Division 07

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SECTION 071326
SELF-ADHERING SHEET WATERPROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Types of sheet waterproofing specified in this Section include the following:

1. Rubberized asphalt sheet waterproofing for below grade applications at foundation walls as indicated.
2. Drainage protection board for vertical applications.

B. Related Sections Include the Following:

1. Division 07 Section "Thermal Insulation" for below-grade rigid insulation installed with waterproofing.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site in compliance with the following:

1. Before installing waterproofing, meet with Owner, Architect, consultants, independent testing agency, waterproofing manufacturer, and other concerned entities.
2. Review requirements for waterproofing, including surface preparation specified under other Sections, substrate condition and pretreatment, minimum curing period, forecasted weather conditions, special details and sheet flashings, installation procedures, inspection and testing procedures, and protection and repairs.
3. Notify participants at least 7 days before conference.

1.3 ACTION SUBMITTALS

A. Product Data for each type of waterproofing specified, including manufacturer's written instructions for evaluating, preparing, and treating substrate, technical data, and tested physical and performance properties.

1. Certification by waterproofing materials manufacturer that products supplied comply with local VOC regulations.

B. Shop Drawings showing locations and extent of waterproofing, including details for substrate joints and cracks, sheet flashings, penetrations, tie-ins with adjoining construction, and other termination conditions.

C. Samples, 3-by-6-inch (75-by-150-mm) minimum size, of each waterproofing and associated materials required for Project.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer. Submit certificates signed by manufacturer stating that installers comply with requirements under the "Quality Assurance" Article

B. Sample Warranties: For special warranties.

1.5 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Obtain primary waterproofing materials of each type required from a single manufacturer that has been producing such materials for a minimum of ten years. Provide secondary materials only as recommended by manufacturer of primary materials.

B. Installer: A firm with not less than five waterproofing projects similar to requirements (including size and scope) for this Project with satisfactory in-service performance and which is acceptable to primary waterproofing materials manufacturer.

C. Single-Source Responsibility: Obtain waterproofing materials from a single manufacturer regularly engaged in manufacturing waterproofing.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in original packages with seals unbroken, labeled with manufacturer's name, product, date of manufacture, and directions for storage.

B. Store materials in their original undamaged packages in a clean, dry, protected location and within temperature range required by waterproofing manufacturer. Protect stored materials from direct sunlight.

1.7 PROJECT CONDITIONS

A. Substrate: Proceed with work after substrate construction, openings, and penetrating work have been completed and areas are free of standing or running water, ice, and frost. Verify that concrete is dry, smooth, and free from sharp or ragged out-angles, honeycombing, rock pockets, depressions, and projections.

B. Environmental Conditions: Apply waterproofing within range of ambient and substrate temperatures recommended by waterproofing manufacturer. Do not apply waterproofing to a damp or wet substrate.

1. Do not apply waterproofing in snow, rain, fog, or mist.
2. Proceed with waterproofing and associated work only when existing and forecasted weather conditions will permit work to be performed in accordance with manufacturers' recommendations and warranty requirements.

C. Do not install waterproofing where it will be exposed to rain, sleet or snow for any duration prior to the installation of toppings or other adjacent materials.

1.8 WARRANTY

A. The warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under requirements of the Contract Documents.

B. Special Warranty: Submit a written warranty executed by the manufacturer, agreeing to repair or replace sheet membrane waterproofing that fails in materials or workmanship within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products: Provide waterproofing system with all auxiliary components as required and recommended by manufacturer for applications indicated; manufactured by one of the following, or equal:

1. Carlisle Coatings and Waterproofing
2. GCP Applied Technologies, Inc.
3. Tamko Roofing Products, Inc.

2.2 RUBBERIZED ASPHALT SHEET WATERPROOFING

A. Rubberized asphalt self-adhering membrane integrally bonded to polyethylene sheeting, formed into uniform flexible sheets of not less than 56 mils thick, complying with the following:

1. Tensile Strength: 325 psi minimum; ASTM D 412.
2. Ultimate Elongation: 300 percent minimum; ASTM D 412.
3. Brittleness Temperature: Minus 25 deg F (minus 32 deg C); ASTM D 746.
4. Hydrostatic Head Resistance: 210 feet minimum.
5. Water Absorption: Not more than 0.1 percent weight gain after 48 hours' immersion at 70 deg F (21 deg C); ASTM D 570.
6. Permeance: 0.05 perm maximum; ASTM E 96, Method B.

