration through fixed panels.

2. Warranty Period: Manufacturer shall warrant the products to be free from material and labor Defects for a period of 5 years from date of Substantial Completion

B. Installer's Warranty: Furnish installer's written workmanship warranty signed by an authorized representative using installer's standard form agreeing to provide labor required to repair or replace work which exhibits workmanship defects. "Defects" is defined to include but not limited to deterioration or failure to perform as required.

1. Warranty Period: Installer shall warrant the installation to be free from workmanship Defects for a period of 2 years from date of Substantial Completion.

C. Factory Applied Finish Warranty for High-Performance Fluoropolymer Finishes: Furnish manufacturer's written warranty signed by an authorized representative using manufacturer's standard form agreeing to repair finish or replace work which exhibits finish defects. "Defects" is defined to include but not limited to deterioration or failure of finish to perform as required.

1. Coverage includes, but is not limited to, the following:

   a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
   b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
   c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Warranty Period: Manufacturer shall warrant the installation to be free from finish defects for a period of 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

A. Acceptable Manufacturers and Products: Subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of manufacturers listed. If not listed, submit as substitution according to the Conditions of the Contract and Division 01 Section "Substitution Procedures".

1. CENTRIA Architectural Systems
2. Industrial Building Panels (IBP)
3. Metl-Span, an NCI Building System Company.

B. Basis of Design (Product Standard): Contract Documents are based on products and systems specified to establish a standard of quality. Other manufacturers offering products having equivalent characteristics may be considered, provided deviations are minor and comply with requirements of Contract Documents as judged by the Architect.

2.2 MATERIALS, GENERAL

A. Single Source Responsibility: Furnish each type of product from single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials.

2.3 PERFORMANCE REQUIREMENTS

A. General Performance: Engineer products and systems to withstand loads within limits of allowable working stresses of the materials involved under conditions indicated and without permanent deformation or failure of materials.

B. Design Loads: Engineer to withstand design loads including, but not limited to, gravity, wind, seismic, and erection design loads and thermal movements established by authorities having jurisdiction, applicable local building codes and as indicated.

1. Structural Movement: Engineer to withstand movements of structure including, but not limited to, drift, twist, column shortening, long-term creep and deflection from uniformly distributed and concentrated live loads. Contractor shall obtain required design data and identify movements accommodated on submittal drawings.

C. Delegated Design: Design metal wall panel assembly, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

D. Structural-Test Performance: Provide metal wall panel assemblies capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated, based on testing according to ASTM E 1592 or ASTM E 330 as follows:

1. When tested at positive and negative wind-load design pressures, assemblies do not evidence deflection no greater than 1/240 of the span.
2. When tested at 150 percent of positive and negative wind-load design pressures, assemblies, including anchorage, do not evidence material failures, structural distress, and permanent deformation of main framing members exceeding 0.2 percent of the clear span.

E. Air Infiltration: Air leakage through assembly of not more than 0.06 cfm/sf (0.30 L/s/sm) of wall area when tested according to ASTM E 283 at a static-air-pressure difference of 6.24 lbf/sf (300 Pa).

F. Water Penetration under Static Pressure: No evidence of water penetration through fixed panels and framing areas when tested according to ASTM E 331 at a minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not less than 12 lbf/sf (576 Pa).

G. Water Penetration under Dynamic Pressure: No evidence of water penetration through fixed panels and framing areas when tested according to AAMA 501.1 at dynamic pressure equal to 20 percent of positive wind-load design pressure, but not less than 12 lbf/sf (576 Pa).

H. Thermal Movements: Engineer products and systems to accommodate thermal movements of supporting elements resulting from the following maximum change (range) in ambient and surface temperatures without buckling, damaging stresses, damaging loads on fasteners, failure of operating units to function properly, and other detrimental effects.

1. Temperature Change (Range): 120 deg F (49 deg C), ambient; 180 deg F (82 deg C), material surfaces.

I. Dimensional Tolerances: Engineer products and systems to accommodate dimensional tolerances of framing members and adjacent construction.

2.4 METAL WALL PANEL MATERIALS

A. Metallic-Coated Steel Sheet: Restricted flatness steel sheet metallic coated by the hot-dip process and pre-painted by the coil-coating process to comply with ASTM A 755 / A 755M.

1. Provide one of the following:

a. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653 / A 653M, G90 (Z275) coating designation; structural quality.
b. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792 / A 792M, Class AZ50 coating designation, Grade 40 (Class AZM150 coating designation, Grade 275); structural quality.

2. Surface: Smooth and flat.
3. Exposed Coil-Coated Finish: Fluoropolymer finish as specified elsewhere in this Section.

4. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mils (0.013 mm).

B. Foam Insulation: Closed cell, modified isocyanurate or polyurethane foam using a non-CFC blowing agent, foamed-in-place type, with maximum flame-spread index of 25 and smoke-developed index of 450.

1. Closed-Cell Content: 90 percent when tested according to ASTM D 2856.

2.5 INSULATED-CORE METAL WALL PANELS

A. General: Provide factory-formed and -assembled metal wall panels fabricated from two metal facing sheets and insulation core factory-foamed in place during fabrication, and with joints between panels designed to form weathertight seals. Include accessories required for weathertight installation.

1. Panel Performance:

a. Flatwise Tensile Strength: 30 psi (207 kPa) when tested according to ASTM C 297.
b. Humid Aging: Volume increase not greater than 6.0 percent and no delamination or metal corrosion when tested for 7 days at 140 deg F (60 deg C) and 100 percent relative humidity according to ASTM D 2126.
c. Heat Aging: Volume increase not greater than 2.0 percent and no delamination, surface blistering, or permanent bowing when tested for 7 days at 200 deg F (93 deg C) according to ASTM D 2126.
d. Cold Aging: Volume decrease not more than 1.0 percent and no delamination, surface blistering, or permanent bowing when tested for 7 days at minus 20 deg F (-6.7 deg C) according to ASTM D 2126.
e. Fatigue: No evidence of delamination, core cracking, or permanent bowing when tested to a 20-lbf/sf (958-kPa) positive and negative wind load and with deflection of L/180 for 2 million cycles.
f. Autoclave: No delamination when exposed to 2-psi (13.8-kPa) pressure at a temperature of 212 deg F (100 deg C) for 2-1/2 hours.
g. Fire-Test-Response Characteristics: Provide metal wall panels and system components with the following fire-test-response characteristics as determined by testing identical panels and system components per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify products with appropriate markings of applicable testing agency.

1) Fire-Resistance Characteristics: Provide materials and construction tested for fire resistance per ASTM E 119.
2) Intermediate-Scale Multistory Fire Test: Tested mockup, representative of completed multistory wall assembly of which wall panel is a part, complies with NFPA 285 for test method and required fire-test-response characteristics of exterior non-load-bearing wall panel assemblies.
3) Radiant Heat Exposure: No ignition when tested according to NFPA 268.
4) Potential Heat: Acceptable level when tested according to NFPA 259.

5) Surface-Burning Characteristics: Provide wall panels with flame-spread index of 25 or less and smoke-developed index of 450 or less, per ASTM E 84.
6) Label: Affix on the back of each panel a label identifying the manufacturer's or distributer's identification, model number, serial number or definitive information describing the product or materials' performance characteristics and approved agency's identification.

2. Foam Insulation-Core Performance:

a. Density: 2.0 to 2.6 lb/cf (32 to 42 kg/cu m) when tested according to ASTM D 1622.
b. Compressive Strength: Minimum 20 psi (138 kPa) when tested according to ASTM D 1621.
c. Shear Strength: 26 psi (179 kPa) when tested according to ASTM C 273.

B. Concealed-Fastener Insulated-Core Metal Wall Panels: Formed with tongue-and-groove panel edges; designed for sequential installation by interlocking panel edges and mechanically attaching panels to supports using concealed clips or fasteners.

1. CENTRIA, Formawall Dimension Series Insulated Core Metal Wall Panels

a. Fluoropolymer Two-Coat System: 0.8 mil primer with 0.8 mil 70 percent PVDF fluoropolymer color coat, AAMA 621: Duraguard

2. Thickness 3"
3. Length and finish: smooth - 16-feet max.
4. Include all accessories for a conplete and water tight system as part of the alternate 1B.

C. Panel Coverage: 36 in (915 mm) nominal and 11-1/4 in (285 mm) nominal alternating.

2.6 METAL WALL PANEL ASSEMBLY ACCESSORIES

A. General: Provide components approved by metal wall panel manufacturer and as required for a complete assembly including trim, corner units, closures, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal wall panels, unless otherwise indicated.

1. Closures: Provide closures fabricated of same metal as metal wall panels.
2. Closure Strips: Closed-cell, expanded, cellular, rubber or cross-linked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1 in (25 mm) thick, flexible closure strips; cut or pre-molded to match metal wall panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
3. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.

B. Formed Flashing and Trim: Match material, thickness, and color of metal wall panel face sheets.

C. Extrusion Trim: Provide manufacturer-provided extruded trim for the following locations and as indicated on Drawings:

1. Base trim.
2. Coping.
3. Panel installation perimeter.
4. Opening perimeters.

D. Panel Sealants: Provide the following as recommended by metal wall panel assembly manufacturer for installation indicated.

1. Flashing Tape: 4-inch wide self-adhering butyl flashing tape.
2. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, non-sag, nontoxic, non-staining tape 1/2 in (12 mm) wide and 1/8 in (3 mm) thick.
3. Elastomeric Joint Sealant: ASTM C 920; elastomeric silicone polymer sealant; of type, grade, class, and use classifications required to seal exposed joints in metal wall panels and remain weathertight; and as recommended in writing by metal wall panel manufacturer.
4. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for concealed hooked-type expansion joints with limited movement.

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

1. Fasteners for Zinc-Coated or Aluminum-Zinc Alloy-Coated Steel Sheet: Hot-dip galvanized steel according to ASTM A 153 / A 153M, ASTM F 2329, or Series 300 stainless steel.

F. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, or cold-applied asphalt emulsion complying with ASTM D 1187; compounded for 15 mils (0.4 mm) dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

G. Self-Adhering, High-Temperature Rubberized Asphalt Flashing: Minimum 30 mils to 40 mils (0.76 mm to 1.00 mm) thick, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.

1. Thermal Stability: ASTM D 1970; stable after testing at 240 deg F (116 deg C).
2. Low-Temperature Flexibility: ASTM D 1970; passes after testing at minus 20 deg F (-6.7 deg C).

3. Manufacturers and Products:

   a. Carlisle Coatings & Waterproofing; CCW WIP 300HT.
   b. Grace Construction Products, a unit of W. R. Grace & Co.; Ultra.
   c. Henry Company; Blueskin PE200 HT.
   d. Metal-Fab Manufacturing, LLC; MetShield.
   e. Owens Corning; WeatherLock Metal High Temperature Underlayment.

H. Barrier Flashing Tape: Air-barrier manufacturer's standard adhesive and pressure-sensitive adhesive tape. Refer to Division 07 Section Air and Water Barriers.

I. Liquid Membrane: Elastomeric, two-component liquid, cold fluid applied, trowel grade or low viscosity provided by waterproofing manufacturer.

2.7 MISCELLANEOUS METAL FRAMING

A. Miscellaneous Metal Framing, General: ASTM C 645, cold-formed metallic-coated steel sheet, ASTM A 653 / A 653M, G90 (Z275) hot-dip galvanized or coating with equivalent corrosion resistance unless otherwise indicated.

B. Subgirts: Manufacturer's standard C- or Z-shaped sections, 0.053 in (16 gage) (1.3 mm) nominal thickness.

C. Base or Sill Angles or Channels: 0.053 in (16 gage) (1.3 mm) nominal thickness.

D. Fasteners for Miscellaneous Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten miscellaneous metal framing members to substrates.

1. CMU and Concrete substraights: Use fasteners appropriate for CMU and concrete.

2.8 FABRICATION

A. General: Fabricate and finish metal wall panels and accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

B. Fabricate metal wall panels in a manner that eliminates condensation on interior side of panel and with joints between panels designed to form weathertight seals.

C. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.

D. Fabricate metal wall panel joints with factory-installed captive gaskets or separator strips that provide a tight seal and prevent metal-to-metal contact, and that will minimize noise from movements within panel assembly.

E. Sheet Metal Accessories: Fabricate flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of item indicated.

1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
2. Seams: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
3. Sealed Joints: Form non-expansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.

4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
5. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended by metal wall panel manufacturer.

    a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal wall panel manufacturer for application but not less than thickness of metal being secured.

2.9 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of accepted Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of accepted Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Acceptance of Surfaces and Conditions: Examine substrates to receive products and systems and associated work for compliance with requirements for installation tolerances, metal wall panel supports, and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions.

1. Examine wall framing to verify that girts, angles, channels, studs, and other structural panel support members and anchorage have been installed within alignment tolerances required by metal wall panel manufacturer.
2. Examine wall sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal wall panel manufacturer.
3. Verify that weather-resistant sheathing paper has been installed over sheathing or backing substrate to prevent air infiltration or water penetration.

B. Examine roughing-in for components and systems penetrating metal wall panels to verify actual locations of penetrations relative to seam locations of metal wall panels before metal wall panel installation.

3.2 INSTALLATION, GENERAL

A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:

1. Respective manufacturer's written installation instructions.
2. Accepted submittals.
3. Contract Documents.

B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by isolating metals and other materials from direct contact with incompatible materials.

3.3 PREPARATION

A. General: Comply with manufacturer's instructions, recommendations and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants, or errors which would result in poor or potentially defective installation or would cause latent defects in Work.

B. Miscellaneous Framing: Install subgirts, base angles, sills, furring, and other miscellaneous wall panel support members and anchorages according to ASTM C 754 and metal wall panel manufacturer's written recommendations.

3.4 WALL PANEL ASSEMBLY INSTALLATION

A. General: Install metal wall panels and accessories according to manufacturer's written instructions in orientation, sizes, and locations indicated on Drawings.

B. Wall Panels: Install wall panels perpendicular to girts and subgirts unless otherwise indicated. Anchor metal wall panels and other components of the Work securely in place, with provisions for thermal and structural movement.

1. Shim or otherwise plumb substrates receiving metal wall panels.
2. Flash and seal metal wall panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until weather barrier and flashings that will be concealed by metal wall panels are installed.
3. Install screw fasteners in predrilled holes.

    a. Air and Water Barrier Sheet Good Substrate: Install a strip of barrier flashing tape behind through-wall attachments that penetrate air and water barrier.

4. Locate and space fastenings in uniform vertical and horizontal alignment.
5. Install flashing and trim as metal wall panel work proceeds.
6. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
7. Apply elastomeric sealant continuously between metal base channel (sill angle) and concrete and elsewhere as indicated or, if not indicated, as necessary for waterproofing.
8. Align bottom of metal wall panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.
9. Provide weathertight escutcheons for pipe and conduit penetrating exterior walls.
10. Apply continuous ribbon of sealant to panel joint on concealed side of insulated-core metal wall panels as vapor seal; apply sealant to panel joint on exposed side of panels for weather seal.
11. Install concealed clips to supports with self-tapping fasteners.

12. Fasten insulated-core metal wall panels to supports with concealed clips at each joint at location and spacing and with fasteners recommended by manufacturer. Fully engage tongue and groove of adjacent panels as recommended by manufacturer.
13. Lap ribbed or fluted sheets one full rib corrugation. Apply panels and associated items for neat and weathertight enclosure. Avoid "panel creep" or application not true to line.
14. Provide metal-backed washers under heads of exposed fasteners on weather side of insulated metal wall panels.
15. Locate and space exposed fasteners in uniform vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of washer.
16. Provide sealant tape at lapped joints of insulated metal wall panels and between panels and protruding equipment, vents, and accessories.
17. Apply a continuous ribbon of sealant tape to panel side laps and elsewhere as needed to make panels weathertight.

C. Fasteners: Use stainless-steel fasteners for surfaces exposed to the exterior; use galvanized steel fasteners for surfaces exposed to the interior.

D. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.

E. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weathertight performance of metal wall panel assemblies. Provide types of gaskets, fillers, and sealants indicated or, if not indicated, types recommended by metal wall panel manufacturer.

1. Seal metal wall panel end laps with double beads of tape or sealant, full width of panel. Seal side joints where recommended by metal wall panel manufacturer.
2. Prepare joints and apply sealants to comply with requirements in Division 07 Section "Joint Sealants".

3.5 ACCESSORY INSTALLATION

A. General: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete metal wall panel assembly including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.

B. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

1. Install exposed flashing and trim that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in weathertight and weather-resistant performance.

2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 ft (3 m) with no joints allowed within 24 in (600 mm) of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently weather resistant and weathertight, form expansion joints of intermeshing hooked flanges, not less than 1 in (25 mm) deep, filled with mastic sealant (concealed within joints).

3.6 ERECTION TOLERANCES

A. Installation Tolerances: Shim and align metal wall panel units within installed tolerance of 1/4 in per 20 ft (6 mm in 6 m), non-accumulative, on level, plumb, and location lines as indicated and within 1/8 in (3 mm) offset of adjoining faces and of alignment of matching profiles.

3.7 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Manufacturer's qualified technical representative shall periodically inspect Work to ensure installation is proceeding in accordance with manufacturer's designs, recommendations, instructions, and warranty requirements. Representative shall submit written reports of each visit indicating observations, findings, and conclusions of inspection.

1. Manufacturer's Technical Representative Qualifications: Direct employee of technical services department of manufacturer with experience in providing recommendations, observations, evaluations, and problem diagnostics.

B. Owner’s Testing Agency Field Service: The Owner may employ and pay a qualified independent testing agency to perform field quality control. Materials and installation failing to meet specified requirements shall be replaced at Contractor's expense. Retesting of materials and installations failing to meet specified requirements shall be done at Contractor’s expense.

1. Before installation of interior finishes, wall panel system shall be tested in accordance with Division 01 Section "Field Test for Water Leakage".

C. Prepare test and inspection reports.

3.8 CLEANING

A. Remove temporary protective coverings and strippable films, if any, as metal wall panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal wall panel installation, clean finished surfaces as recommended by metal wall panel manufacturer. Maintain in a clean condition during construction.

B. After metal wall panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.

C. Replace metal wall panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

3.9 ARCHITECTURAL METAL FINISH SCHEDULE

A. Finish Color: Match Existing.

B. Finish Color: Match Architect's sample.

C. Finish Color: As selected by Architect from manufacturer's standard colors.

D. Finish Color: As selected by Architect from manufacturer's custom colors.

E. Basis of Design: AMFXX

1. Manufacturer:
2. Product Series:
3. Color Name and Number:

END OF SECTION

SECTION 075013

SINGLE-PLY MEMBRANE ROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Single-ply membrane roofing system and supplementary items necessary for installation.

1. Adhered polyvinyl chloride (PVC) roofing system.

B. Related Requirements:

1. Refer to Division 01 Building Enclosure Commissioning for Field Observations and Performance Testing.

1.2 DEFINITIONS

A. Roofing Terminology: Definitions in ASTM D1079 and glossary in NRCA's "The NRCA Roofing Manual: Membrane Roof Systems" apply to work of this Section.

B. Roof Edge Regions: Definitions from ANSI/SPRI ED-1 shall be applicable to this project.

C. PVC: Polyvinyl chloride.

1.3 ACTION SUBMITTALS

A. Product Data: Manufacturer's technical literature for each product and system indicated.

1. Include manufacturer's specifications for materials, finishes, construction details, installation instructions, and recommendations for maintenance.

a. For insulation and roof system component fasteners, include copy of FM Approvals' RoofNav listing.

B. Shop Drawings: Show details of fabrication and installation, including plans, elevations, sections, details of components and attachments to other work. Distinguish between shop and field-assembled work.

1. Show base flashings and membrane terminations.
2. Show layout and thickness of flat insulation.
3. Show layout and thickness of tapered insulation, including slopes.
4. Show crickets and saddles, including slopes.
5. Show roof plan indicating orientation of membrane roofing and fastener spacing.
6. Show insulation and cover board fastening or adhesive patterns for corner, perimeter, and field-of-roof locations.

7. Show cold-applied adhesive pattern for insulation and cover board installation; typical pattern of a 100 square foot area.
8. Include project specific details for typical and non-typical conditions.

C. Samples for Verification Purposes: For the following products:

1. Roofing membrane, 12 in by 12 in (300 mm by 300 mm) square, of color specified, including side and end lap seam.
2. Flashing sheets.
3. Vapor retarder, 12 in by 12 in (300 mm by 300 mm) square.
4. Roof insulation and cover board.
5. Termination bars.
6. Fasteners of each type, length, and finish.
7. Walkways, of color required.

D. Wind Uplift Resistance Submittal: For roofing system, indicating compliance with wind uplift performance requirements.

1.4 INFORMATIONAL SUBMITTALS

A. Manufacturer's Project Acceptance Document: Certification by the manufacturer that its product(s) are approved, acceptable, suitable for use in specific locations, for specific details, and for applications indicated, specified, or required, and that a warranty will be issued.

1. Performance Requirement Certificate: Signed by roof membrane manufacturer, certifying that roofing system complies with Performance Requirements.

a. Submit evidence of compliance with performance requirements.

2. Roofing manufacturer shall review and approve Shop Drawings in writing prior to submission.

B. Field Quality Control Reports: Written report of testing and inspection required by "Field Quality Control".

C. Substrate Surface Temperature Readings at Cold Fluid-Applied Insulation Adhesive: Submit recorded readings when requested.

1. Submit surface temperature readings to roofing manufacturer.

D. Warranty:

1. Provide manufacturer's written warranty covering materials and installation (labor) stating obligations, remedies, limitations and exclusions.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: To include in maintenance manuals.

1.6 QUALITY ASSURANCE

A. Installer Qualifications:

1. Experience: Installer's personnel with not less than 5 years of experience in the successful performance of Work similar in scope of this Project.
2. Supervision: Installer shall maintain a competent supervisor at Project while the Work is in progress, and who has not less than 5 years of experience installing products and systems similar to scope of this Project.
3. Manufacturer Acceptance: Installer shall be certified, approved, licensed or acceptable to manufacturer to install products.

B. Insurance Certification: Assist Owner in preparing and submitting roof installation acceptance certification as necessary in connection with fire and extended-coverage insurance on roofing and associated work.

C. Quality Standards:

1. Unless otherwise recommended by roofing manufacturer, provide roofing system in accordance with recommendations of the NRCA "Roofing and Waterproofing Manual" for roofing type indicated.

1.7 PRE-INSTALLATION CONFERENCE

A. Pre-Installation Conference: Before Work begins, conduct conference at Project site to comply with requirements of applicable Division 01 Sections.

1. Participants:

a. Architect.
b. Contractor, including superintendent.
c. Installer, including project manager and supervisor (superintendent).
d. If requested, Manufacturer's qualified technical representative.
e. Installers of other construction interfaced with Work.

2. Minimum Agenda: Installer shall demonstrate understanding of the Work required by describing detailed procedures for preparing, installing, and cleaning the Work. Demonstration shall include, but not be limited to, following topics:

a. Tour representative areas of Work, inspect and discuss condition of substrate, and other preparatory work performed by other trades.
b. Review Contract Document requirements.
c. Review approved submittals.
d. Review inspection and testing requirements.
e. Review environmental conditions and procedures for coping with unfavorable conditions.
f. Resolve deviations or differences between Contract Documents and the manufacturer’s specifications.
g. Review deck substrate requirements for conditions and finishes, including flatness, presence of moisture, and fastening.
h. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that affects roofing system.
i. Review governing regulations and requirements for insurance and certificates if applicable.
j. Review temporary protection requirements for roofing during and after installation.
k. Review roof observation and repair procedures after roofing installation.

3. Record discussions, including decisions and agreements, and prepare report.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.

B. Store materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored material from direct sunlight.

1. Discard and legally dispose of material that cannot be applied within its stated shelf life.

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

D. Handle and store roofing materials and place equipment in a manner to avoid permanent deflection of deck.

1.9 PROJECT CONDITIONS

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

1.10 COORDINATION

A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.

1.11 WARRANTY

A. Manufacturer's Warranty: Furnish manufacturer's written "Total Roofing System" warranty signed by an authorized representative using manufacturer's standard form, without monetary limitation (NDL), agreeing to repair or replace components of roofing system which exhibit defects in materials or workmanship within specified warranty period. "Defects" is defined to include, but not limited to, deterioration or failure to perform as required.