B. Product: Subject to compliance with requirements, provide one of the following or equal:
1. Bituthene System 4000, GCP Applied Technologies, Inc.
2. CCW MiraDRI 860/861, Carlisle Coatings and Waterproofing.
3. TW-60; Tamko Roofing Products, Inc.

2.3 AUXILIARY MATERIALS

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

B. Adhesives and Joint Tape: Provide types of adhesive compound and tapes recommended by waterproofing sheet manufacturer for bonding to substrate (if required), for waterproofing seams in membrane, and for waterproofing joints between membrane and flashings, adjoining surfaces, and projections through membrane.

C. Primers: Provide type of concrete primer recommended by manufacturer of sheet waterproofing material for applications required.

D. Flashing Materials: Except as otherwise indicated, provide types of flexible sheet material for flashing as recommended by waterproofing sheet manufacturer.

E. Trowelable Liquid Membrane: Two component, cold-applied trowel grade waterproofing material used to flash corners, form fillets and detail hard-to-reach areas. Type recommended by membrane manufacturer, compatible with membrane.

F. Metal Termination Bars: Aluminum bars, approximately 1 by 1/8 inch (25 by 3 mm) thick, predrilled at 9-inch (229-mm) centers.

G. Rigid Insulation: Specified in Division 07 Section “Thermal Insulation”.

2.4 MOLDED-SHEET DRAINAGE PANELS

A. Nonwoven-Geotextile-Faced, Molded-Sheet Drainage Panel: Manufactured composite drainage panels, 3-dimensional, nonbiodegradable, manufactured with a permeable geotextile bonded to molded-plastic-sheet drainage core and designed to effectively convey water.

1. Vertical Application: Provide product with properties suitable for use vertically:
   a. Thickness: 0.40 inches (10.16 mm) min.
   b. Compressive Strength per ASTM D 1621: 15,000 pounds per sq. ft..
   c. Filter Fabric Tensile Strength per ASTM D 4632: 100 pounds min.
   d. Filter Fabric Puncture Resistance per ASTM D 4833: 65 pounds.
   e. Filter Fabric Apparent Opening Size per ASTM D 4751: Sieve size 70 max.
   f. Product: Subject to compliance with requirements, provide one of the following or equal:
      1) Hydroduct 220, GCP Applied Technologies, Inc.
      2) CCW MiraDRAIN 6000/6200, Carlisle Coatings and Waterproofing.
      3) Hydrodrain 400, American Hydrotech, Inc.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions under which waterproofing systems will be applied, with Installer present, for compliance with requirements. Do not proceed with installation until unsatisfactory conditions have been corrected.

1. Do not proceed with installation until after minimum concrete curing period recommended by waterproofing manufacturer.
2. Verify substrate is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D 4263.
3. Notify Architect in writing of anticipated problems using waterproofing over substrate.

3.2 SURFACE PREPARATION

A. General: Comply with manufacturer's instructions for preparing surface.

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

C. Mask off adjoining surfaces not receiving waterproofing to prevent spillage affecting other construction.

D. Remove grease, oil, bitumen, form release agents, paints, and other penetrating contaminants from concrete.

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

F. Prepare, fill, prime, and treat joints and cracks in substrate in accordance with manufacturer’s directions. Remove dust and dirt from joints and cracks according to ASTM D 4258.

G. Corners: Prepare, prime, and treat inside and outside corners according to ASTM D 6135 and manufacturer’s directions.

H. Prepare, treat, and seal vertical and horizontal surfaces at terminations and penetrations through waterproofing and at drains and protrusions according to ASTM D 6135.