1. Warranty Wind Speed: Minimum 90-mph Peak Gust Wind Speed.
2. Warranty includes roofing, flashings, adhesives, sealants, insulation, fastener systems, cover board, substrate board, roofing accessories and other components of roofing system.
3. Warranty includes roof edge flashings integral with roofing system as specified in Division 07 Section Sheet Metal Flashing and Trim.
4. Warranty Period: Manufacturer shall warrant the products to be free from material and labor Defects for a period of 20 years from date of Substantial Completion.

B. Installer's Warranty: Furnish installer's written warranty signed by an authorized representative using installer's standard form agreeing to repair or replace components of roofing system which exhibit defects in materials or workmanship within specified warranty period. "Defects" is defined to include, but not limited to, deterioration or failure to perform as required.

1. Warranty includes roofing, flashings, adhesives, sealants, insulation, fastener systems, cover boards, substrate board, roofing accessories, and other components of roofing system.
2. Warranty includes roof edge flashings integral with roofing system as specified in Division 07 Section Sheet Metal Flashing and Trim.
3. Warranty Period: Installer shall warrant the installation to be free from workmanship Defects for a period of 2 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS AND PRODUCTS

A. Acceptable Manufacturers and Products: Subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of manufacturers listed. If not listed, submit as substitution according to the Conditions of the Contract and Division 01 Section Substitution Procedures.

B. Basis of Design (Product Standard): Contract Documents are based on products and systems specified to establish a standard of quality. Other available manufacturers offering products having equivalent characteristics may be considered, provided deviations are minor and comply with requirements of Contract Documents as judged by the Architect.

2.2 MATERIALS, GENERAL

A. Single Source Responsibility: Furnish each type of product from single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials.

2.3 PERFORMANCE REQUIREMENTS

A. General Performance: Installed roofing system and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Roofing system and base flashings shall remain watertight.

1. Accelerated Weathering: Roof membrane shall withstand 2000 hours of exposure when tested according to ASTM G152, ASTM G154, or ASTM G155.
2. Impact Resistance: Roof membrane shall resist impact damage when tested according to ASTM D3746, ASTM D4272/D4272M, or the "Resistance to Foot Traffic Test" in FM Approvals 4470.

B. Material Compatibility: Provide roofing system materials that are compatible with one another under conditions of service and application required, as demonstrated by roofing system manufacturer based on testing and field experience.

C. Wind Uplift Resistance: Design roofing system to resist wind uplift pressures when tested according to FM Approvals 4474, UL 580, or UL 1897. Contractor shall obtain required design data and identify requirements accommodated on submittal drawings.

D. SPRI Wind Design Standard for Edge Systems: Provide edge systems tested in accordance with ANSI/SPRI/FM 4435/ES-1 Wind Test Design Standard for Edge Systems Used with Low Slope Roofing Systems and capable of resisting design pressures.

E. Fire-Test-Response Characteristics: Provide roofing system materials with the fire-test-response characteristics indicated as determined by testing identical products per test method below by UL, FMG, or another testing and inspecting agency acceptable to authorities having jurisdiction. Materials shall be identified with appropriate markings of applicable testing and inspecting agency.

1. Exterior Fire-Test Exposure: ASTM E 108, Class A, for application and roof slopes indicated.
2. Fire-Resistance Ratings: ASTM E 119, for fire-resistance-rated roof assemblies of which roofing system is a part.

2.4 POLYVINYL CHLORIDE (PVC) ROOFING

A. PVC Membrane Roofing System: ASTM D 4434, Type II glass-fiber reinforced or Type III fabric reinforced membrane.

1. Manufacturers and Products:

   a. Carlisle SynTec, Inc.; Sure-Flex KEE HP.
   b. Johns Manville, Inc.; JM PVC - 60 mil MIN.
   c. Sika Sarnafil Inc.; G410 PVC.

2. Membrane Thickness: 60 mils (1.5 mm), minimum.
3. Exposed Face Color: White.

2.5 AUXILIARY ROOFING MATERIALS

A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with other roofing components.

1. Adhesives and Sealants: Comply with VOC limits of authorities having jurisdiction.

B. Sheet Membrane Flashing: Manufacturer's standard sheet flashing membrane, of recommended thickness and compatible with roofing membrane, of same color as roofing membrane, and appropriate for Project roofing application.

C. Clad Sheet Metal Flashing: Manufacturer's standard clad stainless steel flashing, minimum 24 gauge, of same color as roofing membrane

D. Pipe / Stack Flashing: Pre-molded flexible membrane pipe collar with aluminum ring bonded to base as recommended by roofing system manufacturer.

E. Bonding Adhesive: Manufacturer's standard bonding adhesive.

F. Roof Flashing Adhesive: Manufacturer's standard elastomeric contact adhesive for flashing details.

G. Fluid Applied, Reinforced Liquid Flashing: Manufacturer's standard two-component polymethyl-methacrylate-based liquid flashing.

1. Basis of Design: Sika Sarnafil Inc.; Liquid Flashing.

H. Water Cutoff Mastic: Manufacturer's standard butyl mastic sealant.

I. Metal Termination Bars: ASTM A 666, Type 304 formed stainless steel or extruded alloy 6063 aluminum bars; 2 types, one flat and one flat with upper flange shaped to receive sealant, locations as indicated; 1 in by 1/8 in (25 mm by 3 mm) thick; predrilled at 8 in (200 mm) centers; with corrosive resistant fasteners. No plastic bars allowed.

J. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roofing components to substrate, and acceptable to roofing system manufacturer.

1. All fasteners, anchors, nails, straps, bars and other concrete or wood fasteners shall be stainless steel.

K. Miscellaneous Accessories: Preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, lap sealants, termination reglets, and other accessories.

L. Lap Sealant: Manufacturer's standard single-component sealant, color to match roofing membrane.

M. Sealant Pockets (aka Ptich Pans) at Roof Penetrations: Sealant pockets (aka pitch pans) at roofing penetrations are not allowed and will be considered non-conforming work. Refer to drawings for allowable penetration details.

2.6 SUBSTRATE BOARDS FOR FIRE RESISTANCE

A. Substrate Boards for Fire-Resistance: One of the following:

1. Gypsum Substrate Board: ASTM C 1396 / C 1396M, Type X, gypsum board with water-resistant-treated core and with water-repellent paper bonded to core's face, back, and long edges, 5/8 in (15 mm) thick.
2. Glass-Faced Exterior Substrate Board: ASTM C 1177 / C 1177M, Type X, glass-mat, water resistant exterior gypsum sheathing board specifically manufactured for use beneath roofing systems, 5/8 in (15 mm) thick.

a. Manufacturers and Products:

1) Georgia-Pacific Gypsum LLC; DensDeck FireGuard Prime.

3. Exterior Gypsum Substrate Board: ASTM C 1278 / C 1278M, Type X, exterior gypsum sheathing board specifically manufactured for use beneath roofing systems. Non-combustible, cellulosic-fiber-reinforced, moisture-resistant gypsum core, 5/8 in (15 mm) thick.

a. Manufacturers and Products:

1) USG; SECUROCK Gypsum-Fiber Roof Board

2.7 VAPOR RETARDER

A. Self-Adhering-Sheet Vapor Retarder: Minimum 40-mil- (1.0-mm-) composite consisting of self-adhering rubberized asphalt and laminated film backing, maximum permeance rating of 0.1 perm (6 ng/Pa x s x sq. m). Provide primer when recommended by vapor retarder manufacturer.

2.8 ROOF INSULATION

A. General: Preformed roof insulation boards manufactured or approved by roof membrane manufacturer. Comply with requirements of referenced standards, selected from manufacturer's standard sizes and of thicknesses. Provide accessories recommended by insulation manufacturer for intended use and compatible with roofing membrane.

1. Provide insulation thickness required to maintain minimum aged R-value as indicated on the Drawings.
2. Insulation board thickness of individual insulation layers to be 2.6 in (65 mm) maximum.
3. Insulation board size to be 4 ft by 4 ft (1.22 m by 1.22 m) maximum.
4. Provide factory, tapered insulation boards where indicated for sloping to drains. Fabricate with 1/4 in (6 mm) per 12 in (300 mm) (1:48) taper, unless otherwise indicated.
5. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.

B. Polyisocyanurate Board Insulation: ASTM C 1289, Type II, Class 2, Grade 2, coated polymer bonded glass-fiber mat facers on both major surfaces.

1. Compressive Strength: 20 psi (138 kPa).

2.9 INSULATION ACCESSORIES

A. General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatibility with other roofing system components.

B. Cold Fluid-Applied Insulation Adhesive: Insulation manufacturer's recommended adhesive formulated to attach roof insulation to substrate or to another insulation layer as follows:

1. Bead-applied, low-rise, two-component urethane adhesive.

a. Basis of Design (Product Standard): OMG Inc.; Olybond 500.

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

2.10 ROOF COVER BOARDS

A. Roof Cover Boards: ASTM C1177/C1177M, glass-mat, water-resistant gypsum board or ASTM C1278/C1278M fiber-reinforced gypsum board. Provide in maximum lengths and widths available that will minimize short-edge-to-short-edge butt joints and to correspond to support system indicated.

1. Manufacturers and Products:

a. Georgia-Pacific Gypsum LLC; DensDeck Prime.
b. USG; SECUROCK Gypsum-Fiber Roof Board.

2. Thickness: Minimum 1/2 in (12 mm); or as required to meet performance requirements.
3. Thickness at Vertical Cover Boards (Back of Parapet): 5/8 in (16 mm).

2.11 FLEXIBLE WALKWAYS

A. Flexible Walkways: Factory-formed, nonporous, heavy-duty, solid-rubber, slip-resisting, surface-textured walkway pads or rolls, approximately 3/16 in (5 mm) thick, as recommended by roofing system manufacturer.

1. Size: Approximately 36 by 60 inches (914 by 1524 mm).
2. Color: As selected by Architect.

2.12 FLASHING AND SHEET METAL

A. Flashing and Sheet Metal: Refer to Division 07 Section Sheet Metal Flashing and Trim.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Acceptance of Surfaces and Conditions: Examine substrates to receive products and systems and associated work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions, including concrete moisture content, have been corrected in a manner complying with roofing manufacturer recommendations and Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions.

1. Verify that roof openings and penetrations are in place and set and braced and that roof drains are securely clamped in place.
2. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thickness of insulation.
3. Metal Decking Substrates:

a. Verify that surface plane flatness and fastening of steel roof deck complies with requirements in Division 05 Section Steel Roof Decking.

B. Substrate Surface Temperature at Cold Fluid-Applied Insulation Adhesive: Confirm that concrete substrate or substrate board surface temperature is a minimum 50 deg F (10 deg C) prior to application of adhesive.

3.2 INSTALLATION OF ROOFING, GENERAL

A. Start installation of roofing in presence of roofing system manufacturer's technical personnel and Owner's testing and inspection agency, if applicable.

1. Cooperate with testing and inspecting agencies engaged or required to perform services for installing roofing system.

B. Coordinate installation of roofing system so insulation and other components of the roofing system not permanently exposed are not subjected to precipitation or left uncovered at the end of the workday or when rain is forecast.

1. Provide tie-offs at end of each day's work to cover exposed roofing sheets and insulation with a course of coated felt set in roofing cement or hot roofing asphalt, with joints and edges sealed.
2. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system.
3. Remove and discard temporary seals before beginning work on adjoining roofing.

C. Coordinate installation and transition of roofing system component serving as an air barrier with air barrier specified in other sections.

D. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:

1. Respective manufacturer's written installation instructions.
2. Accepted submittals.
3. Contract Documents.

E. Control of Corrosion: Prevent galvanic action and other forms of corrosion by isolating metals and other materials from direct contact with incompatible materials.

3.3 PREPARATION

A. General: Comply with manufacturer's instructions, recommendations, and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants, or errors which would result in poor or potentially defective installation or would cause latent defects in Work.

B. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.

C. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.

3.4 INSTALLATION OF SUBSTRATE BOARDS

A. Install substrate board with long joints in continuous straight lines, with end joints staggered not less than 24 inches (610 mm) in adjacent rows.

1. At steel roof decks, install substrate board at right angle to flutes of deck.

    a. Locate end joints over crests of steel roof deck.

2. Tightly butt substrate boards together.
3. Cut substrate board to fit tight around penetrations and projections, and to fit tight to intersecting sloping roof decks.

3.5 INSTALLATION OF VAPOR RETARDER

A. Vapor Retarder: Install according to roofing system manufacturer's written instructions.

B. Self-Adhering-Sheet Vapor Retarder: Prime substrate if required by manufacturer. Install self-adhering-sheet vapor retarder over area to receive vapor retarder, side and end lapping each sheet a minimum of 3-1/2 and 6 inches (90 and 150 mm), respectively.

1. Extend vertically up parapet walls and projections to a minimum height equal to height of insulation and cover board.
2. Continuously seal side and end laps with tape.

C. Completely seal vapor retarder at terminations, obstructions, and penetrations to prevent air movement into single-ply roofing.

3.6 INSTALLATION OF INSULATION

A. Coordinate installing roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.

B. Install one or more layers of insulation under area of roofing to achieve required thickness. Where overall insulation thickness is 2 in (50 mm) or greater, install 2 or more layers with joints of each succeeding layer staggered from joints of previous layer

C. Comply with roofing system and insulation manufacturer's written instructions for installing roof insulation.

1. Install base layer of insulation with joints staggered not less than 24 inches (610 mm) in adjacent rows.

    a. Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
    b. Make joints between adjacent insulation boards not more than 1/4 inch (6 mm) in width.
    c. Trim insulation so that water flow is unrestricted.
    d. Fill gaps exceeding 1/4 inch (6 mm) with insulation.
    e. Cut and fit insulation within 1/4 inch (6 mm) of nailers, projections, and penetrations.

2. Install upper layers of insulation and tapered insulation with joints of each layer offset not less than 12 inches (305 mm) from previous layer of insulation.

    a. Staggered end joints within each layer not less than 24 inches (610 mm) in adjacent rows.

b. Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
c. Make joints between adjacent insulation boards not more than 1/4 inch (6 mm) in width.
d. Trim insulation so that water flow is unrestricted. Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water.

1) Install tapered insulation under area of roofing to conform to slopes indicated.

e. Fill gaps exceeding 1/4 inch (6 mm) with insulation.
f. Cut and fit insulation within 1/4 inch (6 mm) of nailers, projections, and penetrations.
g. Adhere each layer of insulation to substrate using the following adhesive setting methods in accordance with manufacturer recommendations and performance requirements.

1) Set each layer of insulation in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.
2) Set each layer of insulation in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.

D. Installation Over Metal Decking:

1. Mechanically attach base layer of insulation using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to metal decks.
2. Adhere upper layers of insulation in accordance with manufacturer recommendations and performance requirements.

3.7 INSTALLATION OF COVER BOARDS

A. Install roof cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Offset joints of insulation below a minimum of 6 in (150 mm) in each direction. Loosely butt roof cover boards together.

1. Trim cover board neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
2. At internal roof drains, conform to slope of drain sump.

a. Trim cover board so that water flow is unrestricted.

3. Cut and fit cover board tight to nailers, projections, and penetrations.
4. Adhere cover board to insulation using the following adhesive setting methods in accordance with manufacturer recommendations and performance requirements.

a. Set each layer of insulation in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.
b. Set each layer of insulation in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.

5. Score boards, if necessary, to conform to substrate irregularities. Comply with manufacturer's installation recommendations to insure proper adhesion and adhesive set.

3.8 INSTALLATION OF ADHERED ROOF MEMBRANE

A. Adhere roof membrane over area to receive roofing according to roofing system manufacturer's written instructions.

B. Unroll roof membrane and allow to relax before installing.

C. Accurately align roof membrane and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.

D. Bonding Adhesive: Apply to substrate and underside of roof membrane at rate required by manufacturer and allow to partially dry before installing roof membrane. Do not apply to splice area of roof membrane.

E. In addition to adhering, mechanically fasten roof membrane securely at terminations, penetrations and perimeter of roofing.

F. Apply roof membrane with side laps shingled with slope of roof deck where possible.

G. Seams: Clean seam areas, overlap roofing, and hot-air weld side and end laps of roof membrane and sheet flashings to ensure a watertight seam installation.

1. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of roof membrane and sheet flashings.
2. Verify field strength of seams a minimum of twice daily, and repair seam sample areas.
3. Repair tears, voids, and lapped seams in roof membrane that do not comply with requirements.

H. Spread sealant bed over deck-drain flange at roof drains, and securely seal roof membrane in place with clamping ring.

3.9 INSTALLATION OF BASE FLASHING

A. Install sheet flashings and preformed flashing accessories and adhere to substrates according to roofing system manufacturer's written instructions.

B. Apply bonding adhesive to substrate and underside of sheet flashing at required rate and allow to partially dry. Do not apply bonding adhesive to seam area of flashing.

C. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing.

D. Seams: Clean seam areas and overlap and firmly roll sheet flashings into the adhesive. Heat weld side and end laps to ensure a watertight seam installation.

E. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars.

3.10 INSTALLATION OF WALKWAYS

A. Flexible Walkways: Install walkway products according to manufacturer's written instructions.

1. Provide 6-inch (76-mm) clearance between adjoining pads.
2. Heat weld to substrate or adhere walkway products to substrate with compatible adhesive according to roofing system manufacturer's written instructions.

B. Walkway Locations: Locations as indicated on Drawings and as follows:

1. Perimeter of each rooftop unit.
2. Between each rooftop unit location, creating a continuous path connecting rooftop unit locations.
3. Between each roof hatch and each rooftop unit location or path connecting rooftop unit locations.
4. Top and bottom of each roof access ladder.
5. Between each roof access ladder and each rooftop unit location or path connecting rooftop unit locations.
6. As required by roof membrane manufacturer's warranty requirements.

3.11 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Manufacturer's qualified technical representative shall periodically inspect Work to ensure installation is proceeding in accordance with manufacturer's designs, recommendations, instructions and warranty requirements. Representative shall submit written reports of each visit indicating observations, findings, and conclusions of inspection.

1. Manufacturer's Technical Representative Qualifications: Direct employee of technical services department of manufacturer with experience in providing recommendations, observations, evaluations, and problem diagnostics.

B. Cold Fluid-Applied Insulation Adhesive Manufacturer's Inspection: Manufacturer's qualified technical representative shall periodically inspect Work to ensure installation is proceeding in accordance with manufacturer's designs, recommendations, instructions and warranty requirements. Representative shall submit written reports of each visit indicating observations, findings, and conclusions of inspection.

1. Test Cuts: The cold fluid-applied insulation adhesive manufacturer shall perform field quality control test cuts of the cold fluid-applied insulation adhesive installation.

C. Testing Agency: The Owner may employ and pay a qualified independent testing agency to perform field quality control, including infrared inspections on installed roof assemblies. Materials and installation failing to meet specified requirements shall be replaced at Contractor's expense. Retesting of materials and installations failing to meet specified requirements shall be done at Contractor's expense.

1. Infrared Thermography: Testing agency shall survey entire roof area using infrared color thermography according to ASTM C1153.

a. Perform tests before overlying construction is placed.
b. After infrared scan, locate specific areas of leaks by electrical capacitance/impedance testing or nuclear hydrogen detection tests.
c. After testing, repair leaks, repeat tests, and make further repairs until roofing and flashing installations are watertight.

1) Cost of retesting is Contractor's responsibility.

d. Testing agency shall prepare survey report of initial scan indicating locations of entrapped moisture, if any.

2. Refer to Division 01 Building Enclosure Commissioning for Field Observations and Performance Testing.

D. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion, in presence of Architect, and to prepare inspection report.

E. Repair or remove and replace components of roofing system where inspections indicate that they do not comply with specified requirements.

F. Roofing system will be considered defective if it does not pass tests and inspections.

G. Additional testing and inspecting, at Contractor's expense, will be performed to determine if replaced or additional work complies with specified requirements.

3.12 REPAIR, CLEANING, AND PROTECTION

A. Protect roofing system from damage and wear during remainder of construction period. When remaining construction will not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.

B. Correct deficiencies in or remove roofing system that does not comply with requirements, repair substrates and repair or reinstall roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.

C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION

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SECTION 076200

SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Flashing and sheet metal including but not limited to the assemblies listed below along with supplementary items necessary for installation:

1. Manufactured reglets with counterflashing.
2. Formed low-slope roof sheet metal fabrications.
3. Formed wall and embedded flashing.
4. Formed equipment support flashing.
5. Formed overhead-piping safety pans.

B. Related Requirements:

1. Refer to Owner Building Enclosure Commissioning Plan for Field Observations and Performance Testing Activities.
2. Refer to Division 6 Section "Rough Carpentry" for wood nailers, curbs, and blocking.
3. Refer to Division 7 Section for set-on-type curbs, equipment supports, roof hatches, vents, and other manufactured roof accessory units.
4. Refer to Division 7 Section "Expansion Control" for manufactured sheet metal expansion-joint covers.

1.2 DELEGATED ENGINEERING REQUIREMENTS FOR COPINGS AND ROOF EDGE FLASHINGS

A. Contract Documents Design Intent: Drawings and Specifications indicate design intent for products and systems and do not necessarily indicate or specify total Work required. Contract Documents shall not be construed as an engineered design; furnish and install all Work required for a complete installation.

B. Delegated Engineering Responsibility: Contractor shall employ a qualified professional engineer to provide engineering for products and systems including attachment to building structure required to meet design intent of Contract Documents.

1. Preparation of structural analysis data including engineering calculations, shop drawings and other submittals signed and sealed by the qualified professional engineer.

C. Delegated Engineering Professional Qualifications: Professional engineer legally authorized to practice in jurisdiction where Project is located and experienced in providing engineering services of kind indicated for products and systems similar to this Project and has a record of successful in-service performance.

D. Coordination of Work:

1. Product Variations: In the event of minor differences between products and systems of acceptable or available manufacturers, Contractor shall notify Architect of such differences and resolve conflicts in a timely manner. Failure of Contractor to provide notification shall be construed as acceptance of conditions indicated, and changes caused by minor differences between products and Contract Documents shall be included in the Work at no additional cost to Owner.
2. Allowable Adjustments: Minor dimension and profile adjustments may be made in interest of fabrication or erection methods or techniques or ability to satisfy design intent, provided design intent is maintained as determined by Architect. Proposed deviations shall include a detailed analysis of impact to adjacent substrates or other building systems, including related design or construction cost impacts. If accepted by Architect, deviations causing changes in materials, constructability, substrates, or conditions shall be included in the Work at no additional cost to Owner.

1.3 ACTION SUBMITTALS

A. Product Data: Manufacturer's technical literature for each product and system indicated.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each manufactured product and accessory.
2. Include underlayment materials and sealants.

B. Shop Drawings: For sheet metal flashing and trim.

1. Include plans, elevations, sections, and attachment details.
2. Detail fabrication and installation layouts, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled work.
3. Include identification of material, thickness, weight, and finish for each item and location in Project.
4. Include details for forming, including profiles, shapes, seams, and dimensions.
5. Include details for joining, supporting, and securing, including layout and spacing of fasteners, cleats, clips, and other attachments. Include pattern of seams.
6. Include details of termination points and assemblies.
7. Embedded Flashing: Large-scale details for each element of flashing system showing layout, profiles, methods of joining, and anchorage details; including lintel units, shelf units, corner units, end dam units, conditions showing interface and relationship to adjacent materials, and other special applications.
8. Include details of roof-penetration flashing.
9. Include details of special conditions.
10. Include details of connections to adjoining work.

    a. Include isometric details of saddles, end dams, and other complex flashing conditions.

C. Samples for Verification Purposes: Submit for items listed below; provide samples made from 12 in (300 mm) lengths of full-size components including fasteners, cover joints, accessories, and attachments.

1. Sheet Metal Flashing: 12 in (300 mm) long by actual width of unit, including finished seam and in required profile. Include fasteners, cleats, clips, closures, and other attachments.

2. Trim, Metal Closures, Expansion Joints, Joint Intersections, and Miscellaneous Fabrications: 12 in (300 mm) long and in required profile. Include fasteners and other exposed accessories.
3. Unit-Type Accessories and Miscellaneous Materials: Full-size Sample.
4. Anodized Aluminum Samples: Samples to show full range to be expected for each color required.