I. Apply primer to substrate surfaces at rate recommended by manufacturer of primary waterproofing materials. Prime only area that will be covered by waterproofing membrane in same working day. Reprime areas not covered by waterproofing membrane within 24 hours.

3.3 INSTALLATION, GENERAL

A. Comply with manufacturer's instructions for handling and installing sheet waterproofing materials.

1. Apply rubberized asphalt membrane waterproofing to vertical surfaces of foundation walls, and elsewhere as indicated on drawings.

B. Coordinate installing waterproofing materials with associated work to provide complete system complying with combined recommendations by manufacturers and installers involved in Work. Schedule installation to minimize exposure of sheet waterproofing materials.

3.4 RUBBERIZED ASPHALT SHEET WATERPROOFING APPLICATION

A. Accurately align sheets and maintain uniform side and end laps of minimum dimensions required. Stagger end laps.

B. Apply bonding adhesive to substrate at required rate and allow to partially dry.

C. Apply waterproofing sheet to vertical surfaces in shingled fashion, starting at the low point and working toward high point of wall. Overlap all side seams a minimum of 2-1/2 inches and end laps a minimum of 5 inches. Roll all membrane with hand roller. Firmly press edges of membrane to surfaces to provide watertight seal. Apply bead of mastic to all terminations.

1. Provide a fillet of liquid membrane at all inside corners covered with sheet waterproofing prior to flashing with sheet waterproofing.

D. Seal projections through membrane and seal seams. Bond to vertical surfaces and also, where shown or recommended by manufacturer, bond to horizontal surfaces.

E. Spread sealant or mastic bed over deck drain flange at deck drains and securely seal waterproofing sheet in place with clamping ring.

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

G. For vertical and sloped-wall membrane, finish in termination bar; otherwise finish under flashing or under masonry in joint. Seal exposed edges with mastic or sealant.

H. Repair tears, voids, and lapped seams in waterproofing not complying with requirements. Slit and flatten fishmouths and blisters. Patch with sheets extending 6 inches (150 mm) beyond repaired areas in all directions.

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

J. Immediately install drainage panels with butted joints over waterproofing membrane

3.5 MOLDED-SHEET DRAINAGE PANEL INSTALLATION

A. Place and secure molded-sheet drainage panels with geotextile facing away from wall surface, according to manufacturer's written instructions over installed waterproofing membrane. Use adhesives that do not penetrate waterproofing. Lap edges and ends of geotextile to maintain continuity. Protect installed molded-sheet drainage panels by installing protection course of rigid insulation over drainage panel, as indicated on Drawings.

3.6 INSULATION INSTALLATION

A. Install single layer of board insulation over installed drainage panel as indicated on Drawings. Cut and fit to within 3/4 inch (19 mm) of projections and penetrations

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

C. Protect during subsequent construction operations.

3.7 PROTECTING AND CLEANING

A. Protect waterproofing from damage and wear during application and remainder of construction period according to manufacturer's written instructions. Do not allow traffic of any type on unprotected membrane.

B. Protect installed insulation from damage due to ultraviolet light exposure, physical abuse, and other causes. Provide temporary coverings where insulation will be subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

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

END OF SECTION

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SECTION 072100
THERMAL INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Foam-plastic board insulation.
2. Weather barrier membrane (building wrap).

1.2 ACTION SUBMITTALS

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

1.3 INFORMATIONAL SUBMITTALS

A. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each product.

1. For proprietary building-wrap weather barrier, submit data substantiating compliance with building code in effect for Project.

B. Research/Evaluation Reports: For foam-plastic insulation, from ICC-ES.

1.4 QUALITY ASSURANCE

A. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1.5 DELIVERY, STORAGE, AND HANDLING

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

B. Protect foam-plastic board insulation as follows:

1. Do not expose to sunlight except to necessary extent for period of installation and concealment.
2. Protect against ignition at all times. Do not deliver foam-plastic board materials to Project site before installation time.