1.4 INFORMATIONAL SUBMITTALS

A. Manufacturer's Project Acceptance Document: Certification by the manufacturer that its product(s) are approved, acceptable, suitable for use in specific locations, for specific details, and for applications indicated, specified, or required, and that a warranty will be issued.

1. Provide sealant and underlayment manufacturers certification that their products are compatible with each other, including adhesion.

B. Product Certificates: For each type of coping and roof edge flashing that is ANSI/SPRI/FM 4435/ES-1 tested.

C. Delegated Engineering Calculations: Structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation; test reports are not acceptable substitute for calculations.

D. Product Test Reports: Written reports based on evaluation of comprehensive tests performed by qualified testing agency indicating that each product complies with requirements.

E. Warranty:

1. Provide manufacturer’s written warranty covering materials and installation (labor) stating obligations, remedies, limitations and exclusions.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For sheet metal flashing and trim, and its accessories, to include in maintenance manuals.

1.6 QUALITY ASSURANCE

A. Manufacturer/Fabricator Qualifications: Manufacturer/shop-fabricator with not less than 5 years experience with successful production of products and systems similar to scope of this Project, with a record of successful in-service performance and completion of projects for a period of not less than 5 years, and with sufficient production capability, facilities, and personnel to produce required Work.

1. For copings and roof edge flashings that are ANSI/SPRI/FM 4435/ES-1 tested, shop shall be NRCA listed or shall provide other evidence acceptable to Architect as able to fabricate required details as tested and approved.

B. Installer Qualifications:

1. Experience: Installer's personnel with not less than 5 years of experience in the successful performance of Work similar to scope of this Project.

2. Supervision: Installer shall maintain a competent supervisor at Project while the Work is in progress, and who has not less than 5 years of experience installing products and systems similar to scope of this Project.

C. Mock-ups: Prior to fabrication and installation, build mock-up for each form of construction and finish required to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution. Build mock-up using materials indicated for the completed Work.

1. Build mock-up in the location and of the size indicated or, if not indicated, as directed by Architect. Contractor shall provide structural support framework.

   a. Show typical components, attachments to building structure, and requirements of installation.

2. Notify Architect seven days in advance of the dates and times when mock-up will be installed.
3. Obtain Architect's acceptance of mock-ups before starting fabrication or installation.
4. Acceptance of mock-ups does not constitute acceptance of deviations from the Contract Documents contained in mock-ups unless such deviations are specifically noted by Contractor and accepted by Architect in writing.
5. Demolish and remove mock-ups when directed by Architect unless accepted to become part of the completed Work.

1.7 PRE-INSTALLATION CONFERENCE

A. Pre-Installation Conference: Before Work begins, conduct conference at Project site.

1. Participants:

   a. Architect.
   b. Contractor, including superintendent.
   c. Installer, including project manager and supervisor.
   d. If requested, Manufacturer's qualified technical representative.
   e. Installers of other construction interfaced with Work.

2. Minimum Agenda: Installer shall demonstrate understanding of the Work required by describing detailed procedures for preparing, installing, and cleaning the Work. Demonstration shall include, but not be limited to, following topics:

   a. Tour representative areas of Work, inspect and discuss condition of substrate, and other preparatory work performed by other trades.
   b. Review Contract Document requirements.
   c. Review approved submittals.
   d. Review inspection and testing requirements.
   e. Review environmental conditions and procedures for coping with unfavorable conditions.
   f. Resolve deviations or differences between Contract Documents and the manufacturer's specifications.

3. Record discussions, including decisions and agreements, and prepare report.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver sheet metal flashing materials and fabrications undamaged. Protect sheet metal flashing and trim materials and fabrications during transportation and handling.

B. Unload, store, and install sheet metal flashing materials and fabrications in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack materials on platforms or pallets, covered with suitable weathertight and ventilated covering. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage. Store sheet metal flashing materials and fabrications away from uncured concrete and masonry.

D. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to extent necessary for period of sheet metal flashing and trim installation.

1.9 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit flashing and sheet metal work to be performed according to manufacturer's written instructions and warranty requirements.

B. Field Measurements: Where products and systems are indicated to fit walls and other construction, verify dimensions by field measurements before fabrication.

1.10 COORDINATION

A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.

B. Coordinate sheet metal flashing and trim layout and seams with sizes and locations of penetrations to be flashed, and joints and seams in adjacent materials.

C. Coordinate sheet metal flashing and trim installation with adjoining roofing and wall materials, joints, and seams to provide leakproof, secure, and noncorrosive installation.

1.11 WARRANTY

A. Installer’s Warranty: Furnish installer’s written warranty signed by an authorized representative using installer’s standard form agreeing to repair or replace components of all sheet metal flashing assemblies that exhibit defects in materials or workmanship within specified warranty period. “Defects” is defined to include, but not limited to, deterioration or failure to perform as required.

1. Warranty Period: 2 years from date of Substantial Completion.

B. Factory Applied Finish Warranty: Furnish manufacturer's written warranty signed by an authorized representative using manufacturer's standard form agreeing to repair finish or replace work which exhibits finish defects. "Defects" is defined to include but not limited to deterioration or failure of finish to perform as required.

1. Coverage includes but is not limited to the following:

   a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
   b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
   c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Warranty Period: Manufacturer shall warrant the installation to be free from finish defects for a period of 20 years from date of Substantial Completion.

C. Factory Applied Finish Warranty for Anodic Finishes: Furnish manufacturer's written warranty signed by an authorized representative using manufacturer's standard form agreeing to repair finish or replace work which exhibits finish defects. "Defects" is defined to include but not limited to deterioration or failure of finish to perform as required.

1. Warranty Period: Manufacturer shall warrant the installation to be free from finish defects for a period of 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS AND PRODUCTS

A. Available Manufacturers and Products: Subject to compliance with requirements of Contract Documents as judged by the Architect, manufacturers offering products that may be incorporated into the Work include, but are not limited to, those listed.

1. Manufacturers:

   a. Cheney Flashing Company.
   b. Fry Reglet Corporation.
   c. OMG Edge Systems.
   d. Keystone Flashing Company, Inc.
   e. Petersen Aluminum Corporation.

2.2 MATERIALS, GENERAL

A. Single Source Responsibility: Furnish each type of product from single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials.

2.3 PERFORMANCE REQUIREMENTS

A. General Performance: Comply with performance requirements specified, as determined by testing of products and systems representing those indicated for this Project, without failure due to defective manufacture, fabrication, installation, or other defects in construction.

1. Sheet metal flashing and trim assemblies, including cleats, anchors, and fasteners, shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure.
2. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.

B. Material Compatibility: Provide flashing and sheet metal materials that are compatible with one another and specified roofing system under conditions of service and application required, as demonstrated by manufacturer based on testing and field experience.

C. Structural Loads: Installed sheet metal flashing materials and fabrications shall withstand loads within limits of allowable working stresses of the materials involved under conditions indicated, including but not limited to, requirements established by authorities having jurisdiction and applicable building codes.

1. Wind Loads: As indicated on Drawings.
2. Other Loads: As indicated on Drawings.

D. Sheet Metal Standard for Flashing and Trim: Comply with NRCA's "The NRCA Roofing Manual" and SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.

E. SPRI Wind Design Standard: Manufacture and install copings and roof edge flashings tested according to SPRI ES-1 and capable of resisting the following design pressure:

1. Design Pressure: Refer to Structural Loads.

F. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

2.4 SHEET METALS

A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.

B. Aluminum Sheet: ASTM B 209 (ASTM B 209M), alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required; with smooth, flat surface.

1. Clear Anodic Finish, Coil Coated: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.
2. Color Anodic Finish, Coil Coated: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm or thicker.

a. Color: As scheduled or as indicated in Design Selections.

1) Color Range: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

3. Fluoropolymer Finish: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions. Provide dry film thickness, primers, color coats and clear coats required to comply with performance requirements and warranty periods indicated.

    a. PVDF Fluoropolymer Finish: Fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in color coat.
    b. FEVE Fluoropolymer Finish: Fluoropolymer finish complying with AAMA 2605 and containing 100 percent fluorinated ethylene vinyl ether (FEVE) resin in color coat.

4. Color: As scheduled or as indicated in Design Selections.
5. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with minimum total dry film thickness of 0.5 mil (0.013 mm).

C. Stainless-Steel Sheet: ASTM A 240/A 240M or ASTM A 666, Type 304 , dead soft, fully annealed; with smooth, flat surface.

1. Finish: 2D (dull, cold rolled).

D. Metallic-Coated Steel Sheet:

1. Aluminum-zinc alloy-coated steel sheet according to ASTM A 792/A 792M, Class AZ50 (Class AZM150) coating designation, Grade 40 (Grade 275); prepainted by coil-coating process to comply with ASTM A 755/A 755M.
2. Fluoropolymer Finish: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions. Provide dry film thickness, primers, color coats and clear coats required to comply with performance requirements and warranty periods indicated.

    a. PVDF Fluoropolymer Finish: Fluoropolymer finish complying with AAMA 621 and containing not less than 70 percent PVDF resin by weight in color coat.
    b. FEVE Fluoropolymer Finish: Fluoropolymer finish complying with AAMA 621 and containing 100 percent fluorinated ethylene vinyl ether (FEVE) resin in color coat

3. Color and Gloss: As scheduled or as indicated in Design Selections.
4. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with minimum total dry film thickness of 0.5 mil (0.013 mm).

2.5 UNDERLAYMENT MATERIALS

A. Material Compatibility: Provide underlayment materials that are compatible with substrates and specified roofing system under conditions of service and application required, as demonstrated by manufacturer based on testing and field experience.

B. Self-Adhering, High-Temperature Sheet Underlayment: Minimum 30 mils (0.76 mm) thick, consisting of a slip-resistant polyethylene- or polypropylene-film top surface laminated to a layer of butyl- or SBS-modified asphalt adhesive, with release-paper backing; specifically designed to withstand high metal temperatures beneath metal roofing. Provide primer according to written recommendations of underlayment manufacturer.

1. Thermal Stability: ASTM D 1970; stable after testing at 240 deg F (116 deg C) or higher.
2. Low-Temperature Flexibility: ASTM D 1970; passes after testing at minus 20 deg F (29 deg C) or lower.
3. SBS-Modified Asphalt Adhesive based Manufacturers and Products:

    a. Carlisle Coatings & Waterproofing; CCW WIP 300HT.
    b. GCP Applied Technologies; Ice and Water Shield HT.
    c. Henry Company; Blueskin PE200 HT.
    d. Metal-Fab Manufacturing, LLC; MetShield.
    e. Owens Corning; WeatherLock Metal High Temperature Underlayment.

4. Butyl Adhesive based Manufacturers and Products:

    a. GCP Applied Technologies; Ultra.

5. Primer: Provided by underlayment manufacturer.
6. Underlayment Sealing Tape: Provided by underlayment manufacturer.
7. Sealant: Approved by underlayment manufacturer, compatible with both adhesive and facer of underlayment material.

C. Slip Sheet: If recommended by manufacturer to separate sheet metal from underlayment; rosin-sized building paper, 3 lb/100 sq. ft. (0.16 kg/sq. m) minimum.

2.6 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, solder, protective coatings, sealants, stainless steel draw bands, solid shims and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.

B. Fasteners: Manufacturer's recommended wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.

1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.

    a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed neoprene sealing washers under heads of exposed fasteners bearing on weather side of metal.
    b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
3. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.
4. Fasteners for Aluminum-Zinc Alloy-Coated Steel Sheet: Series 300 stainless steel.

C. Solder:

1. For Stainless Steel: ASTM B 32, Grade Sn60, with acid flux of type recommended by stainless-steel sheet manufacturer.

D. Rubberized-Asphalt Flexible Flashing: Composite flashing product consisting of a pliable, adhesive rubberized-asphalt compound, bonded to a high-density, cross-laminated polyethylene film to produce an overall thickness of not less than 0.040 in (1.02 mm).

1. Manufacturers and Products:

a. Carlisle Coatings & Waterproofing; CCW-705-TWF Thru-Wall Flashing.
b. Dayton Superior Corporation, Dur-O-Wal Division; Dur-O-Barrier Thru-Wall Flashing.
c. GCP Applied Technologies; Perm-A-Barrier Wall Flashing.
d. Heckmann Building Products, Inc.; No. 82 Rubberized-Asphalt Thru-Wall Flashing.
e. Hohmann & Barnard, Inc.; Textroflash.
f. W.R. Meadows, Inc.; Air-Shield Thru-Wall Flashing.
g. Polyguard Products, Inc.; Polyguard 400.

2. Accessories: Provide preformed corners, end dams, other special shapes, and seaming materials produced by flashing manufacturer.

E. Self-Adhering Metal Sheet Membrane Flexible Flashing: Composite flashing product consisting of flexible 2 mil Type 304 or Type 316 stainless steel sheet, butyl adhesive, interlayer, and siliconized release liner.

1. Manufacturers and Products:

a. York Flashing; Self-Adhering Stainless Steel 304 SA or 316 SA.
b. GE Silicone, Inc.; Elemax SS Flashing.
c. VaproShield, Inc.: Vapro-SS Flashing SA.

2. Accessories: Provide sealants and seaming materials produced by flashing manufacturer.

F. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 in (12 mm) wide and 1/8 in (3 mm) thick.

G. Elastomeric Sealant: ASTM C 920, elastomeric silicone polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

H. Sealant for Use at Concealed Joints: Sealant shall be compatible with underlayment materials at interfaces. Contractor's option, one of the following:

1. Butyl: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for expansion joints with limited movement.
2. Silicone: ASTM C 920, single-component, neutral cure silicone sealant.

a. Basis of Design: Dow Corning; 758 Silicone Weather Barrier Sealant.

I. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, or cold-applied asphalt emulsion complying with ASTM D 1187; compounded for 15 mils (0.4 mm) dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

J. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

2.7 FABRICATION, GENERAL

A. General: Custom fabricate sheet metal flashing and trim to comply with details shown and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required.

1. Fabricate sheet metal flashing and trim in shop to greatest extent possible.
2. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
3. Obtain field measurements for accurate fit before shop fabrication.
4. Form sheet metal flashing and trim to fit substrates without excessive oil canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
5. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.
6. Provide one-piece, watertight saddles at corners, ends and transitions between flashing profiles. Saddles shall have 4-inch flanges and seams shall be mechanically fastened. Uncoated metals shall be fully soldered watertight.

B. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 in in 20 ft (6 mm in 6 m) on slope and location lines indicated on Drawings and within 1/8 in (3 mm) offset of adjoining faces and of alignment of matching profiles.

C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at maximum of 10 ft (3 m) with no joints within 24 in (600 mm) of corner or intersection.

D. Sealant Joints: Where movable, non-expansion-type joints are required, form metal to provide for proper installation of elastomeric sealant according to cited sheet metal standard.

E. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.

F. Fabricate cleats and attachment devices of sizes as recommended by cited sheet metal standard and by FM Global Property Loss Prevention Data Sheet 1-49 for application, but not less than thickness of metal being secured.

G. Soldered Seams - Unfinished or Concealed/Embedded Metals: Fabricate nonmoving seams with flat-lock seams except at corners. Rivet soldered joints for strength and solder over rivets. Solder shall flow through and fill the joint.

1. Corners: Shop fabricate, factory mitered corners with continuously welded or soldered seams. Fabricate corners with no joints within 24 in (600 mm) of corner or intersection.

H. Sealant Seams - Prefinished Metals: Fabricate nonmoving seams with flat-lock seams except at corners. Form seams and seal with elastomeric sealant. Rivet joints where necessary for strength.

1. Corners: Shop fabricate, factory mitered corners. Form seams and seal with elastomeric sealant. Fabricate corners with no joints within 24 in (600 mm) of corner or intersection.

I. Copings 12 Inches Wide or Less: Form butted joints with expansion space and 12 in (300 mm) wide, concealed backup plate with double sealant on each side of joint.

J. Copings Over 12 Inches Wide: Form joints of intermeshing hooked flanges, not less than 1 in (25 mm) deep, filled with sealant concealed within joints.

K. Do not use graphite pencils to mark metal surfaces.

2.8 SHEET METAL FLASHING AND TRIM

A. Reglets: Units of type, material, and profile required, formed to provide secure interlocking of separate reglet and counterflashing pieces, and compatible with flashing indicated.

1. Fabricate from the Following Materials, minimum thickness as indicated unless required otherwise to meet performance requirements.

a. Stainless Steel: 0.025 in (0.64 mm) thick.
b. Aluminum, Prefinished: 0.032 in (0.8 mm) thick.

2. Corners: Factory mitered, mechanically clinched and sealed or soldered watertight.
3. Joints: Lapped 4-inches, double seal with sealant.
4. Surface-Mounted Type: Provide with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.
5. Concrete Type: Provide temporary closure tape to keep reglet free of concrete materials, special fasteners for attaching reglet to concrete forms, and guides to ensure alignment of reglet section ends.
6. Masonry Type: Provide with offset top flange for embedment in masonry mortar joint.
7. Accessories:

a. Flexible-Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing or where Drawings show reglet without metal counterflashing.
b. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of counterflashing's lower edge.

8. Finish: With manufacturer's standard color coating, unless indicated otherwise.

2.9 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

A. Copings: Fabricate in minimum 96 in (2400 mm) long, but not exceeding 12 ft (3.6 m) long, sections. Fabricate joint plates of same thickness as copings. Furnish with continuous cleats to support edge of external leg and interior leg or drill elongated holes for fasteners on interior leg as indicated on drawings.

1. Profile: As indicated on Drawings, according to SMACNA's "Architectural Sheet Metal Manual."

2. Fabricate from the Following Materials, minimum thickness as indicated unless required otherwise to meet performance requirements.

   a. Aluminum, Prefinished: 0.050 in (1.25 mm) thick.
   b. Aluminum-Zinc Alloy-Coated Steel, Prefinished: 0.040 in (1.0 mm) thick.

3. Corners: Factory mitered and mechanically clinched and sealed or soldered watertight.
4. Joints:

   a. Copings 12 Inches Wide or Less: Form butted joints with expansion space and 12 in (300 mm) wide, concealed backup plate with double sealant on each side of joint.
   b. Copings Over 12 Inches Wide: Form joints of intermeshing hooked flanges, not less than 1 in (25 mm) deep, filled with sealant concealed within joints.

B. Manufactured Roof Expansion Joint Cover Systems:

1. Refer to Division 07 Section "Expansion Control" for manufactured roof expansion joint covers.

C. Counterflashing: Manufactured units of heights to overlap top edges of base flashings by 4 in (100 mm) and in lengths not exceeding 12 ft (3.6 m) designed to snap into through-wall-flashing receiver and compress against base flashings with joints lapped. Shop fabricate interior and exterior corners. Fabricate from the following materials, minimum thickness as indicated unless required otherwise to meet performance requirements.

1. Aluminum, Prefinished: 0.032 in (0.8 mm) thick.
2. Stainless Steel: 0.025 in (0.64 mm) thick.
3. Corners: Factory mitered and mechanically clinched and sealed or soldered watertight.
4. Joints: Lapped 4-inches, double seal with sealant.

   a. Offset counter-flashing joints 6-inches from flashing receiver joints.

D. Flashing Receivers: Fabricate from same materials as counterflashing.

E. Roof-Penetration Flashing: Fabricate from the following materials:

1. Aluminum, Prefinished: 0.032 in (0.8 mm) thick.

F. Pre-Engineered Roof Penetration Housing: Heavy gauge aluminum, pre-insulated, multi-penetration housing assembly with flanged curb and proprietary weather-tight silicone exit seals. Size and configuration as required for number and types of penetrations indicated.

1. Basis of Design: Roof Penetration Housings; Vault AWI Series and Exit Seals.

2.10 EMBEDDED FLASHING FABRICATIONS

A. Fabricate continuous flashings in sections 8 ft (2.4 m) long minimum, but not exceeding 12 ft (3.6 m). Provide splice plates at joints of formed, smooth metal flashing.

1. Fabricate from the following materials:

a. Stainless Steel: 0.025 in (0.64 mm) thick.

2. Shop form flashing on a bending brake.
3. Shape, trim and hand seam on bench as far as practical with proper tools.
4. Make angle bends and folds for interlocking metal with full regard for expansion and contraction to avoid buckling or fullness in metal after installation.
5. Form materials to shape indicated with straight lines, sharp angles and smooth curves.
6. Fold and hem exposed edges of flashings.

B. Flashing Joinery: Fabricate interior and exterior corners, intersections, and complex flashing conditions in shop, rather than in field, with properly folded, constructed and mechanicaly fastened continuous soldered joints. Field fabricated units are not permitted and will not be allowed

2.11 MISCELLANEOUS SHEET METAL FABRICATIONS

A. Equipment Support Flashing: Fabricate from the following materials:

1. Aluminum, Prefinished: 0.032 in (0.8 mm) thick.

B. Overhead-Piping Safety Pans: Fabricate from the following materials:

1. Stainless Steel: 0.025 in (0.64 mm) thick.
2. Aluminum, Prefinished: 0.032 in (0.8 mm) thick.
3. Aluminum-Zinc Alloy-Coated Steel, Prefinished: 0.040 in (1.0 mm) thick.

C. Miscellaneous Flashings:

1. Fabricate to cross section indicated with clips and accessories required for secure watertight installation. Meet recommendations of SMACNA for fabrication details and metal thicknesses.
2. Not-Exposed to Public View: Fabricate from the following materials:

a. Aluminum, Prefinished: 0.032 in (0.8 mm) thick.

3. Concealed By other Construction: Fabricate from the following materials:

a. Stainless Steel: 0.025 in (0.64 mm) thick.

D. Pre-Engineered Wall Penetration Panel: Heavy gauge aluminum, multi-penetration wall panel and proprietary weather-tight silicone exit seals. Size and configuration as required for number and types of penetrations indicated.

1. Basis of Design: Roof Penetration Housings; Wall Vault WV Series and Exit Seals.

2.12 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Acceptance of Surfaces and Conditions: Examine substrates to receive products and systems and associated work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions.

1. Verify compliance with requirements for installation tolerances of substrates.
2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
3. Verify that air- or water-resistant barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.

3.2 INSTALLATION, GENERAL

A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:

1. Respective manufacturer's written installation instructions.
2. Accepted submittals.
3. Contract Documents.

B. Pitch Pockets (aka Pitch Pans) at Roof Penetrations: Pitch pockets (aka pitch pans) at roofing penetrations are not allowed and will be considered non-conforming work. Refer to the drawings for allowable roof penetration details.

3.3 PREPARATION

A. General: Comply with manufacturer's instructions, recommendations, and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants, or errors which would result in poor or potentially defective installation or would cause latent defects in Work.

3.4 UNDERLAYMENT INSTALLATION

A. Self-Adhering Sheet Underlayment:

1. Install self-adhering sheet underlayment, wrinkle free.
2. Prime substrate if recommended by underlayment manufacturer.
3. Comply with temperature restrictions of underlayment manufacturer for installation; use primer for installing underlayment at low temperatures.
4. Apply in shingle fashion to shed water, with end laps of not less than 6 in (150 mm) staggered 24 in (600 mm) between courses.
5. Overlap side edges not less than 3-1/2 in (87 mm).

6. Roll laps and edges with roller.
7. Cover underlayment within 14 days.

B. If recommended by manufacturer, apply slip sheet, wrinkle free, before installing sheet metal flashing and trim at horizontal applications where sheet metal will remain exposed.

1. Install in shingle fashion to shed water.
2. Lap joints not less than 4 inches (100 mm).

3.5 INSTALLATION OF SHEET METAL FLASHING AND TRIM

A. General: Install sheet metal flashing and trim to comply with details indicated and recommendations of cited sheet metal standard that apply to installation characteristics required unless otherwise indicated on Drawings.

1. Install fasteners, solder, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
2. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.

a. Provide uniform, neat seams with minimum exposure of solder and sealant.

3. Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement.
4. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
5. Install continuous cleats with fasteners spaced not more than 12 in (300 mm) apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
6. Install exposed sheet metal flashing and trim with limited oil canning, and free of buckling and tool marks.
7. Torch cutting of sheet metal flashing and trim is not permitted.
8. Do not use graphite pencils to mark metal surfaces.

B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.

1. Coat concealed side of uncoated-aluminum and stainless-steel sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.
2. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.
3. Asphalt Roofing Cement: Bed flanges in thick coat of asphalt roofing cement where required by manufacturer of sheet metal flashing materials and fabrications for waterproof performance.

C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim.

1. When ambient temperature at time of installation is between 40 deg F and 70 deg F (4 deg C and 21 deg C), set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures.

2. Space movement joints at maximum of 10 feet (3 m) with no joints within 24 inches (600 mm) of corner or intersection.
3. Form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with sealant concealed within joints.

D. Fasteners: Use fastener sizes that penetrate substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.

E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.

F. Sealant Joints: Seal joints as required for watertight construction.

1. Use sealant-filled joints at lap joints unless otherwise indicated.

a. Embed hooked flanges of joint members not less than 1 inch (25 mm) into sealant.
b. Form joints to completely conceal sealant.
c. When ambient temperature at time of installation is between 40 and 70 deg F (4 and 21 deg C), set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures.

1) Do not install sealant-type joints at temperatures below 40 deg F (4 deg C).

2. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."

G. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter.

1. Pre-tin edges of sheets with solder to width of 1-1/2 in (38 mm); however, reduce pre-tinning where pre-tinned surface would show in completed Work.
2. Do not solder metallic-coated steel and aluminum sheet.
3. Do not use torches for soldering.
4. Heat surfaces to receive solder, and flow solder into joint.

a. Fill joint completely. Completely remove flux and spatter from exposed surfaces.

5. Mechanically fasten soldered joints.
6. Stainless-Steel Soldering:

a. Tin edges of uncoated sheets, using solder for stainless steel and acid flux.
b. Promptly remove acid flux residue from metal after tinning and soldering.
c. Comply with solder manufacturer's recommended methods for cleaning and neutralization.

H. Rivets: Rivet joints in uncoated metals.

3.6 INSTALLATION OF ROOF FLASHING

A. General: Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and cited sheet metal standard.

1. Provide concealed fasteners where possible, and set units true to line, levels, and slopes.

2. Install work with laps, joints, and seams that are permanently watertight and weather resistant.

B. Copings:

1. Install roof edge flashings in accordance with ANSI/SPRI/FM 4435/ES-1.
2. Anchor to resist uplift and outward forces according to recommendations in cited sheet metal standard unless otherwise indicated.

   a. Interlock exterior bottom edge of coping with continuous cleat anchored to substrate.
   b. Anchor interior leg of coping with washers and screw fasteners through slotted holes at 24-inch (600-mm) centers, unless indicated otherwise on Drawings.

3. Anchor to resist uplift and outward forces in accordance with recommendations in FM Global Property Loss Prevention Data Sheet 1-49 for specified FM Approvals' listing for required windstorm classification.

C. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending minimum of 4 in (100 mm) over base flashing. Install stainless-steel draw band and tighten.

D. Counterflashing: Coordinate installation of counterflashing with installation of base flashing.

1. Insert counterflashing in reglets or receivers and fit tightly to base flashing.
2. Extend counterflashing 4 in (100 mm) over base flashing.
3. Lap counterflashing joints minimum of 4 in (100 mm). Secure in waterproof manner by means of anchor and washer at 12 inches (300 mm) o.c. along perimeter and 6 inches (150 mm) o.c. at corners areas centers unless otherwise indicated.

E. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with sealant and clamp flashing to pipes that penetrate roof.

3.7 INSTALLATION OF WALL FLASHING

A. Install sheet metal wall flashing to intercept and exclude penetrating moisture in accordance with cited sheet metal standard unless otherwise indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.

B. Surface-Mounted Reglets: Install reglets to receive flashings where flashing without embedded reglets is indicated on Drawings. Install at height so that inserted counterflashings overlap 4 in (100 mm) over top edge of base flashings.

3.8 EMBEDDED FLASHINGS

A. General: Drawings may not necessarily indicate or describe full extent of Work required for completion of embedded flashing.

B. Scheduled Locations: In addition to conditions shown on Drawings, install embedded flashings within cavity at following locations to direct downward flow of infiltrated water within cavity to exterior:

1. Shelf angles with end dams at through-wall openings; and with lap joints.
2. Lintels with end dams or laps.
3. Jambs at through-wall openings, full height from sill to head.
4. Penetrations, parapet terminations into adjacent walls and other wall terminations.
5. Other obstructions.

C. Preparation: Substrate surfaces shall be smooth and free from projections that could puncture flashing.

D. Flashing Installation:

1. Install sheet metal flashing true to line and levels indicated; minimize quantity of lap joints by using longest units possible.
2. Set shaped sheet metal units in proper locations with outside hemmed edges flush with building face location indicated; attach cavity side flanges to sheathed steel stud wall with screw fasteners driven into studs.
3. At continuous shelf angles, terminate horizontal flashings at through-wall openings with properly folded and constructed sheet metal end dams, with continuous soldered joints.
4. At lintels, terminate horizontal flashings at end of lintel with properly folded and constructed sheet metal end dams, with continuous soldered joints.
5. At lap joints of horizontal flashings, form neat and aligned joints by interlocking splice plate within hemmed edge of sheet metal flashing profile; apply sealant and rubberized asphalt flashing as indicated to create water-resistant joint.
6. Set shaped sheet metal units at jambs of through-wall openings and lap inside of end dams at horizontal flashings below; coordinate installation with rigid cavity insulation, if applicable.
7. Seal cavity edges of sheet metal flashings within cavity to sheathing with continuous rubberized asphalt flashing.

E. Examination and Repair: Immediately prior to laying exterior veneer, examine exposed surfaces of flashing and seal penetrations and damaged areas with rubberized asphalt flashing material before covering with exterior veneer.

F. Asphalt Mastic Dampproofing Application: Apply continuous layer of product, without pinholes or holidays, at locations as indicated on drawings. Apply at coverage rate instructed by manufacturer.

1. Repair voids and damage. Patch with additional layer of asphalt mastic dampproofing extending 6 in (150 mm) beyond repaired areas in all directions.

3.9 INSTALLATION OF MISCELLANEOUS FLASHING

A. Equipment Support Flashing:

1. Coordinate installation of equipment support flashing with installation of roofing and equipment.
2. Weld or seal flashing with elastomeric sealant to equipment support member.

B. Overhead-Piping Safety Pans:

1. Suspend pans from structure above, independent of other overhead items such as equipment, piping, and conduit, unless otherwise indicated on Drawings.

2. Pipe and install drain line to plumbing waste or drainage system.

3.10 INSTALLATION TOLERANCES

A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 in in 20 ft (6 mm in 6 m) on slope and location lines indicated on Drawings and within 1/8 in (3mm) offset of adjoining faces and of alignment of matching profiles.

3.11 FIELD QUALITY CONTROL

A. Testing Agency: The Owner may employ and pay a qualified independent testing agency to perform field quality control. Materials and installation failing to meet specified requirements shall be replaced at Contractor's expense. Retesting of materials and installations failing to meet specified requirements shall be done at Contractor's expense.

1. Refer to Owner's Building Enclosure Commissioning Plan for Field Observations and Performance Testing Activities.

3.12 CLEANING

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Clean and neutralize flux materials. Clean off excess solder.

C. Clean off excess sealants.

3.13 PROTECTION

A. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of sheet metal flashing and trim installation, remove unused materials and clean finished surfaces as recommended by sheet metal flashing and trim manufacturer. Maintain sheet metal flashing and trim in clean condition during construction.

B. Touchup Painting: Clean abraded or damaged areas of shop paint finish and paint exposed areas with the same material used for shop painting. Touchup finish is to match undamaged finish and extend into retained adjoining finish in a manner that will minimize evidence of touchup.

C. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures, as determined by Architect.

END OF SECTION

SECTION 078116

SPRAYED FIRE-RESISTIVE MATERIALS (SFRM)

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Sprayed fire-resistive materials (SFRM) and supplementary items necessary for installation.

1.2 DEFINITIONS

A. SFRM: Sprayed Fire-Resistive Materials.

B. Concealed: Not visible; hidden by other construction.

C. Exposed: Visible, not hidden by other construction.

D. Direct Moisture: Exposed to wetness, surfaces normally soaked, saturated or regularly exposed to water and or moisture.

1.3 ACTION SUBMITTALS

A. Fire-Rated Assembly Design Classification: Submit documentation issued by testing agency for each fire-rated assembly design selected.

B. Product Data: Manufacturer's technical literature for each product and system indicated.

1. Include manufacturer's specifications for materials, finishes, construction details, installation instructions, and recommendations for maintenance.

a. Sprayed fire-resistive materials.
b. Substrate primers.
c. Bonding agent.
d. Metal lath.
e. Reinforcing fabric.
f. Reinforcing mesh.
g. Sealer and topcoats when applicable.

C. Shop Drawings: Show details of fabrication and installation, including plans, elevations, sections, details of components and attachments to other work.

1. Framing plans and schedules indicating the following.

a. Extent of fire protection for each construction and fire-resistance rating.
b. Applicable fire-resistance design designations of a qualified testing and inspecting agency acceptable to authorities having jurisdiction.
c. Minimum sprayed fire-resistive material thicknesses needed to achieve required fire-resistance rating of each structural component and assembly.

1) Requirements for steel surface preparation.

d. Treatment of sprayed fire-resistive material after application.

1.4 INFORMATIONAL SUBMITTALS

A. Manufacturer's Project Acceptance Document: Certification by the manufacturer that its product(s) are approved, acceptable, suitable for use in specific locations, for specific details, and for applications indicated, specified, or required, and that a warranty will be issued.

1. Product Certificates: For each type of sprayed fire-resistive material.

B. Evaluation Reports: For sprayed fire-resistive material, from ICC-ES.

C. Preconstruction Test Reports: For fire protection.

D. Field Quality Control Reports: Written report of testing and inspection required by "Field Quality Control".

E. Warranty:

1. Provide manufacturer written warranty covering materials and installation (labor) stating obligations, remedies, limitations, and exclusions.

1.5 QUALITY ASSURANCE

A. Installer Qualifications:

1. Experience: Installer's personnel with not less than 5 years of experience in the successful performance of Work similar in scope of this Project.
2. Supervision: Installer shall maintain a competent supervisor at Project while the Work is in progress, and who has not less than 5 years of experience installing products and systems similar in scope of this Project.
3. Manufacturer Acceptance: Installer shall be certified, approved, licensed, or acceptable to manufacturer to install products.

1.6 PRECONSTRUCTION TESTING

A. Preconstruction Adhesion and Compatibility Testing: Test reports indicating compliance with requirements for specified performance and test methods.

1. Bond Strength: Test for cohesive and adhesive strength in accordance with ASTM E736. Provide bond strength indicated in referenced fire-resistance design, but not less than minimum specified in Part 2.
2. Verify that manufacturer, through its own laboratory testing or field experience, attests that primers or coatings are compatible with sprayed fire-resistive material.
3. If additional testing is required, schedule sufficient time for testing and analyzing results to prevent delaying the Work.

1.7 PRE-INSTALLATION CONFERENCE

A. Pre-Installation Conference: Before Work begins, conduct conference at Project site.

1. Participants:

   a. Architect.
   b. Contractor, including superintendent.
   c. Installer, including project manager and supervisor.
   d. If requested, Manufacturer's qualified technical representative.
   e. Installers of other construction interfaced with Work.

2. Minimum Agenda: Installer shall demonstrate understanding of the Work required by describing detailed procedures for preparing, installing, and cleaning the Work. Demonstration shall include, but not be limited to, following topics:

   a. Tour representative areas of Work, inspect and discuss condition of substrate, and other preparatory work performed by other trades.
   b. Review Contract Document requirements.

      1) Review products, design ratings, restrained and unrestrained conditions, thicknesses, and other performance requirements.
      2) Review written patching plan detailing materials and methods used for patching fire-resistive materials damaged during construction.

   c. Review approved submittals.
   d. Review inspection and testing requirements.
   e. Review environmental conditions and procedures for coping with unfavorable conditions.
   f. Resolve deviations or differences between Contract Documents and the manufacturer's specifications.

3. Record discussions, including decisions and agreements, and prepare report.

1.8 FIELD CONDITIONS

A. Environmental Limitations: Apply fire protection when ambient temperature, substrate temperature, and moisture conditions are within range established and recommended by manufacturer. Provide temporary protection and heat to maintain temperature for 24 hours before, during, and for 24 hours after product application.

B. Ventilation: Ventilate building spaces during and after application of fire protection, providing complete air exchanges in accordance with manufacturer's written instructions. Use natural means or, if they are inadequate, forced-air circulation until fire protection dries thoroughly.

1.9 COORDINATION

A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.

1.10 WARRANTY

A. Installer’s Warranty: Furnish installer's written workmanship warranty signed by an authorized representative using installer’s standard form agreeing to provide labor required to repair or replace work which exhibits workmanship defects. "Defects" is defined to include but not limited to deterioration or failure to perform as required.

1. Coverage of warranty includes but is not limited to the following:

   a. Defects or deterioration.
   b. Cracking, flaking, or spalling.
   c. Peeling or delaminating from substrates.
   d. Failure to remain bonded.
   e. Erosion in excess of specified requirements.
   f. Faulty application.

2. Warranty Period: Installer shall warrant the installation to be free from workmanship Defects for a period of 2 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS AND PRODUCTS

A. Acceptable Manufacturers and Products: Subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of manufacturers listed. If not listed, submit as substitution according to the Conditions of the Contract and Division 01 Section "Substitution Procedures".

2.2 MATERIALS, GENERAL

A. Single Source Responsibility: Furnish each type of product from single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials.

2.3 PERFORMANCE REQUIREMENTS

A. General Performance: Comply with performance requirements specified, as determined by testing of products and systems representing those indicated for this Project, without failure due to defective manufacture, fabrication, installation, or other defects in construction.

B. Assemblies: Provide fire protection, including auxiliary materials, in accordance with requirements of each fire-resistance design and manufacturer's written instructions.

   1. Obtain fire protection for each fire-resistance design from single source.

C. Material Compatibility: Primer and sprayed fire-resistive materials shall be compatible with one another and with substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and laboratory analysis.

D. Fire-Resistance Design: Indicated on Drawings, tested in accordance with ASTM E119 or UL 263; testing by a qualified testing agency or listing of other testing agency acceptable to authorities having jurisdiction. Identify products with appropriate markings of applicable testing agency.

   1. Steel members are considered unrestrained unless indicated otherwise.

E. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: 10 or less.
2. Smoke-Developed Index: 10 or less.

F. Asbestos: Provide products containing no detectable asbestos.

2.4 SPRAYED-FIRE RESISTIVE MATERIALS

A. Sprayed Fire-Resistive Material: Manufacturer's standard, factory-mixed, lightweight, dry formulation, complying with indicated fire-resistance design.

1. Products mixed with water at Project site to form a slurry or mortar before conveyance and application

B. Bond Strength: Minimum cohesive and adhesive strength based on field testing in accordance with ASTM E736.

1. Buildings more than 75 ft (22.8 m) up to 420 ft (128 m) in Height: 430-lbf/sq. ft. (20.59-kPa).

C. Density: Not less than density specified in the approved fire-resistance design, in accordance with ASTM E605.

1. Low-Density – Gypsum Binder: 15 pcf (240 k/cu m).
2. Medium-Density - Gypsum Binder: 18 pcf (288 k/cu m).
3. Medium-Density – Cement Binder: 22 pcf (352 k/cu m).
4. High-Density – Cement Binder: 40 pcf (640 k/cu m).

D. Thickness: As required for fire-resistance design indicated, measured in accordance with requirements of fire-resistance design or ASTM E605, whichever is thicker, but not less than 0.375 inch (9 mm).

E. Combustion Characteristics: ASTM E136.

F. Corrosion Resistance: No evidence of corrosion according to ASTM E 937.

G. Deflection: No cracking, spalling, or delamination according to ASTM E 759.

H. Effect of Impact on Bonding: No cracking, spalling, delamination, per ASTM E 760.

I. Air Erosion: Maximum weight loss of 0.025 grams per square foot in 24 hours according to ASTM E 859.

J. Fungal Resistance: Treat products with manufacturer's standard antimicrobial formulation to result in no growth on specimens per ASTM G21.

K. SFRM-02:

1. Interior Locations: Unless a higher bond strength SFRM is scheduled below.

a. Concealed conditions for Buildings more than 75 ft (22.8 m) up to 420 ft (128 m) in height.

b. Exposed conditions for Buildings up to 420 ft (128 m) in height.

2. Low-Density; minimum bond strength of 430-lbf/sq. ft. (20.59-kPa):

a. Grace Construction Products; Monokote MK-10HB.
b. Isolatek International; Cafco 300HS.

3. Medium Density; minimum bond strength of 430-lbf/sq. ft. (20.59-kPa):

a. Carboline Co., Fireproofing Products Div.; Pyrolite 22.
b. Grace Construction Products; Monokote Z106G.
c. Isolatek International; Cafco 400 AC.
d. Southwest Vermiculite Co., Inc.; Type 5MD.

L. SFRM-04 - Medium Density, Portland Cement Binder; minimum bond strength of 1000-lbf/sq. ft. (47.88-kPa):

1. Interior Locations: Unless a higher bond strength SFRM is scheduled below.

a. Exposed columns.
b. Exposed structure in mechanical/electrical rooms and elevator shafts.
c. Exposed conditions subject to abrasion or humidity.

2. Manufacturers and Products:

a. Carboline Co., Fireproofing Products Div.; Pyrolcrete 239.
b. GCP Applied Technologies; Monokote Z106/HY.
c. Isolatek International; Cafco 400.
d. Southwest Fireproofing Products Co., Inc.; Type 7GP.

M. SFRM-05 - High-Density, Portland Cement Binder; minimum bond strength of 10000-lbf/sq. ft. (478.8-kPa).

1. Interior or Exterior Locations:

a. Exterior conditions.
b. Exposed conditions subject to impact or direct moisture.

2. Manufacturers and Products:

a. Carboline Co., Fireproofing Products Div.; Pyrocrete 40.
b. GCP Applied Technologies; Monokote Z146.
c. Isolatek International; Fendolite M-II.
d. Southwest Vermiculite Co., Inc.; 7HD.

2.5 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that are compatible with sprayed fire-resistive material and substrates and are approved by UL or another testing and inspecting agency acceptable to authorities having jurisdiction for use in fire-resistance designs indicated.

B. Substrate Primers: Primers approved by sprayed fire-resistive material manufacturer and complying with one or both of the following requirements:

1. Primer and substrate are identical to those tested in required fire-resistance design by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
2. Primer's bond strength in required fire-resistance design complies with specified bond strength for sprayed fire-resistive material and with requirements in UL's "Fire Resistance Directory" or in the listings of another qualified testing agency acceptable to authorities having jurisdiction, based on a series of bond tests in accordance with ASTM E736.

C. Bonding Agent: Product approved by sprayed fire-resistive material manufacturer and complying with requirements in UL's "Fire Resistance Directory" or in the listings of another qualified testing agency acceptable to authorities having jurisdiction.

D. Metal Lath: Expanded metal lath fabricated from material of weight, configuration, and finish required, in accordance with fire-resistance designs indicated and sprayed fire-resistive material manufacturer's written instructions. Include clips, lathing accessories, corner beads, and other anchorage devices required to attach lath to substrates and to receive sprayed fire-resistive material.

E. Reinforcing Fabric: Glass- or carbon-fiber fabric of type, weight, and form required to comply with fire-resistance designs indicated; approved and provided by sprayed fire-resistive material manufacturer.

F. Reinforcing Mesh: Metallic mesh reinforcement of type, weight, and form required to comply with fire-resistance design indicated; approved and provided by sprayed fire-resistive material manufacturer. Include pins and attachment.

G. Sealer: Transparent-drying, water-dispersible, tinted protective coating recommended in writing by sprayed fire-resistive material manufacturer for each fire-resistance design.

H. Topcoat: Suitable for application over sprayed fire-resistive material; of type recommended in writing by sprayed fire-resistive material manufacturer for each fire-resistance design.

1. Cement-Based Topcoat: Factory-mixed, cementitious hard-coat formulation for trowel or spray application over SFRM.
2. Water-Based Permeable Topcoat: Factory-mixed formulation for brush, roller, or spray application over applied SFRM.

I. Patching Material: Product provided by fire-resistive materials manufacturer for patching damaged work.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Acceptance of Surfaces and Conditions: Examine substrates to receive products and systems and associated work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions.

1. Verify that substrates are free of dirt, oil, grease, release agents, rolling compounds, mill scale, loose scale, incompatible primers, paints, and encapsulants, or other foreign substances capable of impairing bond of fire protection with substrates under conditions of normal use or fire exposure.
2. Verify that objects penetrating fire protection, including clips, hangers, support sleeves, and similar items, are securely attached to substrates.
3. Verify that substrates receiving fire protection are not obstructed by ducts, piping, equipment, or other suspended construction that will interfere with fire protection application.

B. Verify that concrete work on steel deck is complete before beginning Work.

C. Verify that roof construction, installation of rooftop HVAC equipment, and other related work are complete before beginning Work.

D. Conduct tests in accordance with sprayed fire-resistive material manufacturer's written instructions to verify that substrates are free of substances capable of interfering with bond.

E. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

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

3.2 INSTALLATION, GENERAL

A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:

1. Respective manufacturer written installation instructions.
2. Accepted submittals.
3. Contract Documents.

B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by isolating metals and other materials from direct contact with incompatible materials.

3.3 PREPARATION

A. General: Comply with manufacturer's instructions, recommendations, and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants, or errors which would result in poor or potentially defective installation or would cause latent defects in Work.

B. Cover other work subject to damage from fallout or overspray of fire protection materials during application.

C. Clean substrates of substances that could impair bond of fire protection.

D. Prime substrates where included in fire-resistance design and where recommended in writing by sprayed fire-resistive material manufacturer unless compatible shop primer has been applied and is in satisfactory condition to receive fire protection.

1. If paint or primer is incompatible as determined by sprayed fire-resistive material manufacturer and must be removed or repaired, provide additional materials at no cost to the Owner.

E. For applications visible on completion of Project, repair substrates to remove surface imperfections that could affect uniformity of texture and thickness in finished surface of fire protection. Remove minor projections and fill voids that would telegraph through fire-resistive products after application.

3.4 APPLICATION

A. Construct fire protection assemblies that are identical to fire-resistance design indicated and products as specified, tested, and substantiated by test reports; for thickness, primers, sealers, topcoats, finishing, and other materials and procedures affecting fire protection Work.

B. Comply with sprayed fire-resistive material manufacturer's written instructions for mixing materials, application procedures, and types of equipment used to mix, convey, and apply fire protection as applicable to specific conditions of installation and as required to achieve fire-resistance ratings indicated.

C. Coordinate application of fire protection with other construction to minimize need to cut or remove fire protection.

1. Do not begin applying fire protection until clips, hangers, supports, sleeves, and other items penetrating fire protection are in place.
2. Defer installing ducts, piping, and other items that would interfere with applying fire protection until application of fire protection is completed.

D. Metal Decks:

1. Do not apply fire protection to underside of metal deck substrates until concrete topping, if any, is completed.
2. Do not apply fire protection to underside of metal roof deck until roofing is completed; prohibit roof traffic during application and drying of fire protection.

E. Install auxiliary materials as required, as detailed, and in accordance with fire-resistance design and sprayed fire-resistive material manufacturer's written instructions for conditions of exposure and intended use. For auxiliary materials, use attachment and anchorage devices of type recommended in writing by sprayed fire-resistive material manufacturer.

F. Spray apply fire protection to maximum extent possible. After the spraying operation in each area, complete the coverage by trowel application or other placement method recommended in writing by sprayed fire-resistive material manufacturer.

G. Extend fire protection in full thickness over entire area of each substrate to be protected.

H. Install body of fire protection in a single course unless otherwise recommended in writing by sprayed fire-resistive material manufacturer.

I. Where sealers are used, apply products that are tinted to differentiate them from fire protection over which they are applied.

J. Provide a uniform finish complying with description indicated for each type of fire protection material and matching finish approved for required mockups.