3. Quickly complete installation and concealment of foam-plastic board insulation in each area of construction.

C. Do not leave weather barrier exposed to weather for more than 120 days.

PART 2 - PRODUCTS

2.1 FOAM-PLASTIC BOARD INSULATION

A. Extruded-Polystyrene Board Insulation: ASTM C 578, of type and minimum compressive strength indicated below, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84.

1. Basis of Design Product: Styrofoam Brand SM Insulation by DuPont (formerly Dow) or equal products by one of the following:
   a. DiversiFoam Products.
   b. Owens Corning.

2. Type IV, 25 psi (173 kPa).
3. Thickness: As indicated on Drawings for each application.
4. Edges: Square edge or shiplap edge boards, manufacturer's standard for thicknesses required.
5. Applications: Below grade applications, and under stucco systems.

B. Polyisocyanurate Board Insulation: ASTM C 1289, Type I, Class 2, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84.

1. Basis of Design Product: Provide Thermax (ci) Exterior Insulation by DuPont (formerly Dow) or equal products by one of the following.
   a. Atlas Roofing Corporation.
   b. Rmax, Inc.

2. Thickness: As indicated on Drawings for each application.
3. Facing:
   a. Foil faced both sides, where indicated
   b. Unfaced, where indicated..

4. Edges: Square edge or shiplap edge boards, manufacturer's standard for thicknesses required.
5. Application: Exterior wall sheathing.

C. Adhesive for Bonding Insulation: Product with demonstrated capability to bond insulation securely to substrates without damaging insulation and substrates.

1. VOC Limits: Provide adhesives with VOC content not more than 50 g/L when calculated according to 40 CFR 59, Subpart D (EPA method 24).

2.2 WEATHER BARRIER MEMBRANE

A. Building Wrap: Spunbonded polyolefin, non-woven, non-perforated, weather barrier with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, when tested according to ASTM E 84; and UV stabilized.

1. Basis of Design Product: DuPont; Tyvek CommercialWrap, or approved equal.

B. Weather Barrier Tape: Oriented polypropylene film coated with a permanent acrylic adhesive; DuPont Tyvek Tape, or equal.

C. Self-Adhering Flashing Tape: Provide DuPont StraightFlash straight flashing tape and FlexWrap flexible flashing tape, consisting of Tyvek polyethylene film and butyl sealant; at

window and door heads and where indicated.

D. Fasteners: Type required for substrate being fastened to.

2.3 INSULATION FASTENERS

A. Adhesively Attached, Spindle-Type Anchors: Plate welded to projecting spindle; capable of holding insulation of specified thickness securely in position indicated with self-locking washer in place.

1. Products: Subject to compliance with requirements, provide one of the following or equal:
   a. AGM Industries, Inc.; Series T TACTOO Insul-Hangers.
   b. Eckel Industries of Canada; Stic-Klip Type N Fasteners
   c. Gemco; Spindle Type.

2. Plate: Perforated, galvanized carbon-steel sheet, 0.030 inch (0.762 mm) thick by 2 inches (50 mm) square.
3. Spindle: Copper-coated, low-carbon steel; fully annealed; 0.105 inch (2.67 mm) in diameter; length to suit depth of insulation indicated.

B. Adhesively Attached, Angle-Shaped, Spindle-Type Anchors: Angle welded to projecting spindle; capable of holding insulation of specified thickness securely in position indicated with self-locking washer in place.

1. Products: Subject to compliance with requirements, provide one of the following or equal:
   a. Gemco; 90-Degree Insulation Hangers.

2. Angle: Formed from 0.030-inch- (0.762-mm-) thick, perforated, galvanized carbon-steel sheet with each leg 2 inches (50 mm) square.
3. Spindle: Copper-coated, low-carbon steel; fully annealed; 0.105 inch (2.67 mm) in diameter; length to suit depth of insulation indicated.

C. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- (0.41-mm-) thick galvanized-steel sheet, with beveled edge for increased stiffness, sized as required to hold insulation securely in place, but not less than 1-1/2 inches (38 mm) square or in diameter.