K. Cure fire protection in accordance with sprayed fire-resistive material manufacturer's written instructions.

L. Do not install enclosing or concealing construction until after fire protection has been applied, inspected, and tested and corrections have been made to deficient applications.

M. Finishes: Apply fire protection to produce finishes in accordance with manufacturer's written instructions for each finish selected.

1. Spray-Textured Finish: Finish left as spray applied with no further treatment.

N. Patching: Under the following conditions, remove sprayed fire-resistive materials and re-apply same sprayed fire-resistive materials as used for original application, or apply patching material:

1. Portions damaged, abraded, or removed by subsequent building construction.
2. Previously applied materials determined by testing and inspection agency to be noncompliant.

3.5 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Manufacturer's qualified technical representative shall periodically inspect Work to ensure installation is proceeding in accordance with manufacturer's designs, recommendations, instructions, and warranty requirements. Representative shall submit written reports of each visit indicating observations, findings, and conclusions of inspection.

1. Manufacturer's Technical Representative Qualifications: Direct employee of technical services department of manufacturer with experience in providing recommendations, observations, evaluations, and problem diagnostics.

B. Special Inspections: Owner will engage a qualified special inspector to perform the special inspections:

1. Test and inspect as required by the Building Code and Authorities Having Jurisdiction.

C. Perform the tests and inspections of completed Work in successive stages. Do not proceed with application of fire protection for the next area until test results for previously completed applications of fire protection show compliance with requirements. Tested values must equal or exceed values as specified and as indicated and required for approved fire-resistance design.

D. Fireproofing will be considered defective if it does not pass tests and inspections.

1. Remove and replace fireproofing that does not pass tests and inspections, and retest at Contractor’s expense.
2. Apply additional fireproofing, per manufacturer's written instructions, where test results indicate insufficient thickness, and retest at Contractor’s expense.

E. Prepare test and inspection reports.

3.6 CLEANING

A. Cleaning: Immediately after completing spraying operations in each containable area of Project, remove material overspray and fallout from surfaces of other construction and clean exposed surfaces to remove evidence of soiling.

3.7 PROTECTION

A. Protect fire protection, in accordance with advice of manufacturer and Installer, from damage resulting from construction operations or other causes, so fire protection is without damage or deterioration at time of Substantial Completion.

1. Prevent deterioration of fire-resistive materials due to exposure to weather and to unfavorable ambient conditions for humidity, temperature, and ventilation.

3.8 REPAIRS

A. As installation of other construction proceeds, inspect fire protection and repair damaged areas and fire protection removed due to work of other trades.

B. Repair fire protection damaged by other work before concealing it with other construction.

C. Repair fire protection by reapplying it using same method as original installation or using manufacturer's recommended trowel-applied product.

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SECTION 078123

INTUMESCENT FIRE RESISTIVE MATERIALS (IFRM)

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Mastic and intumescent fire-resistive coatings and supplementary items necessary for installation.

1. Finish Sample: Submit with proposal a preliminary sample of intumescent mastic fireproofing finish representing the quality and variations in appearance.

1.2 ACTION SUBMITTALS

A. Fire-Rated Assembly Design Classification: Submit documentation issued by testing agency for each fire-rated assembly design selected.

B. Product Data: Manufacturer's technical literature for each product and system indicated.

1. Include manufacturer's specifications for materials, finishes, construction details, installation instructions, and recommendations for maintenance.

a. Mastic and intumescent fire-resistive coatings.
b. Substrate preparation and primers.
c. Reinforcing fabric.
d. Reinforcing mesh.
e. Topcoat.

C. Shop Drawings: Show details of fabrication and installation, including plans, elevations, sections, details of components and attachments to other work. Distinguish between shop and field-assembled work.

1. Framing plans and schedules indicating the following:

a. Extent of fire protection for each construction and fire-resistance rating.
b. Applicable fire-resistance design designations of a qualified testing and inspecting agency acceptable to authorities having jurisdiction.
c. Minimum mastic and intumescent fire-resistive coating thicknesses needed to achieve required fire-resistance rating of each structural component and assembly.

1) Requirements for steel surface preparation and primers.

d. Treatment of mastic and intumescent fire-resistive coating after application.

D. Samples for Verification: For each fireproofing assembly design and for each color and texture specified, stepped samples, not less than 12 in (300 mm) square, prepared on sheet steel, including primers and topcoats.

1.3 INFORMATIONAL SUBMITTALS

A. Manufacturer Project Acceptance Document: Certification by the manufacturer that its product(s) are approved, acceptable, suitable for use in specific locations, for specific details, and for applications indicated, specified, or required, and that a warranty will be issued.

1. Product Certificates: For each type of mastic and intumescent fire-resistive coating.

B. Evaluation Reports: For mastic and intumescent fire-resistive coating, from ICC-ES.

C. Field Quality Control Reports: Written report of testing and inspection required by Field Quality Control Article.

D. Warranty:

1. Provide manufacturer written warranty covering materials and installation (labor) stating obligations, remedies, limitations, and exclusions.

1.4 QUALITY ASSURANCE

A. Installer Qualifications:

1. Experience: Installer's personnel with not less than 5 years of experience in the successful performance of Work similar in scope of this Project.
2. Supervision: Installer shall maintain a competent supervisor at Project while the Work is in progress, and who has not less than 5 years of experience installing products and systems similar in scope of this Project.
3. Manufacturer Acceptance: Installer shall be certified, approved, licensed, or acceptable to manufacturer to install products.

B. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and to set quality standards for materials and execution.

1. Build mockup of each type of fire protection and different substrate and each required finish.

a. Apply coatings by method that will be used for the Work to 48 in (1200 mm) long structural steel column or beam demonstrating final finish; including a patch of a damaged area and a steel-to-steel connection

2. Notify Architect seven days in advance of the dates and times when mock-up will be installed.
3. Obtain Architect's acceptance of mock-ups before starting installation.
4. Acceptance of mock-ups does not constitute acceptance of deviations from the Contract Documents contained in mock-ups unless such deviations are specifically noted by Contractor and accepted by Architect in writing.
5. Demolish and remove mock-ups when directed by Architect unless accepted to become part of the completed Work.

1.5 PRE-INSTALLATION CONFERENCE

A. Pre-Installation Conference: Before Work begins, conduct conference at Project site.

1. Participants:

a. Architect.
b. Contractor, including superintendent.
c. Installer, including project manager and supervisor.
d. If requested, Manufacturer's qualified technical representative.
e. Installers of other construction interfaced with Work.

2. Minimum Agenda: Installer shall demonstrate understanding of the Work required by describing detailed procedures for preparing, installing, and cleaning the Work. Demonstration shall include, but not be limited to, following topics:

a. Tour representative areas of Work, inspect and discuss condition of substrate, and other preparatory work performed by other trades.
b. Review Contract Document requirements.

1) Review products, design ratings, restrained and unrestrained conditions, thicknesses, and other performance requirements.

c. Review approved submittals.
d. Review inspection and testing requirements.
e. Review environmental conditions and procedures for coping with unfavorable conditions.
f. Resolve deviations or differences between Contract Documents and the manufacturer's specifications.

3. Record discussions, including decisions and agreements, and prepare report.

1.6 DELIVERY, STORAGE, AND HANDLING

A. General: Deliver, store and handle products to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

B. Deliver products to site in original, unopened containers or packages with intact and legible manufacturers' labels identifying product and manufacturer, date of manufacture, lot number, shelf life if applicable, qualified testing and inspecting agency's design classification marking applicable to Project, curing time, and mixing instructions for multi-component materials.

1.7 FIELD CONDITIONS

A. Environmental Limitations: Apply fire protection when ambient temperature, substrate temperature, and moisture conditions are within range established and recommended by manufacturer. Provide temporary protection and heat to maintain temperature for 24 hours before, during, and for 24 hours after product application.

B. Ventilation: Ventilate building spaces during and after application of fire protection, providing complete air exchanges in accordance with manufacturer's written instructions. Use natural means or, if they are inadequate, forced-air circulation until fire protection dries thoroughly.

1.8 COORDINATION

A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.

1.9 WARRANTY

A. Manufacturer’s Warranty: Furnish manufacturer’s written material and labor warranty signed by an authorized representative using manufacturer’s standard form agreeing to furnish materials and labor required to repair or replace work which exhibits material defects caused by manufacture or design and installation of product. “Defects” is defined to include but not limited to deterioration or failure to perform as required.

1. Coverage of warranty includes, but is not limited to, the following:

a. Defects or deterioration.
b. Cracking, flaking, or spalling.
c. Peeling or delaminating from substrates.
d. Failure to remain bonded.
e. Erosion more than specified requirements.
f. Faulty application.

2. Warranty Period: Manufacturer shall warrant the products to be free from material and labor Defects for a period of 2 years from date of Substantial Completion.

B. Installer's Warranty: Furnish installer's written workmanship warranty signed by an authorized representative using installer’s standard form agreeing to provide labor required to repair or replace work which exhibits workmanship defects. "Defects" is defined to include but not limited to deterioration or failure to perform as required.

1. Warranty Period: Installer shall warrant the installation to be free from workmanship Defects for a period of 2 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS AND PRODUCTS

A. Acceptable Manufacturers and Products: Subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of manufacturers listed. If not listed, submit as substitution according to Conditions of the Contract and Division 01 Section "Substitution Procedures".

1. Albi Protective Coatings.
2. Carboline Company, subsidiary of RPM International, Fireproofing Products Div
3. Isolatek International
4. Hilti, Inc

5. Sherwin Williams.

2.2 MATERIALS, GENERAL

A. Single Source Responsibility: Furnish each type of product from single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials.

2.3 PERFORMANCE REQUIREMENTS

A. General Performance: Comply with performance requirements specified, as determined by testing of products and systems representing those indicated for this Project, without failure due to defective manufacture, fabrication, installation, or other defects in construction.

B. Assemblies: Provide fire protection, including auxiliary materials, in accordance with requirements of each fire-resistance design and manufacturer's written instructions.

1. Obtain fire protection for each fire-resistance design from single source.

C. Material Compatibility: Primer, intumescent fire-resistive materials and topcoats shall be compatible with one another and with substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and laboratory analysis.

D. Fire-Resistance Design: Indicated on Drawings, tested in accordance with ASTM E119 or UL 263; testing by a qualified testing agency or listing of other testing agency acceptable to authorities having jurisdiction. Identify products with appropriate markings of applicable testing agency.

1. Steel members are considered unrestrained unless indicated otherwise.

E. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: 25 or less.
2. Smoke-Developed Index:

a. Exposed-to-View or Concealed Spaces other than Return Air Plenums: 450 or less.
b. Return Air Plenums: 50 or less.

F. VOC Content: For field applications, coatings shall comply with VOC content limits of authorities having jurisdiction and the following VOC content limits:

1. Flat Paints and Coatings: 50 g/L.
2. Nonflat Paints and Coatings: 150 g/L.
3. Primers, Sealers, and Undercoaters: 200 g/L.

G. Asbestos: Provide products containing no detectable asbestos.

2.4 MASTIC AND INTUMESCENT FIRE-RESISTIVE COATINGS

A. Exterior Applications - Mastic and Intumescent Fire-Resistive Coating: Manufacturer's standard, factory-mixed formulation or factory-mixed, multicomponent system consisting of intumescent base coat and topcoat, and complying with indicated fire-resistance design.

1. Manufacturers and Products: Designated for exterior use by a qualified testing agency acceptable to authorities having jurisdiction.

    a. Albi Protective Coatings; Albi Clad 800.
    b. Carboline Company, subsidiary of RPM International, Fireproofing Products Div.; Thermo-Lag E100 or E100S.
    c. Isolatek International; Cafco SprayFilm-WB 4 / Isolatek WB 4 with Cafco SprayFilm Topseal.
    d. Sherwin Williams; Firetex FX5090.

2. Thickness: As required for fire-resistance design indicated, measured in accordance with requirements of fire-resistance design.

B. Interior Applications - Mastic and Intumescent Fire-Resistive Coating: Manufacturer's standard, factory-mixed formulation or factory-mixed, multicomponent system consisting of intumescent base coat and topcoat, and complying with indicated fire-resistance design.

1. Manufacturers and Products - Designated for interior general-purpose use by a qualified testing agency acceptable to authorities having jurisdiction.

    a. Albi Protective Coatings; Albi Clad TF.
    b. Carboline Company, subsidiary of RPM International, Fireproofing Products Div.; AD Firefilm III, AD Firefilm IV, Thermo-Sorb VOC or Thermo-Sorb 263
    c. Hilti, Inc.; Fire Finish CFP-SP WB.
    d. Isolatek International; Cafco SprayFilm-WB 3 or Cafco SprayFilm-WB 5.
    e. Sherwin Williams; Firetex FX5120.

2. Thickness: As required for fire-resistance design indicated, measured in accordance with requirements of fire-resistance design.

C. Interior or Exterior Applications - Shop Applied or Field Applied Epoxy Intumescent Fire-Resistive Coating: Manufacturer's standard, factory-mixed formulation or factory-mixed, multicomponent system consisting of epoxy intumescent, and complying with indicated fire-resistance design.

1. Manufacturers and Products: Designated for interior or exterior general-purpose, high performance use by a qualified testing agency acceptable to authorities having jurisdiction.

    a. Sherwin-Williams; Firetex FX9502.

D. Basis of Design for Level of Finish: Carboline; Finish Level 4 High Quality Architectural Finish (Spray Applied, Back Rolled and Sanded Smooth).

1. A "Finish Level 4 High Quality Architectural Finish" refers to a very smooth, even surface with minimal texture.

2.5 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that are compatible with mastic and intumescent fire-resistive coating and substrates and are approved by UL or another testing and inspecting agency acceptable to authorities having jurisdiction for use in fire-resistance designs indicated.

B. Substrate Primers: Primers approved by mastic and intumescent fire-resistive coating manufacturer and complying with required fire-resistance design by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.

C. Reinforcing Fabric: Glass- or carbon-fiber fabric of type, weight, and form required to comply with fire-resistance designs indicated; approved and provided by mastic and intumescent fire-resistive coating manufacturer.

D. Reinforcing Mesh: Metallic mesh reinforcement of type, weight, and form required to comply with fire-resistance design indicated; approved and provided by mastic and intumescent fire-resistive coating manufacturer. Include pins and attachment.

E. Topcoat: Suitable for application over mastic and intumescent fire-resistive coating; of type approved or recommended in writing by mastic and intumescent fire-resistive coating manufacturer for each fire-resistance design.

1. Color and Gloss: As scheduled or indicated in Design Selections.

2.6 STEEL FINISH

A. Surface Preparation: Prepare metal surfaces to comply with intumescent mastic fireproofing manufacturer requirements.

1. Steel Substrate before Priming: SSPC-SP 6 Commercial Blast Cleaning unless more stringent requirements are recommended by intumescent mastic fireproofing manufacturer.
2. Galvanized Steel Substrate before Priming: SSPC-SP 7 Brush-off Blast Cleaning unless more stringent requirements are recommended by intumescent mastic fireproofing manufacturer.
3. Primed Steel Substrate: SSPC-SP 2 Hand Tool Cleaning or SP 3 Power Tool Cleaning unless more stringent requirements are recommended by intumescent mastic fireproofing manufacturer.

B. Priming: Apply primer in steel fabrication shop.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Acceptance of Surfaces and Conditions: Examine substrates to receive products and systems and associated work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions.

1. Verify that substrates are free of dirt, oil, grease, release agents, rolling compounds, mill scale, loose scale, incompatible primers, paints, and encapsulants, or other foreign substances capable of impairing bond of fire protection with substrates under conditions of normal use or fire exposure.
2. Verify that objects penetrating fire protection, including clips, hangers, support sleeves, and similar items, are securely attached to substrates.
3. Verify that substrates receiving fire protection are not obstructed by ducts, piping, equipment, or other suspended construction that will interfere with fire protection application.

B. Conduct tests in accordance with mastic and intumescent fire-resistive coating manufacturer's written instructions to verify that substrates are free of substances capable of interfering with bond.

C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

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

3.2 INSTALLATION, GENERAL

A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:

1. Respective manufacturer’s written installation instructions.
2. Accepted submittals.
3. Contract Documents.

3.3 PREPARATION

A. General: Comply with manufacturer's instructions, recommendations, and specifications for cleaning and surface preparation. Surfaces shall have no defects or errors which would result in poor or potentially defective installation or would cause latent defects in Work.

B. Cover other work subject to damage from fallout or overspray of fire protection materials during application.

C. Clean substrates of substances that could impair bond of fire protection.

D. Prime substrates where included in fire-resistance design and where recommended in writing by mastic and intumescent fire-resistive coating manufacturer unless compatible shop primer has been applied and is in satisfactory condition to receive fire protection.

E. For applications visible on completion of Project, repair substrates to remove surface imperfections that could affect uniformity of texture and thickness in finished surface of fire protection. Remove minor projections and fill voids that would telegraph through fire-resistive products after application.

3.4 APPLICATION

A. Construct fire protection assemblies that are identical to fire-resistance design indicated and products as specified, tested, and substantiated by test reports; for thickness, primers, topcoats, finishing, and other materials and procedures affecting fire protection Work.

B. Comply with mastic and intumescent fire-resistive coating manufacturer's written instructions for mixing materials, application procedures, and types of equipment used to mix, convey, and apply fire protection as applicable to conditions of installation and as required to achieve fire-resistance ratings indicated.

C. Coordinate application of fire protection with other construction to minimize need to cut or remove fire protection.

1. Do not begin applying fire protection until clips, hangers, supports, sleeves, and other items penetrating fire protection are in place.
2. Defer installing ducts, piping, and other items that would interfere with applying fire protection until application of fire protection is completed.

D. Install auxiliary materials as required, as detailed, and in accordance with fire-resistance design and mastic and intumescent fire-resistive coating manufacturer's written instructions for conditions of exposure and intended use. For auxiliary materials, use attachment and anchorage devices of type recommended in writing by mastic and intumescent fire-resistive coating manufacturer.

E. Spray-apply fire protection to maximum extent possible to achieve a smooth finish. Apply in thin layers to build up to the required thickness. After the spraying operation in each area, complete the coverage by trowel application or other placement method recommended in writing by mastic and intumescent fire-resistive coating manufacturer.

F. Extend fire protection in full thickness over entire area of each substrate to be protected.

G. Install body of fire protection in a single course unless otherwise recommended in writing by mastic and intumescent fire-resistive coating manufacturer.

H. Provide a uniform finish complying with description indicated for each type of fire protection material and matching finish approved for required mockups.

I. Cure fire protection in accordance with mastic and intumescent fire-resistive coating manufacturer's written instructions.

J. Do not install enclosing or concealing construction until after fire protection has been applied, inspected, and tested and corrections have been made to deficient applications.

K. Finishes: Apply fire protection to produce the required finish.

3.5 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Manufacturer's qualified technical representative shall periodically inspect Work to ensure installation is proceeding in accordance with manufacturer's designs, recommendations, instructions, and warranty requirements. Representative shall submit written reports of each visit indicating observations, findings, and conclusions of inspection.

1. Manufacturer's Technical Representative Qualifications: Direct employee of technical services department of manufacturer with experience in providing recommendations, observations, evaluations, and problem diagnostics.

B. Special Inspections: Owner will engage a qualified special inspector to perform the special inspections:

1. Test and inspect as required by the Building Code and Authorities Having Jurisdiction.

C. Perform the tests and inspections of completed Work in successive stages. Do not proceed with application of fire protection for the next area until test results for previously completed applications of fire protection show compliance with requirements. Tested values must equal or exceed values as specified and as indicated and required for approved fire-resistance design.

D. Fire protection will be considered defective if it does not pass tests and inspections.

1. Remove and replace fire protection that does not pass tests and inspections, and retest at Contractor’s expense.
2. Apply additional fire protection, per manufacturer's written instructions, where test results indicate insufficient thickness, and retest at Contractor’s expense.

E. Prepare test and inspection reports.

3.6 CLEANING

A. Cleaning: Immediately after completing spraying operations in each containable area of Project, remove material overspray and fallout from surfaces of other construction and clean exposed surfaces to remove evidence of soiling.

3.7 PROTECTION

A. Protect fire protection, in accordance with advice of manufacturer and Installer, from damage resulting from construction operations or other causes, so fire protection is without damage or deterioration at time of Substantial Completion.

3.8 REPAIRS

A. As installation of other construction proceeds, inspect fire protection and repair damaged areas and fire protection removed due to work of other trades.

B. Repair fire protection damaged by other work before concealing it with other construction.

C. Repair fire protection by reapplying it using same method as original installation or using manufacturer's recommended trowel-applied product.

END OF SECTION

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SECTION 078413

PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes penetration firestopping systems for openings and penetrations through smoke and fire-resistance-rated assemblies, and supplementary items necessary to complete their installation.

1. Penetrations in fire-resistance-rated walls.
2. Penetrations in horizontal assemblies.
3. Penetrations in smoke barriers.

1.2 ACTION SUBMITTALS

A. Product Data: Manufacturer's technical literature for each product and system indicated.

1. Include manufacturer's specifications for materials, finishes, construction details, installation instructions, and recommendations for maintenance.

B. Product Schedule: For each penetration firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing and inspecting agency..

1. Engineering Judgments: Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular penetration firestopping system, submit illustration, with modifications marked, approved by penetration firestopping system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly. Obtain approval of authorities having jurisdiction prior to submittal.

1.3 INFORMATIONAL SUBMITTALS

A. Manufacturer's Project Acceptance Document: Certification by the manufacturer that its product(s) are approved, acceptable, suitable for use in specific locations, for specific details, and for applications indicated, specified, or required, and that a warranty will be issued.

B. Field Quality Control Reports: Written report of testing and inspection required by "Field Quality Control".

1.4 CLOSEOUT SUBMITTALS

A. Installer Certificates: From Installer indicating that penetration firestopping systems have been installed in compliance with requirements and manufacturer's written instructions.

1.5 QUALITY ASSURANCE

A. Installer Qualifications:

1. Experience: Installer's personnel with not less than 5 years of experience in the successful performance of Work similar to scope of this Project.
2. Supervision: Installer shall maintain a competent supervisor at Project while the Work is in progress, and who has not less than 5 years of experience installing products and systems similar to scope of this Project.
3. Manufacturer Acceptance: Installer shall be certified, approved, licensed, or acceptable to manufacturer to install products.

1.6 PRE-INSTALLATION CONFERENCE

A. Pre-Installation Conference: Before Work begins, conduct conference at Project site.

1.7 PROJECT CONDITIONS

A. Field Measurements: Where products and systems are indicated to fit walls and other construction, verify dimensions by field measurements before fabrication.

B. Environmental Limitations: Do not install firestopping systems when ambient or substrate temperatures are outside limits permitted by firestopping system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.

C. Install and cure penetration firestopping materials per manufacturer's written instructions using natural means of ventilations or, where this is inadequate, forced-air circulation.

1.8 COORDINATION

A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.

B. Coordinate construction of openings and penetrating items to ensure that penetration firestopping systems can be installed according to specified firestopping system design.

C. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate firestopping systems.

D. Notify Owner's inspecting agency at least seven days in advance of firestopping system installations; confirm dates and times on days preceding each series of installations.

E. Do not cover up firestopping system installations that will become concealed behind other construction until Owner's inspecting agency and building inspector, if required by authorities having jurisdiction, have examined each installation.

PART 2 - PRODUCTS

2.1 FIRESTOPPING, GENERAL

A. Acceptable Manufacturers: Manufacturer is “acceptable if firestopping system has been tested and listed by UL or other testing and inspection agency acceptable to authorities having jurisdiction and manufacturer can evidence product compliance with requirements of the Contract Documents.

B. Compatibility: Provide firestopping systems that are compatible with one another, with the substrates forming openings, and with the items, if any, penetrating firestopping systems, under conditions of service and application, as demonstrated by firestopping system manufacturer based on testing and field experience.

C. Single Source Responsibility: Furnish each type of product from single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials and approved by the qualified testing and inspection agency for firestopping systems indicated.

2.2 PERFORMANCE REQUIREMENTS

A. General: Provide firestopping systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of assembly penetrated.

B. Fire-Test-Response Characteristics:

1. Perform penetration firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.
2. Test per testing standards referenced. Provide rated systems complying with the following requirements:

a. Penetration firestopping systems shall bear classification marking of a qualified testing agency acceptable to authorities having jurisdiction.