1. Products: Subject to compliance with requirements, provide one of the following or equal:
   a. AGM Industries, Inc.; RC150 or SC150.
   b. Gemco; Dome-Cap, R-150 or S-150.

2.4 MISCELLANEOUS MATERIALS

A. Cement board protection board.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean substrates of substances that are harmful to insulation or weather barriers, including removing projections capable of puncturing weather barriers, or that interfere with insulation attachment.

3.2 INSTALLATION, GENERAL

A. Comply with insulation manufacturer's written instructions applicable to products and applications indicated.

B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.

C. Extend insulation to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

D. Provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

3.3 INSTALLATION OF BELOW-GRADE INSULATION

A. On vertical surfaces, set insulation units using manufacturer's recommended adhesive according to manufacturer's written instructions. Extend insulation to dimension below exterior grade line as indicated.

1. Where below grade insulation is installed over drainage protection board and installed waterproofing membrane, install boards vertically, loose laid.

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

3.4 INSTALLATION OF INSULATION FOR FRAMED AND FURRED CONSTRUCTION

A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.

B. Foam-Plastic Board Insulation: Seal joints between units by applying adhesive, mastic, or sealant to edges of each unit to form a tight seal as units are shoved into place. Fill voids in completed installation with adhesive, mastic, or sealant as recommended by insulation manufacturer.

3.5 INSTALLATION OF INSULATION FOR CONCRETE SUBSTRATES

A. Install board insulation on concrete substrates by adhesively attached, spindle-type insulation anchors as follows:

1. Fasten insulation anchors to concrete substrates with insulation anchor adhesive according to anchor manufacturer's written instructions. Space anchors according to insulation manufacturer's written instructions for insulation type, thickness, and application indicated.

2. Apply insulation standoffs to each spindle to create cavity width indicated between concrete substrate and insulation.
3. After adhesive has dried, install board insulation by pressing insulation into position over spindles and securing it tightly in place with insulation-retaining washers, taking care not to compress insulation below indicated thickness.
4. Where insulation will not be covered by other building materials, apply capped washers to tips of spindles.

3.6 INSTALLATION OF WEATHER BARRIER MEMBRANE

A. Cover insulation with weather barrier membrane where indicated on Drawings according to manufacturer's written instructions.

1. Install weather barrier in a horizontal manner starting at the lower portion of the wall surface with subsequent layers installed in a shingling manner to overlap lower layers
2. Provide overlaps as per manufacturer’s recommendations. Tape all vertical and horizontal seams.
3. Install accessories including flashing tapes as per manufacturer’s recommendations to seal all penetrations and openings in weather barrier, including all window and door openings.

3.7 PROTECTION

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

END OF SECTION

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SECTION 074113
METAL ROOF PANELS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Standing seam metal roofing system.

B. Standing seam metal roofing accessories.

C. Metal roofing accessories.

1.2 REFERENCES

A. ASTM E 1646 - Standard Test Method for Water Penetration of Exterior Metal Roof Panel Systems by Uniform Static Air Pressure Difference.

B. ASTM E 1680 - Standard Test Method for Rate of Air Leakage Through Exterior Metal Roof Panel Systems.

C. ASTM E 2140 - Standard Test Method for Water Penetration of Metal Roof Panel Systems by Static Water Pressure Head.

D. ASCE 7 - Minimum Design Loads for Buildings and Other Structures.

E. UL 580 - Standard for Tests for Uplift Resistance of Roof Assemblies.

F. ICC-ES AC166 - Test Procedure for Wind Driven Rain Resistance of Metal Roof Coverings.

G. SMACNA - Architectural Sheet Metal Manual.

H. National Coil Coating Association (NCCA)

I. NRCA - The NRCA Roofing and Waterproofing Manual.

1.3 DESIGN / PERFORMANCE REQUIREMENTS

A. Scope of Work:
   1. Remove existing shingles and gutters down to OSB deck.
   2. Prime existing wood deck and adhere new high-performance, high temperature underlayment
   3. Install new concealed clip system and high-performance standing seam metal roof panels
   4. Install new gutter system
   5. Install new S5! Snow retention system

B. Standing Seam Roofing System: R-Mer Span
   1. Thermal Expansion and Contraction:
      a. Completed metal roofing and flashing system shall be capable of withstanding expansion and contraction of components caused by changes in temperature without buckling, producing excess stress on structure, anchors or fasteners, or reducing performance ability.
      b. Design temperature differential shall be not less than 200 degrees F.
      c. Interface between panel and clip shall provide for unlimited thermal movement in each direction along the longitudinal direction.
      d. Location of metal roofing rigid connector shall be at roof ridge unless otherwise approved by the Project Architect. Metal ridge connector may require design as per job conditions by specified manufacturer.
   2. Uniform Wind Load Capacity:

a. Installed roof system shall withstand negative (uplift) design wind loading pressures complying with the following criteria.
1) See separate Wind Uplift calculation report.
b. ASTM E 1592: Capacity shall be determined using pleated airbag method in accordance with ASTM E 1592, testing of sheet metal roof panels. Allowable safe working loads shall be determined by dividing the ultimate test load by the safety factor specified above.
c. Underwriters' Laboratories, Inc., (UL), wind uplift resistance classification: Roof assembly shall be classified as Class 1-90, as defined by UL 580

3. Underwriters' Laboratories, Inc., (UL):
a. Underwriters' Laboratories, Inc., (UL) fire resistance P ratings for roof assemblies: If applicable, panel system shall be approved for use in an appropriate Construction Assembly, as defined by UL 263.
b. Underwriters' Laboratories, Inc., (UL) Class A fire rating per UL 790.
4. Capacities for gauge, span or loading other than those tested may be determined by interpolation of test results within the range of test data. Extrapolations for conditions outside test range are not acceptable.
5. Water penetration (dynamic pressure): No water penetration, other than condensation, when exposed to dynamic rain and 70 mph wind velocities for not less than five minutes duration, when tested in accord with principles of AAMA 501.1.
6. Wind and wind driven rain resistance: No water penetration or panel movement when exposed to 110 mph wind velocities when tested in accordance with TAS 100.
7. Installed roof system assembly shall show that it can resist the calculated roof pressure in accordance with the test results of TAS 125.
8. Water penetration in low slope applications: No water penetration or panel movement when subject to 6-inch head of water for 6 hours when tested in accordance with the ASTM E 2140 and when subject to 6-inch head of water for 7 days when tested in accordance with the TAS 114 appendix G.
9. Submit third party validation of environmental claims, prepared UL Environment, for all metal roof panels containing recycled content and/or bio based content.

1.4 SUBMITTALS

A. Product Data: Submit product data, test reports, and certifications in accordance with quality assurance and performance requirements specified herein.

B. Shop Drawings: Prepared specifically for this project; showing dimensions of metal roofing and accessories, fastening details and connections and interface with other products.

C. Selection Samples: For each finish product specified, two complete sets of samples representing manufacturer's full range of available colors and textures.

D. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

E. Closeout Submittals:
1. Provide manufacturer's maintenance instructions that include recommendations for periodic checking and maintenance of installed roof system.
2. Provide executed copy of manufacturer's warranty.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer shall have in place a documented, standardized quality control program such as ISO-9001 approval.

B. Installer Qualifications: Certified and approved installer of the sheet metal roofing manufacturer.

1.6 PRE-INSTALLATION CONFERENCE

A. Convene a pre-roofing conference approximately two weeks before scheduled commencement of roofing system installation and associated work.

B. Require attendance of installers of deck or substrate construction to receive roofing, installers of rooftop units and other work in and around roofing which must precede or follow roofing work including mechanical work, Architect, Owner, roofing system manufacturer's representative.