1) UL Fire Resistance Directory.
2) Intertek Group Directory of Listed Building Products.
3) FM Global Building Materials Approval Guide.

2.3 PENETRATION FIRESTOP SYSTEMS

A. Penetration Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.

1. Classified in Underwriters Laboratories (UL) Fire Resistance Directory, Section XHEZ - Penetration Firestop System", and/or Section XHHW - Fill Void or Cavity Materials for specific project conditions.

B. Penetrations in Fire-Resistance-Rated Walls: Penetration firestopping systems with ratings determined per ASTM E 814 or UL 1479.

1. F-Rating: Not less than the fire-resistance rating of constructions penetrated.

C. Penetrations in Horizontal Assemblies: Penetration firestopping systems with ratings determined per ASTM E 814 or UL 1479.

1. F-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated.
2. T-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated except for floor penetrations within the cavity of a wall.

a. Penetrations located outside wall cavities.
b. Penetrations located outside fire-resistive shaft enclosures.
c. Penetrations located in construction containing fire-protection-rated openings.

3. W-Rating: Provide penetration firestopping systems showing no evidence of water leakage when tested according to UL 1479.

D. Penetrations in Smoke Barriers: Penetration firestopping systems with ratings determined per UL 1479.

1. L-Rating: Not exceeding 5.0 cfm/sq. ft. (0.025 cu. m/s per sq. m) of penetration opening at and no more than 50-cfm (0.024-cu. m/s) cumulative total for any 100 sq. ft. (9.3 sq. m) at both ambient and elevated temperatures.

E. Penetrations in Fire-Resistance-Rated Smoke Barriers: In addition to penetration firestopping systems with L-Ratings determined per UL 1479, provide F-Ratings and T-Ratings determined per ASTM E 814 or UL 1479.

F. Exposed Penetration Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, per ASTM E 84.

G. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping system manufacturer and approved by qualified testing and inspecting agency for conditions indicated.

1. Permanent forming/damming/backing materials.
2. Substrate primers.
3. Collars.
4. Steel sleeves.

2.4 FILL MATERIALS

A. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer sleeve lined with an intumescent strip, a flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.

B. Latex Sealants: Single-component latex formulations that do not re-emulsify after cure during exposure to moisture

C. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.

D. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced intumescent elastomeric sheet bonded to galvanized-steel sheet.

E. Intumescent Putties: Nonhardening, water-resistant, intumescent putties containing no solvents or inorganic fibers.

F. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.

G. Mortars: Prepackaged dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.

H. Pillows/Bags: Reusable heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents, and fire-retardant additives. Where exposed, cover openings with steel-reinforcing wire mesh to protect pillows/bags from being easily removed.

I. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

J. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants.

K. Additional Application Requirements:

1. Firestops exposed to view and/or are scheduled to receive finishes shall be paintable or capable of receiving finish materials.
2. Firestops exposed to traffic, moisture, and physical damage shall be products that do not deteriorate when exposed to these conditions.
3. Firestops for water piping penetrations, of any type, shall be moisture-resistant products.
4. Firestops for floor penetrations with annular spaces exceeding 4 in (100 mm) or more in width and exposed to possible loading and traffic shall be products capable of supporting the floor loads involved either by installing floor plates or by other means.
5. Firestops for penetrations involving insulated piping shall be products that do not require removal of insulation.
6. Firestops for cable trays and future penetrations shall be reusable pillows or bags.

L. Provide firestops within fire resistive walls and partitions containing flush mounted devices such as outlet boxes, electrical cabinets and mechanical cabinets mounted back to back and spaced less than 24 inches on center in accordance with UL Fire Resistance Directory "Wall Opening Protective Materials", Category CLIV.

2.5 MIXING

A. Penetration Firestopping Materials: For those products requiring mixing before application, comply with penetration firestopping system manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Acceptance of Surfaces and Conditions: Examine substrates to receive products and systems and associated work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions.

3.2 PREPARATION

A. General: Comply with manufacturer's instructions, recommendations, and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants, or errors which would result in poor or potentially defective installation or would cause latent defects in Work.

B. Surface Cleaning: Before installing fire-resistive penetration systems, clean penetrations immediately to comply with fire-resistive joint system manufacturer's written instructions and the following requirements.

1. Remove foreign materials from surfaces of openings, joints and penetrating items that could interfere with adhesion of firestopping.
2. Clean opening and joint substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with firestopping. Remove loose particles remaining from cleaning operation.
3. Remove laitance and form release agents from concrete.

C. Priming: Prime substrates where recommended by firestopping manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

D. Masking Tape: Use masking tape to prevent firestopping from contacting adjoining surfaces that will remain exposed upon completion of Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from firestopping materials. Remove tape as soon as it is possible to do so without disturbing firestopping's seal with substrates.

3.3 INSTALLATION, GENERAL

A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:

1. Respective manufacturer written installation instructions.
2. Accepted submittals.
3. Contract Documents.

B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by isolating metals and other materials from direct contact with incompatible materials.

3.4 INSTALLATION OF PENETRATION FIRESTOPS

A. General: Install penetration firestopping systems to comply with manufacturer's written installation instructions and published drawings for products and applications.

B. Install forming materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings.

1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not forming permanent components of firestopping.

C. Install fill materials for penetration firestop systems by proven techniques to produce the following results:

1. Completely fill voids and cavities formed by openings, forming materials, accessories, and penetrating items.
2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
3. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.5 IDENTIFICATION

A. Wall Identification: Permanently label walls containing penetration firestopping systems with the words "FIRE AND/OR SMOKE BARRIER - PROTECT ALL OPENINGS," using lettering not less than 3 inches (76 mm) high and with minimum 0.375-inch (9.5-mm) strokes.

1. Locate in accessible concealed floor, floor-ceiling, or attic space at 15 feet (4.57 m) from end of wall and at intervals not exceeding 30 feet (9.14 m).

B. Penetration Identification: Identify each penetration firestopping system with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches (150 mm) of penetration firestopping system edge so labels are visible to anyone seeking to remove penetrating items or firestopping systems. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:

1. The words "Warning - Penetration Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
2. Contractor's name, address, and phone number.
3. Tested System or Engineered Judgement Number.
4. Date of installation.
5. Manufacturer's name.
6. Installer's name.

3.6 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Manufacturer's qualified technical representative shall periodically inspect Work to ensure installation is proceeding in accordance with manufacturer's designs, recommendations, instructions, and warranty requirements. Representative shall submit written reports of each visit indicating observations, findings, and conclusions of inspection.

1. Manufacturer's Technical Representative Qualifications: Direct employee of technical services department of manufacturer with experience in providing recommendations, observations, evaluations, and problem diagnostics.

B. Inspecting Agency: Owner will engage a qualified testing agency to perform tests and inspections according to ASTM E 2174.

C. Where deficiencies are found or penetration firestopping system is damaged or removed because of testing, repair or replace penetration firestopping system to comply with requirements.

1. Materials and installation failing to meet specified requirements shall be replaced at Contractor's expense. Retesting of materials and installations failing to meet specified requirements shall be done at Contractors expense.

D. Proceed with enclosing penetration firestopping systems with other construction only after inspection reports are issued and installations comply with requirements.

3.7 CLEANING

A. Clean off excess fill materials and sealants adjacent to openings and joints as work progresses by methods and with cleaning materials approved by manufacturers of firestopping system products and of products in which opening and joints occur.

B. Provide final protection and maintain conditions during and after installation that ensure that penetration firestopping systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, immediately cut out and remove damaged or deteriorated penetration firestopping material and install new materials to produce systems complying with specified requirements.

END OF SECTION

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CAMDEN, NEW JERSEY

SECTION 078446

FIRE RESISTIVE JOINT FIRESTOPPING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes firestopping systems for joints at perimeter and through smoke and fire-resistance-rated assemblies, and supplementary items necessary to complete their installation.

1. Joints in or between fire-resistance-rated constructions.
2. Joints at exterior curtain-wall/floor intersections.
3. Joints in smoke barriers.

1.2 ACTION SUBMITTALS

A. Product Data: Manufacturer's technical literature for each product and system indicated.

1. Include manufacturer's specifications for materials, finishes, construction details, installation instructions, and recommendations for maintenance.

B. Product Schedule: For each penetration firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing and inspecting agency.

1. Engineering Judgments: Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular penetration firestopping system, submit illustration, with modifications marked, approved by penetration firestopping system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly. Obtain approval of authorities having jurisdiction prior to submittal.

1.3 INFORMATIONAL SUBMITTALS

A. Manufacturer's Project Acceptance Document: Certification by the manufacturer that its product(s) are approved, acceptable, suitable for use in specific locations, for specific details, and for applications indicated, specified, or required, and that a warranty will be issued.

B. Field Quality Control Reports: Written report of testing and inspection required by "Field Quality Control".

1.4 CLOSEOUT SUBMITTALS

A. Installer Certificates: From Installer indicating that penetration firestopping systems have been installed in compliance with requirements and manufacturer's written instructions.

1.5 QUALITY ASSURANCE

A. Installer Qualifications:

1. Experience: Installer's personnel with not less than 5 years of experience in the successful performance of Work similar to scope of this Project.
2. Supervision: Installer shall maintain a competent supervisor at Project while the Work is in progress, and who has not less than 5 years of experience installing products and systems similar to scope of this Project.
3. Manufacturer Acceptance: Installer shall be certified, approved, licensed, or acceptable to manufacturer to install products.

B. Compatibility and Adhesion Testing: Manufacturer of fire stopping material shall be responsible for testing samples of materials that will contact or affect firestopping materials.

1. Use manufacturer's standard test methods to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of fill materials to joint substrates.
2. Perform tests under environmental conditions replicating those that will exist during installation.
3. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
4. For materials failing tests, obtain fire-resistant joint sealants manufacturer's written instructions for corrective measures, including the use of specially formulated primers.

1.6 PRE-INSTALLATION CONFERENCE

A. Pre-Installation Conference: Before Work begins, conduct conference at Project site.

1.7 PROJECT CONDITIONS

A. Field Measurements: Where products and systems are indicated to fit walls and other construction, verify dimensions by field measurements before fabrication.

B. Environmental Limitations: Do not install firestopping systems when ambient or substrate temperatures are outside limits permitted by firestopping system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.

C. Install and cure penetration firestopping materials per manufacturer's written instructions using natural means of ventilations or, where this is inadequate, forced-air circulation.

1.8 COORDINATION

A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.

B. Coordinate construction of joints to ensure that joint firestopping systems can be installed according to specified firestopping system design.

C. Coordinate sizing of joints to accommodate joint firestopping systems.

D. Notify Owner's inspecting agency at least seven days in advance of firestopping system installations; confirm dates and times on days preceding each series of installations.

E. Do not cover up firestopping system installations that will become concealed behind other construction until Owner's inspecting agency and building inspector, if required by authorities having jurisdiction, have examined each installation.

PART 2 - PRODUCTS

2.1 FIRESTOPPING, GENERAL

A. Acceptable Manufacturers: Manufacturer is "acceptable" if firestopping system has been tested and listed by UL or other testing and inspection agency acceptable to authorities having jurisdiction and manufacturer can evidence product compliance with requirements of the Contract Documents.

B. Compatibility: Provide firestopping systems that are compatible with one another and the substrates forming openings, under conditions of service and application, as demonstrated by firestopping system manufacturer based on testing and field experience.

C. Single Source Responsibility: Furnish each type of product from single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials. Use only components specified by firestopping system manufacturer and approved by the qualified testing and inspecting agency for firestopping systems indicated.

2.2 PERFORMANCE REQUIREMENTS

A. General: Provide firestopping systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of assembly in which firestopping systems are installed. Joint firestopping systems shall accommodate building movements without impairing their ability to resist the passage of fire and hot gasses.

B. Fire-Test-Response Characteristics:

1. Perform joint firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.
2. Test per testing standards referenced in "Joint Firestopping Systems" Article. Provide rated systems complying with the following requirements:

a. Joint firestopping systems shall bear classification marking of a qualified testing agency.

1) UL in its "Fire Resistance Directory.
2) Intertek Group in its Directory of Listed Building Products.
3) FM Global in its "Building Materials Approval Guide.

2.3 JOINT FIRESTOPPING SYSTEMS.

A. Joints in or between Fire-Resistance-Rated Construction: Provide joint firestopping systems with ratings determined per ASTM E 1966 or UL 2079.

1. F-Rating: Equal to or exceeding the fire-resistance rating of the wall, floor, or roof in or between which it is installed.

B. Joints at Exterior Curtain-Wall/Floor Intersections: Provide joint firestopping systems with rating determined per ASTM E 2307.

1. F-Rating: Equal to or exceeding the fire-resistance rating of the floor assembly.

C. Joints in Smoke Barriers: Provide fire-resistive joint systems with ratings determined per UL 2079 based on testing at a positive pressure differential of 0.30-inch wg (74.7 Pa).

1. L-Rating: Not exceeding 5.0 cfm/ft. (0.00775 cu. m/s x m) of joint at both ambient and elevated temperatures.

D. Exposed Joint Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.

E. Accessories: Provide components of fire-resistive joint systems, including primers and forming materials, that are needed to install elastomeric fill materials and to maintain ratings required. Use only components specified by joint firestopping system manufacturer and approved by the qualified testing agency for conditions indicated.

F. Joints, required for control of movement, at intersection between Rated Wall Assemblies and Nonrated Horizontal Assemblies: Provide joint firestopping with ratings determined by ASTM E 2837.

G. Perimeter Fire Containment System: Provide systems for establishment of a fire resistive barrier at the portion of perimeter exterior wall (spandrel) that is adjacent to edge of structural floor or roof slabs, which provides and maintains a resistance to the passage of fire from one floor to the floor above. Provide fire resistive rating with movement capabilities equaling or exceeding the rating of the adjacent floor or roof assembly, as determined by ASTM E 2307.

1. Integrity Rating: Measure of system's ability to withstand fire exposure without permitting passage of flame through openings or occurrence of flaming on any element of the unexposed surface of the fill material or floor or on the interior surface of the wall above the fill material.
2. Expansion and Contraction: Perimeter fire containment systems shall accommodate movement of the exterior wall due to thermal expansion and contraction.

2.4 TOP-OF-WALL JOINT FIRESTOPPING

A. Safing Insulation: Semi rigid board insulation produced by combining slag-wool fibers with thermosetting resin binders and complying with the following:

1. ASTM C 612, Type 1A and 1B.
2. Nominal density of 4 lb/cu. ft.
3. ASTM E119 Fire rating indicated, but not less than 2 hours.

B. Coating Material: Manufacturers standard fill material or spray applied product for sealing surface of safing insulation and adjacent construction against penetration of fire and smoke.

C. Fire Resistive Sealants: Intumescent single-component, water based, high solids, elastomeric sealants. Nonsag formulation for openings in vertical and other surfaces requiring a nonslumping, gunnable sealant.

2.5 PERIMETER FIRE CONTAINMENT SYSTEM - EDGE OF SLAB

A. Safing Insulation: Semi rigid board insulation produced by combining slag-wool fibers with thermosetting resin binders and complying with the following:

1. ASTM C 612, Type 1A and 1B.
2. Nominal density of 4 lb/cu. ft.
3. ASTM E119 Fire rating indicated, but not less than 2 hours.

B. Coating Material: Manufacturers standard fill material or spray applied product for sealing surface of safing insulation and adjacent construction against penetration of fire and smoke.

2.6 PERIMETER FIRE CONTAINMENT SYSTEM - GLAZED ALUMINUM FRAMING SYSTEMS

A. Curtainwall Insulation and Mullion Cover: Semi-rigid board insulation produced by combining slag-wool or rock-wool fibers with thermosetting resin binders, aluminum foil scrim backing, and complying with the following:

1. ASTM C 612, Type 3.
2. Nominal density of 8 and 4 lb/cu. ft. as required by test assembly.
3. ASTM E 119 fire rating as indicated, but not less than 2 hours.

B. Safing Material: Semi-rigid board insulation produced by combining slag-wool fibers with thermosetting resin binders, unfaced, and complying with to the following:

1. ASTM C 612, Type IA and IB.
2. Nominal density of 4 lb/cu. ft.
3. ASTM E 119 fire rating as indicated, but not less than 2 hours.

C. Coating Material: Manufacturer's standard fill material or spray applied product for sealing top of safing material.

D. Impaling Pins: 12 gage steel pins swaged to galvanized steel angles for screw attachment to glazed aluminum wall system aluminum framing.

E. Reinforcing Angles: Galvanized steel angles of size, thickness, and finish suitable for application.

F. Curtainwall Insulation Tape: Manufacturer's standard pressure sensitive aluminum foil faced tape product for taping curtainwall insulation joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Acceptance of Surfaces and Conditions: Examine substrates to receive products and systems and associated work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions

3.2 PREPARATION

A. General: Comply with manufacturer's instructions, recommendations, and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants, or errors which would result in poor or potentially defective installation or would cause latent defects in Work.

B. Surface Cleaning: Before installing fire-resistive joint systems, clean joints immediately to comply with fire-resistive joint system manufacturer's written instructions and the following requirements:

1. Remove foreign materials from surfaces of joints that could interfere with adhesion of firestopping.
2. Clean joint substrates to produce clean, sound surfaces capable of developing optimum bond with firestopping. Remove loose particles remaining from cleaning operation.
3. Remove laitance and form release agents from concrete.

C. Priming: Prime substrates where recommended by firestopping manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

D. Masking Tape: Use masking tape to prevent firestopping from contacting adjoining surfaces that will remain exposed upon completion of Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from firestopping materials. Remove tape as soon as it is possible to do so without disturbing firestopping's seal with substrates.

3.3 INSTALLATION - GENERAL

A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:

1. Respective manufacturer written installation instructions.
2. Accepted submittals.
3. Contract Documents.

B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by isolating metals and other materials from direct contact with incompatible materials.

3.4 INSTALLATION OF FIRE-RESISTANT JOINT SEALANTS

A. General: Install fire-resistive joint systems to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.

B. Install forming materials and other accessories of types required to support elastomeric fill materials during their application and in position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.

1. After installing elastomeric fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of fire-resistive joint system.

C. Install fill materials for fire-resistive joint systems by proven techniques to produce the following results:

1. Elastomeric fill voids and cavities formed by joints and forming materials as required to achieve fire-resistance ratings indicated.
2. Apply elastomeric fill materials so they contact and adhere to substrates formed by joints.
3. For elastomeric fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.5 INSTALLATION OF FIRE SAFING PROTECTION

A. Top of Wall: Install safing insulation to fill gap between top of wall and floor slab above. Cut safing insulation 50 percent wider than gap to be filled to ensure compression fit.

3.6 INSTALLATION OF PERIMETER FIRE CONTAINMENT SYSTEM

A. Edge of Slab:

1. Edge of Slab: Install safing insulation to fill gap between edge of structural floor/roof slab and back of exterior wall on safing clips spaced as needed to support insulation but not further apart then 24 in (600 mm) o.c. unless not required by tested system. Cut safing insulation 50 percent wider than gap to be filled to ensure compression fit or install vertically as required by tested assembly.
2. Install coating material or smoke seal compound to cover fill material and seal opening.

B. Glazed Aluminum Framing Systems:

1. Install system to extend the required vertical distance above and below the structural floor/roof slab but not less than to next horizontal mullion.
2. Attach impaling pins to glazed aluminum wall framing, using screws, at corners and around perimeter of glazed unit. Install curtainwall insulation material over impaling pins so that the edges are tight fitting against the aluminum frame and the face of material will be flush with the aluminum frame. Secure units with clinch shields over impaling pins. Locate horizontal seams in the curtainwall insulation material, 6 in (150 mm) from top of joint and provide supporting angles as required.
3. Install safing material in the joint between the interior face of aluminum frame (and face of curtainwall insulation material) and the edge of the structural floor or roof slab. Compression fit safing material 50 percent, or as required by tested assembly, into spaces between floor slab and mounting angles. Provide safing clips to support safing material if required by tested system. Install coating material or smoke seal over safing material flush with top of floor/roof slab.
4. Install mullion covers centered over horizontal and vertical aluminum frames within barrier area using the same impaling pins as used to attach the curtainwall insulation material. Secure covers with clinch shields over impaling pins.
5. Install curtainwall insulation tape to seal all meeting edges of insulation with tape centered over the junction of adjacent insulation and all meeting edges of insulation and framing members so that approximately 2 in (50 mm) of tape covers each edge of the adjacent material.

3.7 IDENTIFICATION

A. Joint Identification: Identify joint firestopping systems with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches (150 mm) of joint edge so labels are visible to anyone seeking to remove or joint firestopping system. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:

1. The words "Warning - Fire-Resistive Joint System - Do Not Disturb. Notify Building Management of Any Damage."
2. Contractor's name, address, and phone number.
3. Tested System or Engineered Judgment Number.
4. Date of installation.
5. Manufacturer's name.
6. Installer's name.

3.8 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Manufacturer's qualified technical representative shall periodically inspect Work to ensure installation is proceeding in accordance with manufacturer's designs, recommendations, instructions, and warranty requirements. Representative shall submit written reports of each visit indicating observations, findings, and conclusions of inspection.

1. Manufacturer's Technical Representative Qualifications: Direct employee of technical services department of manufacturer with experience in providing recommendations, observations, evaluations, and problem diagnostics.

B. Inspecting Agency: Owner will engage a qualified testing agency to perform tests and inspections according to ASTM E 2393.

C. Where deficiencies are found or joint firestopping systems are damaged or removed due to testing, repair or replace joint firestopping systems so they comply with requirements.

1. Materials and installation failing to meet specified requirements shall be replaced at Contractor's expense. Retesting of materials and installations failing to meet specified requirements shall be done at Contractors expense.

D. Proceed with enclosing joint firestopping systems with other construction only after inspection reports are issued and installations comply with requirements.

E. Where required, inspection of fire resistive joint firestopping shall be performed in accordance with ASTM E 2393, "Standard Practice for On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers" or other recognized standard.

3.9 CLEANING

A. Clean off excess fill materials and sealants adjacent to openings and joints as work progresses by methods and with cleaning materials approved by manufacturers of firestopping system products and of products in which joints occur.

B. Provide final protection and maintain conditions during and after installation that ensure joint firestopping systems are without damage or deterioration at time of Substantial Completion. If damage or deterioration occurs despite such protection, cut out and remove damaged or deteriorated fire-resistive joint systems immediately and install new materials to produce fire-resistive joint systems complying with specified requirements.

END OF SECTION

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SECTION 079200

JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Joint sealants, backing materials, and supplementary items necessary for installation.

B. Related Requirements:

1. Refer to Division 01 Section Field Test for Air and Water Leakage.

1.2 ACTION SUBMITTALS

A. Product Data: Manufacturer's technical literature for each product and system indicated.

1. Include manufacturer's specifications for materials, finishes, construction details, installation instructions, and recommendations for maintenance.

B. Samples for Verification Purposes: Samples for each kind and color of joint sealants in 1/2 in (12 mm) wide joints formed between two 6 in (150 mm) long strips of material matching appearance of exposed surfaces adjacent to joint sealants.

C. Joint-Sealant Schedule: Include the following information:

1. Joint-sealant application, joint location, and designation.
2. Joint-sealant manufacturer and product name.
3. Joint-sealant formulation, primers and backers.
4. Joint-sealant color.

1.3 INFORMATIONAL SUBMITTALS

A. Manufacturer's Project Acceptance Document: Certification by the manufacturer that its product(s) are approved, acceptable, suitable for use in specific locations, for specific details, and for applications indicated, specified, or required, and that a warranty will be issued.

B. Field Quality Control Reports: Written report of testing and inspection required by "Field Quality Control" Article.

C. Warranties:

1. Provide manufacturer's and installer's written warranty covering materials and installation (labor) stating obligations, remedies, limitations, and exclusions.

1.4 QUALITY ASSURANCE

A. Installer Qualifications:

1. Experience: Installer's personnel with not less than 5 years of experience in the successful performance of Work similar to scope of this Project.
2. Supervision: Installer shall maintain a competent supervisor at Project while the Work is in progress, and who has not less than 5 years of experience installing products and systems similar to scope of this Project.
3. Manufacturer Acceptance: Installer shall be certified, approved, licensed, or acceptable to manufacturer to install products.

B. Sealant, Waterproofing and Restoration Institute (SWRI) Validation Certificate: Each sealant shall be validated by SWRI Sealant Validation Program.

C. Mock-Ups: Before beginning Work of this Section, install joint sealants in mock-ups of the various assemblies specified in other Sections indicated to receive joint sealants specified in this Section. Mock-ups shall include each form of product and color required to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution.

1.5 PRECONSTRUCTION TESTING

A. Pre-Construction Compatibility and Adhesion Testing: Submit to joint-sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint urethane and silicone sealants:

1. General Requirements: Test materials forming joint substrates and joint sealant backings for compatibility and adhesion with joint sealants.
2. Adhesion Testing: Use ASTM C794 to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
3. Compatibility Testing: Use ASTM C1087 to determine sealant compatibility when in contact with glazing and gasket materials.
4. Specimen Quantity: Submit manufacturer's recommended number of pieces of each type of material, including joint substrates, joint-sealant backings, and miscellaneous materials.

    a. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.

5. Reports: Interpret test results and certify reports indicating requirements for primers and substrate preparation needed.

    a. For materials failing tests, obtain joint-sealant manufacturer's written instructions for corrective measures, including use of specially formulated primer.

B. Pre-Construction Stain Testing: Submit samples of joint substrate materials that will contact or affect urethane and silicone joint sealants to respective joint sealant manufacturers for following testing:

1. General Requirements: Test materials forming joint substrates for resistance to staining caused by joint sealants.
2. Stain Testing: Use ASTM C1248 to determine stain potential of sealant when in contact with substrates, including stone and stone masonry.

3. Specimen Quantity: Submit manufacturer's recommended number of pieces of each type of material, including joint substrates, joint-sealant backings, and miscellaneous materials.

    a. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.

4. Reports: Interpret test results and certify reports indicating whether joint sealants stain substrate materials.

    a. For materials failing tests, obtain joint-sealant manufacturer's written instructions for corrective measures.

1.6 PRE-INSTALLATION CONFERENCE

A. Pre-Installation Conference: Before Work begins, conduct conference at Project site.

1. Participants:

    a. Architect.
    b. Contractor, including superintendent.
    c. Installer, including project manager and supervisor.
    d. Manufacturer's qualified technical representative.
    e. Installers of other construction interfaced with Work.

2. Minimum Agenda: Installer shall demonstrate understanding of the Work required by describing detailed procedures for preparing, installing, and cleaning the Work. Demonstration shall include, but not be limited to, following topics:

    a. Tour representative areas of Work, inspect and discuss condition of substrate, and other preparatory work performed by other trades.
    b. Review Contract Document requirements.
    c. Review approved submittals.
    d. Review inspection and testing requirements.
    e. Review environmental conditions and procedures for coping with unfavorable conditions.
    f. Resolve deviations or differences between Contract Documents and the manufacturer's specifications.

3. Record discussions, including decisions and agreements, and prepare report.

1.7 PROJECT CONDITIONS

A. Ambient Conditions: Install joint sealants within range of ambient and substrate temperatures and moisture conditions as recommended by manufacturer. Protect substrates from environmental conditions that affect performance.

1. Do not apply to a damp or wet substrate or during high humidity conditions including snow, rain, fog, or mist.

B. Weather Conditions Limitation: Proceed with Work only when existing and forecasted weather conditions will permit installation according to manufacturer's instructions and warranty requirements.

1.8 COORDINATION

A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.

1.9 WARRANTY

A. Manufacturer's Warranty for Urethane Sealants: Furnish manufacturer's written material warranty signed by an authorized representative using manufacturer's standard form agreeing to furnish materials required to repair or replace work which exhibits material defects caused by manufacture or design of product. "Defects" is defined to include but not limited to deterioration or failure to perform as required.

1. Warranty Period: Manufacturer shall warrant the products to be free from material Defects for a period of 5 years from date of Substantial Completion.

B. Manufacturer's Warranty for Silicone Sealants: Furnish manufacturer's written material warranty signed by an authorized representative using manufacturer's standard form agreeing to furnish materials required to repair or replace work which exhibits material defects caused by manufacture or design of product. "Defects" is defined to include but not limited to deterioration or failure to perform as required.

1. Warranty Period: Manufacturer shall warrant the products to be free from material Defects for a period of 20 years from date of Substantial Completion.

C. Installer's Warranty: Furnish installer's written warranty signed by an authorized representative using installer's standard form agreeing to provide labor required to repair or replace work which exhibits workmanship defects. "Defects" is defined to include but not limited to deterioration or failure to perform as required.

1. Warranty Period: Installer shall warrant the products to be free from workmanship Defects for a period of 2 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Single Source Responsibility: Furnish each type of product from single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials.

B. Compatibility: Joint sealants, backings, and other related materials shall be compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint sealant manufacturer based on testing and field experience.

C. Suitability for Contact with Food: Comply with authorities having jurisdiction for joints in repeated contact with food.

D. Sealant Color: As scheduled or as indicated in Design Selections.

2.2 EXTERIOR ELASTOMERIC SEALANTS

A. Exterior Pourable Urethane Sealant:

1. Product Quality Standard: ASTM C 920, Type M, Grade P, Class 25, Use T.
2. Description: Multi-component, pourable, moisture curing, polyurethane sealant; rated for incline when used on sloped surfaces.
3. Joint Movement Capability: Plus 25 percent, minus 25 percent.
4. Primers: Product provided by sealant manufacturer if required by conditions.
5. Manufacturers and Products:

    a. Sika Corp.; Sikaflex SL 2.
    b. Pecora Corp.; Urexpan NR-200.
    c. Sika Corp., Construction Products Div.; Sikaflex 2c SL.
    d. Tremco Commercial Sealants & Waterproofing; THC-900/THC-901 or Vulkem 445SSL.

B. Exterior Non-sag Silicone Sealant:

1. Product Quality Standard: ASTM C 920, Type S, Grade NS, Class 50 or 100/50.
2. Description: Single component, non-sag, neutral cure, non-staining as determined by pre-construction stain testing, and non-bleeding, silicone sealant.
3. Joint Movement Capability:

    a. Class 50: Plus 50 percent, minus 50 percent.
    b. Class 100/50: Plus 100 percent, minus 50 percent.

4. Primers: Product provided by sealant manufacturer if required by conditions.
5. Manufacturers and Products:

    a. Class 50:

        1) Dow; DOWSIL 795 Silicone Building Sealant.
        2) Momentive Performance Materials, GE Silicones; Silpruf SCS2000.
        3) Pecora Corp.; 864NST.
        4) Sika Corp., Construction Products Div.; Sikasil WS-295.
        5) Tremco Commercial Sealants & Waterproofing; Spectrem 3.

    b. Class 100/50:

        1) Dow; DOWSIL 790 Silicone Building Sealant.
        2) Momentive Performance Materials, GE Silicones; Silpruf LM SCS2700.
        3) Pecora Corp.; 890NST.
        4) Sika Corp., Construction Products Div.; Sikasil WS-290.
        5) Tremco Commercial Sealants & Waterproofing; Spectrem 1.

C. Exterior Air and Water Barrier Silicone Sealant:

1. Description: One part, neutral cure silicone sealant, designed for adhering to low energy surfaces commonly found on sheet air and water barriers.
2. Manufacturers and Products:

a. Basis of Design: Dow Corning; Dowsil 758 Silicone Weather Barrier Sealant.

2.3 INTERIOR ELASTOMERIC SEALANTS

A. Interior Non-sag Silicone Sealant:

1. Product Quality Standard: ASTM C 920, Type S, Grade NS, Class 25.
2. Description: Single component, non-sag, moisture curing, silicone sealant specially formulated with fungicide for use in sanitary non-porous applications.
3. Manufacturers and Products:

a. Dow; DOWSIL 786 Silicone Sealant.
b. Momentive Performance Materials, GE Silicones; Sanitary SCS1700.
c. Pecora Corp.; 898.
d. Sika Corp., Construction Products Div.; Sikasil GP
e. Tremco Commercial Sealants & Waterproofing; Tremsil 200.

B. Interior Non-sag Urethane Sealant:

1. Product Quality Standard: ASTM C 920, Type S, Grade NS, Class 25 or 35.
2. Description: Single component, non-sag, moisture curing, non-staining as determined by pre-construction stain testing if exposed, polyurethane sealant.
3. Joint Movement Capability: Plus 25 percent, minus 25 percent, or plus 35 percent, minus 35 percent.
4. Primers: Product provided by sealant manufacturer if required by conditions.
5. Manufacturers and Products:

a. Sika Corp.; Sikaflex NP 1.
b. Pecora Corp.; Dynatrol I-XL.
c. Sika Corp., Construction Products Div.; Sikaflex 1a or Sikaflex Textured Sealant.
d. Tremco Commercial Sealants & Waterproofing; Dymonic or Vulkem 116.

C. Interior Non-sag Acrylic Latex Sealant:

1. Product Quality Standard: ASTM C 834, Type and Grade as required by conditions.
2. Description: Single component, non-sag, moisture curing, general purpose, paintable, siliconized acrylic latex sealant.
3. Joint Movement Capability: Plus 7.5 percent, minus 7.5 percent
4. Manufacturers and Products:

a. Pecora Corp.; AC 20+.
b. Tremco Commercial Sealants & Waterproofing; Tremflex 834.

D. Sprayed Foam Insulating Gap Filler:

1. Description: Low pressure, one-component, expanding, open-cell latex-based insulating foam gap filler; applied with professional hand-held dispensing gun; CFC and HCFC free.
2. Performance Requirements: Class 1 Fire-Retardant per ASTM E 84.
3. Manufacturers and Products:

a. Convenience Products; Touch ‘N Foam, Easy Fill Latex Foam Sealant.
b. DAP Products, Inc.; DAPtex Plus.

E. Acoustical Sealants: As specified in Division 09 Section "Gypsum Board Assemblies".

F. Fire Resistive Sealants: As specified in Division 07 Section "Fire Resistive Joint Firestopping".

2.4 JOINT SEALANT BACKING

A. Sealant Backing Material, General: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

1. Use closed cell (Type C) sealant backing rod at formed sealant joints for typical conditions unless otherwise recommended by sealant manufacturer.
2. Use open cell (Type O) sealant backing rod at interior line of sealant for double sealed condition unless otherwise recommended by sealant manufacturer.

B. Cylindrical Sealant Backings:

1. Product Quality Standard: ASTM C 1330, Type C, Type O, Type B; as approved in writing by joint-sealant manufacturer for joint application indicated.
2. Description: Extruded polyethylene, polyurethane, or polyolefin in either closed cell structure (Type C), open cell structure (Type O), or bicellular structure with surface skin (Type B) as defined by ASTM Terminology C 717.
3. Size: Diameter approximately 25 percent larger than joint width, unless otherwise directed by manufacturer.
4. Manufacturers and Products:

a. Type C:

1) Sika Corp.; MasterSeal 920.
2) Nomaco Inc.; Green Rod or HBR.

b. Type O:

1) Backer Rod Mfg. Inc.; Denver Foam.
2) Nomaco Inc.; Foam-Pak II.

c. Type B:

1) Sika Corp.; MasterSeal 921.
2) Nomaco Inc.; Dual-Rod or Sof-Rod.

C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials, or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.5 PREFORMED SILICONE SHEETS AND TRANSITIONS

A. Preformed Cured Silicone Sheet and Transition Strips: Preformed silicone strip and molded pieces designed for flashing and transition applications, including closures between building envelope systems and spanning joints with large and/or dynamic movement.

1. Manufacturers and Products:

   a. Dow; DOWSIL Silicone Transition System.
   b. Momentive Performance Materials, Inc. / GE Silicones; UltraSpan.
   c. Pecora; Sil-Span.
   d. Sika Corp.; Sika Silbridge 400 Transition Sheet.
   e. Tremco Commercial Sealants and Waterproofing; Proglaze Engineered Transition Assembly.

2.6 ACCESSORIES

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Non-porous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent non-porous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

C. Masking Tape: Non-staining, non-absorbent material compatible with joint sealants and surfaces adjacent to joints.

D. Weep Hole Baffles: PVC-coated, reticulated open cell polyurethane foam, 30 - 40ppi sized for installation at 30 to 50 percent compression.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Acceptance of Surfaces and Conditions: Examine substrate surfaces to receive products and systems and associated Work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting Work within a particular area will be construed as acceptance of surface conditions.

3.2 INSTALLATION, GENERAL

A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:

1. Respective manufacturer's written installation instructions.
2. Accepted submittals.
3. Contract Documents.

3.3 PREPARATION

A. General: Comply with manufacturer's instructions, recommendations, and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants, or errors which would result in poor or potentially defective installation or would cause latent defects in Work.

B. Cleaning of Joints: Clean out joints immediately before installing joint backings and sealants to comply with joint sealant manufacturer's written instructions and following requirements:

1. Remove foreign material that could interfere with adhesion of joint sealant, including, but not limited to, dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air.
3. Remove laitance and form-release agents from concrete.
4. Clean non-porous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.
5. Substrate material allowed by sealant's ASTM C 920 Use Classification.

C. Joint Priming: Prime joint substrates where recommended by joint sealant manufacturer, or as required by pre-construction compatibility and adhesion testing. Apply primer to comply with joint sealant manufacturer's written instructions. Confine primers to areas of joint sealant bond; do not allow spillage or migration onto adjoining surfaces.

D. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.4 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations in ASTM C1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Joint Sealant Backings: Install type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of sealant backings.
2. Do not stretch, twist, puncture, or tear backings.
3. Remove absorbent sealant backings that have become wet or damaged before sealant application and replace with dry materials.
4. Install closed cell backer rod at exterior joints unless indicated otherwise on Drawings.

    a. Use open cell backer rod at interior line of sealant for double sealed conditions.

5. Install bond-breaker tape behind sealants where backings are not used between sealants and backs of joints.

D. Joint Sealants: Install at same time as backings using proven techniques that comply with following:

1. Place sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses in each joint configuration.
3. Produce uniform, cross sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
4. Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

    a. Remove excess sealant from surfaces adjacent to joints.
    b. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
    c. Use masking tape to protect surfaces adjacent to recessed tooled joints.

5. Install joint sealants in accordance with ASTM C 1193 as applicable to materials, applications, conditions indicated, and with the following profile configurations:

    a. Fillet: Figure 5.
    b. Bridge: Figure 6.
    c. Butt: Figure 8A (concave tooling), generally hour-glass shape with 2:1 width-to-depth ratio.

E. Sprayed Foam Insulating Gap Filler: Apply sprayed foam insulating gap filler within exterior wall assemblies using professional hand-held dispensing gun in accordance with manufacturer's written instructions.

1. Prior to installation of wall finish systems, apply sprayed foam insulating gap filler to gaps, cracks, cavities, openings, and voids in exterior wall back-up, including annular space around piping, ducts, conduits, wiring, and electrical outlets to seal off potential air drafts.
2. After sprayed foam sealant is applied, make flush with face of adjacent wall by using method recommended by manufacturer.

3.5 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Manufacturer's qualified technical representative shall periodically inspect Work to ensure installation is proceeding in accordance with manufacturer's designs, recommendations, instructions, and warranty requirements. Representative shall submit written reports of each visit indicating observations, findings, and conclusions of inspection.

1. Manufacturer's Technical Representative Qualifications: Direct employee of technical services department of manufacturer with experience in providing recommendations, observations, evaluations, and problem diagnostics.

B. Testing Agency: The Owner may employ and pay a qualified independent testing agency to perform field quality control. Materials and installation failing to meet specified requirements shall be replaced at Contractor's expense. Retesting of materials and installations failing to meet specified requirements shall be done at Contractor's expense.

1. Refer to Division 01 Section Field Test for Air and Water Leakage.

C. Field Adhesion Testing: Field test urethane and silicone sealant adhesion to joint substrates as follows:

1. General Requirements: Before installation, field test urethane and silicone sealant adhesion to joint substrates as follows

   a. Locate test joints where indicated or, if not indicated, as directed by Architect.
   b. Conduct field tests for each kind of urethane and silicone sealants and joint substrates indicated.
   c. Notify Architect 7 days in advance of dates and times when test joints will be erected.

2. Extent of Testing: Test completed and cured sealant joints as follows:

   a. Perform one test for the first 1000 feet (300 m) of joint length for each kind of sealant and joint substrate.
   b. Perform one test for each 1000 feet (300 m) of joint length thereafter or one test per each floor per elevation.

3. Test Methods: Joint sealant manufacturer's technical representative shall conduct following tests:

   a. When Joint Substrates are Identical: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C1193 or Method A, Tail Procedure, in ASTM C1521:

      1) Install 24 in (600 mm) long test specimens using same materials, methods for joint preparation, and joint sealant installation required for Work. Allow sealants to cure fully before testing.
      2) Make horizontal knife cut across width of sealant joint from one substrate to other substrate.
      3) Make 2 vertical cuts at both sides of substrates, downward starting at horizontal cut, approximately 3 in (75 mm) long.
      4) Grasp 3 in (75 mm) long piece of sealant tab firmly 1 in (25 mm) from its bonded edge and pull at not less than 90 degree angle.
      5) Substrate adhesion is acceptable if sealant tears cohesively within itself or elongates to a manufacturer determined extension value from 1 in (25 mm) gauge length before releasing from substrate adhesively.

   b. When Joint Substrates are Different: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C1193 or Method A, Tail Procedure, in ASTM C1521:

      1) Install 24 in (600 mm) long test specimens using same materials, methods for joint preparation, and joint sealant installation required for Work. Allow sealants to cure fully before testing.
      2) Make first horizontal knife cut across width of sealant joint from one substrate to other substrate.
      3) Make one vertical cut along one side of substrate, downward starting at horizontal cut, approximately 3 in (75 mm) long.

4) Make second horizontal knife cut across width of sealant joint from one substrate to other substrate at opposite end of 3 in (75 mm) long first cut.
5) Grasp 3 in (75 mm) long piece of sealant flap firmly and pull at not less than 90 degree angle.
6) Substrate adhesion is acceptable if sealant tears cohesively within itself or elongates to a manufacturer determined extension value from 1 in (25 mm) gauge length before releasing from substrate adhesively.

4. Reports: Inspect tested joints and report on the following:

a. Whether sealants filled joint cavities and are free of voids.
b. Whether sealant dimensions and configurations comply with specified requirements.
c. Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. Compare these results to determine if adhesion complies with sealant manufacturer's field-adhesion hand-pull test criteria.

5. Record test results in a field-adhesion-test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant material, sealant configuration, and sealant dimensions.
6. Repair sealants pulled from test area by applying new sealants following same procedures used originally to seal joints. Ensure that original sealant surfaces are clean and that new sealant contacts original sealant.

D. Evaluation of Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements

3.6 CLEANING

A. Remove excess sealant or sealant smears adjacent to joints as Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.7 PROTECTION

A. Protect during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original Work.

3.8 JOINT SEALANT SCHEDULE

A. Exterior Elastomeric Sealant Applications:

1. Exterior Pourable Urethane Sealant:

a. Moving joints in exterior concrete walks and drives.

2. Exterior Non-sag Silicone Sealant:

    a. Moving joints on exterior side of exterior walls.
    b. Gaps between building materials and components created by items penetrating the primary drainage surface of the exterior building envelope.
    c. Joints between dissimilar materials on exterior side of exterior walls.

3. Exterior Air and Water Barrier Sealant:

    a. Exterior moving and non-moving joints sealed to weather barrier materials.

B. Interior Elastomeric Sealant Applications:

1. Interior Non-sag Silicone Sealant:

    a. Non-moving joints in moist or damp areas which are susceptible to mildew.
    b. Non-moving joints in toilet rooms.
    c. Non-moving joints in kitchens.
    d. Non-moving joints in repeated contact with food.

2. Interior Non-sag Urethane Sealant:

    a. Building joints on interior side of exterior walls where joint movement is anticipated.

3. Interior Non-sag Acrylic Latex Sealant:

    a. Non-moving joints where another type of sealant is not otherwise specified or scheduled.
    b. Minimal moving joints due to temperature change.

C. Sprayed Foam Insulating Gap Filler Applications:

1. Exterior non-moving gaps around windows, glazed aluminum walls, doors, and penetrations beneath weather-resistant coverings.
2. Interior non-moving gaps around windows, glazed aluminum walls, doors, and penetrations.

END OF SECTION

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SECTION 079513

EXPANSION JOINT COVER ASSEMBLIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Expansion control assemblies and supplementary items necessary for installation.

1. Floor, wall, and ceiling interior expansion joint covers.
2. Wall exterior expansion joint covers.
3. Roof / membrane expansion joint covers.

B. Related Requirements:

1. Refer to Division 01 Building Enclosure Commissioning for Field Observations and Performance Testing.

1.2 DEFINITIONS

A. Minimum and Maximum Joint Widths: The extreme joint widths anticipated for an expansion joint.

B. Nominal Joint Width for Thermal Movement: The anticipated width of an expansion joint at local mean temperature.

C. Movement Capability: The plus or minus percentage of change relative to the nominal joint width.

1.3 ACTION SUBMITTALS

A. Product Data: Manufacturer's technical literature for each product and system indicated.

1. Include manufacturer's specifications for materials, finishes, construction details, installation instructions, and recommendations for maintenance.

B. Shop Drawings: Show details of fabrication and installation. Distinguish between shop and field-assembled work.

1. Include plans, elevations, sections, details, splices, block-out requirement, attachments to other work, and line diagrams showing entire route of each expansion joint.

a. Provide factory-fabricated closure materials and transition pieces, T-joints, corners, curbs, cross-connections, and other accessories as required to provide continuous expansion joint cover assemblies.

2. Where expansion joint cover assemblies change planes, provide isometric or clearly detailed drawing depicting how factory-fabricated transitions, terminations and other components interconnect and terminate.

C. Samples for Verification: For each type of expansion joint cover assembly, full width by 6 inches (150 mm) long in size.

D. Expansion Joint Cover Assembly Schedule: Prepared by or under the supervision of the supplier. Include the following information:

1. Manufacturer and model number for each joint system.
2. Joint system location cross-referenced to Drawings.
3. Nominal joint width.
4. Movement capability.
5. Classification as thermal or seismic.
6. Materials, colors, and finishes.
7. Product options.
8. Fire-resistance ratings.

1.4 INFORMATIONAL SUBMITTALS

A. Manufacturer's Project Acceptance Document: Certification by the manufacturer that its product(s) are approved, acceptable, suitable for use in specific locations, for specific details, and for applications indicated, specified, or required, and that a warranty will be issued.

B. Field Quality Control Reports: Written report of testing and inspection required by "Field Quality Control".

C. Warranty:

1. Provide manufacturer's written warranty covering materials and installation (labor) stating obligations, remedies, limitations, and exclusions

1.5 QUALITY ASSURANCE

A. Installer Qualifications:

1. Experience: Installer's personnel with not less than 5 years of experience in the successful performance of Work similar to scope of this Project.
2. Supervision: Installer shall maintain a competent supervisor at Project while the Work is in progress, and who has not less than 5 years of experience installing products and systems similar to scope of this Project.
3. Manufacturer Acceptance: Installer shall be certified, approved, licensed, or acceptable to manufacturer to install products.

1.6 MOCKUPS

A. Mock-ups: Prior to fabrication and installation, build mock-up for each form of construction and finish required to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution. Build mock-up using materials indicated for the completed Work.

1. Build mock-up in the location and of the size indicated or, if not indicated, as directed by Architect. Contractor shall provide structural support framework.

a. Show typical components, attachments to building structure, and requirements of installation.

2. Notify Architect seven days in advance of the dates and times when mock-up will be installed.
3. Obtain Architect's acceptance of mock-ups before starting fabrication or installation.
4. Acceptance of mock-ups does not constitute acceptance of deviations from the Contract Documents contained in mock-ups unless such deviations are specifically noted by Contractor and accepted by Architect in writing.
5. Demolish and remove mock-ups when directed by Architect unless accepted to become part of the completed Work.

1.7 PRE-INSTALLATION CONFERENCE

A. Pre-Installation Conference: Before Work begins, conduct conference at Project site.

1. Participants:

a. Architect.
b. Contractor, including superintendent.
c. Installer, including project manager and supervisor.
d. If requested, Manufacturer's qualified technical representative.
e. Installers of other construction interfaced with Work.

2. Minimum Agenda: Installer shall demonstrate understanding of the Work required by describing detailed procedures for preparing, installing, and cleaning the Work. Demonstration shall include, but not be limited to, following topics:

a. Tour representative areas of Work, inspect and discuss condition of substrate, and other preparatory work performed by other trades.
b. Review Contract Document requirements.
c. Review approved submittals.
d. Review inspection and testing requirements.
e. Review environmental conditions and procedures for coping with unfavorable conditions.
f. Resolve deviations or differences between Contract Documents and the manufacturer's specifications.

3. Record discussions, including decisions and agreements, and prepare report.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in manufacturer's original undamaged packages or acceptable bulk containers.

B. Store packaged materials to protect them from elements or physical damage.

1.9 PROJECT CONDITIONS

A. Field Measurements: Where products and systems are indicated to fit walls and other construction, verify dimensions by field measurements before fabrication.

1.10 COORDINATION

A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.

B. Coordinate installation of exterior expansion joint assemblies to ensure that transitions are watertight.

1.11 WARRANTY

A. Manufacturer's Warranty for Roofing and Membrane Expansion Joint Systems: Furnish manufacturer's written material warranty signed by an authorized representative using manufacturer's standard form agreeing to furnish materials and labor required to repair or replace work which exhibits material defects caused by manufacture or design of product. "Defects" is defined to include but not limited to deterioration or failure to perform as required.

1. Warranty Period: Manufacturer shall warrant the products to be free from material and labor defects for a period of 2 years from date of Substantial Completion.

a. Includes transitions and terminations of expansion joint systems.

B. Installer's Warranty for Roof Expansion and Membrane Expansion Joint Systems: Furnish installer's written workmanship warranty signed by an authorized representative using installer's standard form agreeing to provide labor required to repair or replace work which exhibits workmanship defects. "Defects" is defined to include but not limited to deterioration or failure to perform as required.

1. Warranty Period: Installer shall warrant the installation to be free from workmanship Defects for a period of 2 years from date of Substantial Completion.

a. Includes transitions and terminations of expansion joint systems.

PART 2 - PRODUCTS

2.1 MANUFACTURERS AND PRODUCTS

A. Acceptable Manufacturers and Products: Subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of manufacturers listed. If not listed, submit as substitution according to the Conditions of the Contract and Division 01 Section "Substitution Procedures".

B. Basis of Design (Product Standard): Contract Documents are based on products and systems specified to establish a standard of quality. Other available manufacturers offering products having equivalent characteristics may be considered, provided deviations are minor and comply with requirements of Contract Documents as judged by the Architect.

2.2 MATERIALS, GENERAL

A. Single Source Responsibility: Furnish each type of product from single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials.

2.3 ASSEMBLY DESCRIPTION

A. Furnish units in longest practicable lengths to minimize field splicing.

B. Include factory-fabricated closure materials and transition pieces, T-joints, corners, curbs, cross-connections, and other accessories as required to provide continuous expansion joint cover assemblies.

2.4 PERFORMANCE REQUIREMENTS

A. General Performance: Comply with performance requirements specified, as determined by testing of products and systems representing those indicated for this Project, without failure due to defective manufacture, fabrication, installation, or other defects in construction.

1. Exterior and Roof Joint Assemblies: Provide moisture barrier and drainage system as required to maintain continuity and watertightness of exterior building enclosure.
2. Fire-Resistance-Rated / Smoke Barrier Joint Assemblies: Provide fire barrier as required to maintain fire-resistance rating and integrity of smoke barrier assemblies.
3. Acoustically Rated Joint Assemblies: Provide acoustical barrier as required to maintain acoustical performance of acoustically rated partitions. Refer to Drawings for partition types and STC ratings.

B. Structural Loads and Movement: Engineer products and systems to withstand loads and movement within limits of allowable working stresses of the materials involved under conditions indicated including, but not limited to gravity, wind sway, seismic, and thermal movements established by authorities having jurisdiction, applicable building codes, and as indicated.

1. Expansion Joint Design Criteria: Comply with ASTM E 1399 Standard Test Method for Cyclic Movement and Measuring the Minimum and Maximum Joint Widths of Architectural Joint Systems.

a. Type of Movement: Thermal and Wind sway.

1) Nominal Joint Width: As indicated on Drawings.
2) Minimum Joint Width: As indicated on Drawings.
3) Maximum Joint Width: As indicated on Drawings.

b. Seismic Movement:

1) Joint Movement: As indicated on Drawings.

2. Load Capacity: Vehicular and Pedestrian Design Load and Load Contact Area as recommended by joint manufacturer in accordance with IBC Table 1607.1.

C. Seismic Performance: Systems shall withstand the effects of earthquake motions determined in accordance with ASCE/SEI 7, the building code and authorities having jurisdiction.

D. Fire-Resistance Ratings: Provide expansion joint cover assemblies with fire barriers identical to those of systems tested for fire resistance according to UL 2079 or ASTM E1966 by a qualified testing agency acceptable to authorities having jurisdiction.

1. Fire-Resistance Rating: Provide manufacturer's standard fire barrier assembly, not less than that indicated on Drawings and adjacent construction.

E. Accessibility Requirements for Floor Expansion Joint Systems: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines (ADAAG)" and ICC A117.1.

2.5 ARCHITECTURAL JOINT SYSTEMS, GENERAL

A. General: Provide architectural joint systems of design, basic profile, materials, and operation indicated. Provide units with capability to accommodate variations in adjacent surfaces.

1. Furnish units in longest practicable lengths to minimize field splicing. Install with hairline mitered corners where joint changes direction or abuts other materials.
2. Include factory-fabricated closure materials and transition pieces, tee-joints, corners, curbs, cross-connections, and other accessories as required to provide continuous joint systems.

2.6 ARCHITECTURAL JOINT SYSTEMS FOR BUILDING INTERIORS

A. Floor-to-Floor Joint Systems: Manufacturers and Products:

1. Type 01:

a. Architectural Art Mfg., Inc.; D Series.
b. Balco, Inc.; NBA Series.
c. Construction Specialties, Inc. (C/S Group); SJ Series.
d. InPro Corporation JointMaster; 721 Series.
e. MM Systems Corporation; LASB-NB Series. (Basis of Design)
f. Sika Corp.; Watson Bowman Acme FNB Series.

2. Type 10:

a. Balco, Inc.; Pan Series.
b. Construction Specialties, Inc. (C/S Group); SSR Series.
c. InPro Corporation JointMaster; 501 Series.
d. MM Systems Corporation; PDS Series. (Basis of Design)
e. Sika Corp.; Watson Bowman Acme SPJ Series.

B. Floor-to-Wall Joint (Corner) Systems: Manufacturers and Products:

1. Type 13:

a. Construction Specialties, Inc. (C/S Group); SSRW Series.
b. InPro Corporation JointMaster; 501 Series.
c. MM Systems Corporation; PDSE Series. (Basis of Design)
d. Sika Corp.; Watson Bowman Acme SPJ Series.

2. Type 14:

a. Balco, Inc.; NBAL-EW Series.
b. MM Systems Corporation; LASBE-NBR Series. (Basis of Design)

C. Wall-to-Wall Joint Systems: Manufacturers and Products:

1. Type 25:

a. Architectural Art Mfg., Inc.; H Series.
b. Balco, Inc.; 6GW Series.
c. Construction Specialties, Inc. (C/S Group); AFW Series.
d. MM Systems Corporation; FX-K Series. (Basis of Design)
e. Sika Corp.; Emseal Wabo Contour II (CTR).

D. Wall-to-Wall (Corner) Joint Systems: Manufacturers and Products:

1. Type 29:

a. Architectural Art Mfg., Inc.; H Series.
b. Balco, Inc.; 6GWC Series.
c. Construction Specialties, Inc. (C/S Group); AFW Series.
d. MM Systems Corporation; FX-L Series. (Basis of Design)
e. Sika Corp.; Emseal Wabo Contour II (CTR).

E. Ceiling-to-Wall (Corner) Joint Systems: Manufacturers and Products:

1. Type 33:

a. Architectural Art Mfg., Inc.; H Series.
b. Balco, Inc.; 6GWC Series.
c. Construction Specialties, Inc. (C/S Group); AFW Series.
d. MM Systems Corporation; FX-L Series. (Basis of Design)
e. Sika Corp.; Emseal Wabo Contour II (CTR).

F. Ceiling-to-Ceiling Joint Systems: Manufacturers and Products:

1. Type 37:

a. Architectural Art Mfg., Inc.; H Series.
b. Balco, Inc.; 6GW Series.
c. Construction Specialties, Inc. (C/S Group); AFW Series.
d. MM Systems Corporation; FX-K Series. (Basis of Design)

2.7 WALL EXTERIOR EXPANSION JOINT COVERS

A. Exterior Elastomeric-Seal Wall Joint Cover: Assembly consisting of continuous elastomeric primary seal and backup seal anchored to frames, fixed to sides of joint gap.

1. Basis-of-Design: Balco; a CSW Industrials Company; FCVS Series Elastomeric Face Seal Systems.
2. Manufacturers and Products:

a. Balco; a CSW Industrials Company; FCVS Series Elastomeric Face Seal Systems.
b. Construction Specialties, Inc. (C/S Group); SC Series.
c. InPro Corporation; 615 or 616 Series.
d. MM Systems Corporation; VSS Series.

e. Sika Corp.; Watson Bowman Acme WeatherSeam Exterior WSW Series.

3. Application: As indicated on Drawings.
4. Exposed Metal and/or Color: As selected by Architect from manufacturer's standards.

B. Exterior Preformed Foam Wall Joint Seals: Manufacturer's standard joint seal consisting of pre-compressed hydrophobic foam backer seal impregnated with a nondrying, water-repellent agent and factory pre-coated silicone cover to fit joint widths based on design criteria indicated, with factory- or field-applied adhesive for bonding to substrates.

1. Basis-of-Design Product: Sika EMSEAL; Seismic Colorseal Series. Watertight Expansion Joint.
2. Manufacturers and Products:

a. Construction Specialties, Inc. (C/S Group); VF Series.
b. InPro Corporation; 1200 Series Foam Seal.
c. Sika EMSEAL; Seismic Colorseal Series. Watertight Expansion Joint.

3. Application: As indicated on Drawings.
4. Color: As selected by Architect from manufacturer's standards.

2.8 ROOF / MEMBRANE EXTERIOR EXPANSION JOINT COVERS

A. Membrane Roof / Vegetative Roof Expansion Assemblies: Assembly consisting of a dual-seal, double-flanged, extruded thermoplastic rubber member with provisions for anchoring and sealing to roofing/waterproofing membrane.

1. Basis-of-Design Product: Sika Corp.; EMSEAL RoofJoint Series.

a. Flange Members: Nitrile; as required for roofing membrane.

2. Application: As indicated on Drawings.
3. Color: As selected by Architect from manufacturer's standards.

B. Split Slab Membrane Plaza Deck / Parking Deck Expansion Assemblies: Assembly consisting of a flanged, extruded thermoplastic rubber member anchored to frames with provisions for anchoring and sealing to roofing/waterproofing membrane.

1. Basis-of-Design Product: Sika Corp.; EMSEAL Migutan-FP Series.

a. Flange Members: PVC thermoplastic alloy or TPV (thermoplastic vulcanizate); as required for roofing membrane.

2. Manufacturers and Products:

a. Construction Specialties, Inc. (C/S Group); PDA Series.
b. Sika EMSEAL; Migutan-FP Series.

3. Application: As indicated on Drawings.
4. Exposed Metal and/or Color: As selected by Architect from manufacturer's standards.

C. Metal-Plate Roof / Seismic Joint Cover: Assembly consisting of sliding metal cover plate in continuous contact with gaskets mounted on metal frames fixed to sides of joint gap.

1. Basis-of-Design Product: Balco; a CSW Industrials Company; FR / FRE-Straight Curb Series or LPR / LPRE - Canted Curb Series.

    a. Extruded-Aluminum Covers:

        1) Covers less than 15 in (375 mm) Wide: Minimum 0.080 in (2 mm) thick.
        2) Covers 15 in (375 mm) and Wider: Minimum 0.125 in (3 mm) thick.

2. Manufacturers and Products:

    a. Architectural Art Mfg., Inc.; L Series Roof Expansion Covers.
    b. Balco; a CSW Industrials Company; FR / FRE-Straight Curb Series or LPR / LPRE - Canted Curb Series.
    c. Construction Specialties, Inc. (C/S Group); Models SRJ and SRJW.
    d. MM Systems Corporation; Styles RXH / RXJ.
    e. Sika Corp.; Watson Bowman Acme Models RFC / RFC-C or RFL / RFL-C.

3. Application: As indicated on Drawings.
4. Exposed Metal and/or Color: As selected by Architect from manufacturer's standards.

D. Bellows Roof Joint Cover: Assembly consisting of metal flanges and extruded elastomeric bellows with an integral water gutter.

1. Basis-of-Design Product: Balco; a CSW Industrials Company; Michael Rizza Company RRg Series.
2. Manufacturers and Products:

    a. Construction Specialties, Inc. (C/S Group); BRJ / BRJW Series.
    b. Balco; a CSW Industrials Company; Michael Rizza Company RRg Series Silicone.
    c. MM Systems Corporation; ERF Series.
    d. Sika Corp.; Emseal WaboFlash Series.

3. Application: As indicated on Drawings.
4. Color: As selected by Architect from manufacturer's standards.

2.9 FLEXIBLE GUTTER AND DRAIN TUBE SYSTEM

A. Description: Manufacturer standard secondary moisture control and collection system consisting of flexible, reinforced neoprene gutter profile that satisfies the required design movement and compresses without damage during full joint closure. Gutter profile shall contain and drain excess amounts of collected moisture through a drain tube that exhibits similar flexibility. System secures to underside of concrete slab substrate by utilizing anchored retainer profile.

1. Basis of Design: Sika Corp.; Watson Bowman Acme WaboGutterFlex, Model USG; total joint opening sizes as required to meet specific joint movement criteria.
2. Gutter Profile Materials: 0.062 in (1.5 mm) thick single ply fabric reinforced neoprene sheet. Width of profile shall be governed by joint type and movement requirements.
3. Drain Tube: 1-1/2 in (38 mm) inside diameter by 1/8 in (3 mm) thick wall clear PVC flexible tubing. Length shall be as required for final connection.

4. Transition Element: Premolded 0.060 in (1.5 mm) thick EPDM tapered profile with pre-taped flange and adhesive for proper bonding to underside of gutter profile.
5. Retainer Profile: 3/16 in (5 mm) thick aluminum 5052-H32 alloy, mill finish, preformed to receive a continuous bead of edge sealant and pre-drilled for anchors at 16 in (400 mm) on center.
6. Edge Sealant: Manufacturer recommended one-part polyurethane moisture cure sealant.
7. Anchors: Manufacturer's standard 1/4 in (6 mm) diameter by 1-3/4 in (44 mm) long countersunk flathead concrete screw anchor. Carbon steel anchor shall receive factory fluoropolymer coating.

B. Locations: Exterior floor, roof, plaza deck and parking deck joint cover assemblies.

2.10 MATERIALS

A. Aluminum: ASTM B221 (ASTM B221M), Alloy 6063-T5 for extrusions; ASTM B209 (ASTM B209M), Alloy 6061-T6 for sheet and plate.

1. Apply manufacturer's standard protective coating on aluminum surfaces to be placed in contact with cementitious materials.

B. Stainless Steel: ASTM A240/A240M or ASTM A666, Type 304 for plates, sheet, and strips.

C. Elastomeric Seals: Manufacturer's standard preformed elastomeric membranes or extrusions to be installed in metal frames.

D. Fire Barriers: Any material or material combination, when fire tested after cycling, designated to resist the passage of flame and hot gases through a movement joint and to comply with performance criteria for required fire-resistance rating.

E. Moisture Barrier: Manufacturer's standard, flexible elastomeric material.

2.11 ALUMINUM FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Finish designations prefixed by "AA" conform to the system established by the Aluminum Association for designating aluminum finishes.

D. Mill Finish for Floor Covers: AA-M10 (Mechanical Finish: as fabricated; no other applied finish unless buffing is required to removed scratches, welding, or grinding produced in fabrication process).

E. Clear Anodic Finish for Wall and Ceiling Covers: AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.

2.12 STAINLESS STEEL FINISHES

A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.

B. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.

1. Run grain of directional finishes with long dimension of each piece.

2. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
3. Directional Satin Finish: No. 4.

C. Bright, Cold-Rolled, Unpolished Finish: No. 2B.

2.13 ACCESSORIES

A. Moisture Barriers: Manufacturer's standard continuous, waterproof membrane within joint and attached to substrate on sides of joint.

1. Provide at exterior joint assemblies and where indicated on Drawings.

B. Fasteners and Anchors: Manufacturer's recommended standard or stainless steel fasteners and attachment devices: suitable for application and load capacity. Include anchors, clips, fasteners, set screws, spacers, and other accessories compatible with material in contact, as indicated or required for complete installations.

C. Roofing Cement: ASTM D 4586, Type II.

D. Elastomeric Sealant: ASTM C 920, elastomeric silicone polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and to remain watertight as recommended by manufacturer.

1. Refer to Division 7 Section Joint Sealants.

E. Mineral-Fiber Blanket Insulation: ASTM C 665.

1. Refer to Division 7 Thermal Insulation.

F. Silicone Extrusions: Classified according to ASTM D 2000, UV stabilized, and do not propagate flame.

G. Epoxy Grout Fill:

1. General: Use epoxy grout fill in accordance with manufacturer's application limitations, precautions, and directions for use, including but not limited to surface preparation, mixing, placing, curing, and compatibility with substrate conditions.
2. Description: Multi-component, high strength epoxy grout.
3. Manufacturers and Products:

a. BASF Construction Chemicals; MasterFlow 648.
b. Laticrete; L&M EpoGrout 758 Epoxy Structural Grout.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Acceptance of Surfaces and Conditions: Examine substrates to receive products and systems and associated work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions.

3.2 INSTALLATION, GENERAL

A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:

1. Respective manufacturer’s written installation instructions.
2. Accepted submittals.
3. Contract Documents.

B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by isolating metals and other materials from direct contact with incompatible materials.

3.3 PREPARATION

A. General: Comply with manufacturer's instructions, recommendations and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants, or errors which would result in poor or potentially defective installation or would cause latent defects in Work.

B. Prepare substrates according to expansion joint cover assembly manufacturer's written instructions.

1. Repair concrete slabs and blockouts using manufacturer's recommended repair grout of compressive strength adequate for anticipated structural loadings.

C. Coordinate and furnish anchorages, setting drawings, and instructions for installing joint systems. Provide fasteners of metal, type, and size to suit type of construction indicated and to provide for secure attachment of joint systems.

3.4 INSTALLATION

A. Comply with manufacturer's written instructions for storing, handling, and installing expansion joint cover assemblies and materials unless more stringent requirements are indicated.

B. Metal Frames: Perform cutting, drilling, and fitting required to install joint systems.

1. Install in true alignment and proper relationship to joints and adjoining finished surfaces measured from established lines and levels.
2. Adjust for differences between actual structural gap and nominal design gap due to ambient temperature at time of installation. Notify Architect where discrepancies occur that will affect proper joint installation and performance.

3. Cut and fit ends to accommodate thermal expansion and contraction of metal without buckling of frames.
4. Install frames in continuous contact with adjacent surfaces.

    a. Shimming is not permitted unless specifically allowed by the manufacturer in writing for this installation.

5. Locate anchors at interval recommended by manufacturer, but not less than 3 in (75 mm) from each end and not more than 24 in (600 mm) on center.

C. Elastomeric Seals in Metal Frames: Install elastomeric seals and membranes in frames to comply with manufacturer's written instructions. Install with minimum number of end joints.

1. Provide in continuous lengths for straight sections.
2. Seal transitions. Vulcanize or heat-weld field-spliced joints as recommended by manufacturer.
3. Mechanically lock seals into frames or adhere to frames with adhesive or pressure-sensitive tape as recommended by manufacturer.

D. Preformed Foam Joint Seals: Install in compliance with manufacturer's written instructions. Install with minimum number of end joints.

1. Install each length of seal immediately after removing protective wrapping.
2. Firmly secure compressed joint seals to joint gap side to obtain full bond using exposed pressure-sensitive adhesive or field-applied adhesive as recommended by manufacturer.
3. Do not pull or stretch material. Produce seal continuity at splices, ends, turns, and intersections of joints.
4. For applications at low ambient temperatures, heat foam joint seal material in compliance with manufacturer's written instructions.

E. Install with hairline mitered corners where expansion joint cover assemblies change direction or abut other materials.

F. Terminate exposed ends of expansion joint cover assemblies with field- or factory-fabricated termination devices.

G. Fire-Resistance-Rated Assemblies: Coordinate installation of architectural joint assembly materials and associated work so complete assemblies comply with assembly performance requirements.

1. Fire Barriers: Install fire barriers to provide continuous, uninterrupted fire resistance throughout length of joint, including transitions and field splices.

H. Moisture Barrier: Provide moisture barrier and drainage at exterior joints and where indicated on Drawings. Provide drainage fittings and connect to drains.

I. Roof Expansion Assemblies: Extend assemblies over curbs, parapets, cornices, gutters, valleys, fasciae, and other elements in the construction profile, with factory-fabricated intersections and transitions to provide continuous, uninterrupted, waterproof roof expansion assemblies.

1. Install factory-fabricated transitions between roof expansion assemblies and building architectural joint systems to provide continuous, uninterrupted, watertight construction.

2. Splice roof expansion assemblies with materials provided by roof expansion assembly manufacturer for this purpose, according to manufacturer's written instructions, to provide continuous, uninterrupted, waterproof roof expansion assemblies.
3. Provide uniform profile of roof expansion assembly throughout length of each installation; do not stretch polymeric sheets.
4. Install mineral-fiber blanket insulation to fill joint space within joint and moisture barrier.
5. Bed anchorage flanges in roofing cement or sealant recommended by manufacturer and securely nail to curbs and cant strips as recommended by manufacturer but not less than 6 in (150 mm) on center.

J. Flexible Gutter and Drain Tube System: Install in accordance with manufacturer written instructions.

1. Flexible gutter profile shall be continuous along length of joint.
2. Seal and anchor flexible gutter system to substrate. Refer to manufacturer instructions for capping ends.
3. Drain tube assemblies shall be spaced at approximately 25 ft (7.5 m) center to center along length of joint or as indicated on the Drawings.
4. Attach drain tube assembly. Using hand roller, apply direct pressure to flange ensuring full contact and proper adhesion.

3.5 CONNECTIONS AND TRANSITIONS

A. Prefabricated Joint Transition Assemblies: Coordinate transitions and terminations of expansion joint covers between each type of application and installation. Provide factory-fabricated units at all joint transitions and terminations, including but not limited to waterproofing, exterior walls, soffits, and roof expansion joint cover assemblies.

3.6 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Manufacturer's qualified technical representative shall periodically inspect Work to ensure installation is proceeding in accordance with manufacturer's designs, recommendations, instructions, and warranty requirements. Representative shall submit written reports of each visit indicating observations, findings, and conclusions of inspection.

1. Manufacturer's Technical Representative Qualifications: Direct employee of technical services department of manufacturer with experience in providing recommendations, observations, evaluations, and problem diagnostics.

B. Testing Agency: The Owner may employ and pay a qualified independent testing agency to perform field quality control. Materials and installation failing to meet specified requirements shall be replaced at Contractor's expense. Retesting of materials and installations failing to meet specified requirements shall be done at Contractor's expense.

1. Refer to Division 01 Building Enclosure Commissioning for Field Observations and Performance Testing.

3.7 PROTECTION

A. Do not remove protective covering until finish work in adjacent areas is complete. When protective covering is removed, clean exposed metal surfaces to comply with manufacturer's written instructions.

B. Provide final protection and maintain conditions in a manner acceptable to manufacturer and Installer that ensures that expansion joint assemblies are without damage or deterioration at time of Substantial Completion.

1. Where construction traffic is anticipated, remove and properly store cover plates or seals and install temporary protection over joints. Reinstall cover plates or seals prior to Substantial Completion of the Work.

END OF SECTION

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