C. Objectives include:
1. Review foreseeable methods and procedures related to roofing work, including set up and mobilization areas for stored material and work area.
2. Tour representative areas of roofing substrates, inspect and discuss condition of substrate, roof drains, curbs, penetrations and other preparatory work.
3. Review structural loading limitations of deck and inspect deck for loss of flatness and for required attachment.
4. Review roofing system requirements, Drawings, Specifications and other Contract Documents.
5. Review and finalize schedule related to roofing work and verify availability of materials, installer's personnel, equipment and facilities needed to make progress and avoid delays.
6. Review required inspection, testing, certifying procedures.
7. Review weather and forecasted weather conditions and procedures for coping with unfavorable conditions, including possibility of temporary roofing.
8. Record conference including decisions and agreements reached. Furnish a copy of records to each party attending.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

B. Store materials protected from exposure to harmful environmental conditions and at temperature and humidity conditions recommended by the manufacturer.
1. Store materials above ground, on skids.
2. Protect material with waterproof covering and allow sufficient ventilation to prevent condensation buildup or moisture entrapment on the materials.

1.8 PROJECT CONDITIONS

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

1.9 WARRANTY

A. Contractors Guarantee: 2 Years
1. The Contractor guarantees that the total roofing installation, together with all related composition flashings, plastic flashings, metal flashings, patented pre-formed polystyrene panels, and base sheet fasteners, roof insulation, any vapor seal, blocking, adhesives and seals in connection with the same, will be watertight and free from defects as to materials, installation and/or workmanship for a period of 2-years from the date of acceptance of the completed project.
2. During the 2-year guarantee period, the contractor agrees that within 24 hours of receipt of notice from the Owner, he will inspect and make immediate emergency

repairs to defects or to leaks in the roof system, and within reasonable time, he will restore the affected items to the standard of the original specifications.

3. All emergency and permanent work during the life of the Contractors guarantee will be done without cost to the Owner, except in the event it is determined that such leaks were caused by abuse, lightning, hurricane, tornado, hail storm or other unusual climatic phenomena of the elements, or failure of adjacent or related work previously installed by others.

B. Manufacturer's Warranty: In addition to the 2 year period specified above, furnish the membrane manufacturer's printed 30 Year (continuous) No Dollar Limit, edge-to-edge, non-prorated, Full System Warranty, covering workmanship, materials, metal edge system and wind related damage, for the Work of this Section.

1. The warranty shall include, but not be limited to, repair of leakage and the repair and/or replacement of the roofing system as necessary to correct defects or damage caused by; materials, workmanship, or wind speeds less than 90 MPH (V3s).
2. The manufacturer approved roof system shall withstand extended peak gust wind speed coverage up to 90 MPH (V3s).
3. Warranty shall commence with the Owner final acceptance of all the work covered under the warranty as written above.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: Garland Company, Inc. (The); 3800 E. 91st St., Cleveland, OH 44105. Contact: John Lesko (332) 999-4131 jlesko@garlandind.com

B. Or Approved Equal

2.2 STANDING SEAM METAL ROOFING

A. R-Mer Span:

1. Width of Standing T-Seam Panel: 1 inch T-seam.
   a. 16 inches.
2. Standing Seam: 2-3/8 inch tall mechanically seamed with factory installed hot melt sealant in-seam cap. Panel/Cap is configured with a total of 4 layers of metal surrounding anchor clip.
3. Panel Profile: Provided with minimum 1-1/2 inches wide elevated mesa's every 2 inches on center continuous throughout panel.
   a. Slope: Open Purlins or Solid Substrate down to 1/4:12.
4. Panel material:
   a. Aluminum, 3105-H14 alloy, smooth as per ASTM B 209, .040 inch thickness.
5. Flashing and flat stock material: Fabricate in profiles indicated on Drawings of same material, thickness, and finish as roof system, unless indicated otherwise.
6. Uncoated Mill Finish: Exposed and unexposed surfaces for uncoated panels mill finish.
7. Accessory Components:
   a. Anchor Clips:
      1) Concealed Standard Anchor Clips: Clips 16 gauge stainless steel, alloy 316L, 1 piece clip with projecting legs for additional panel alignment and provision for unlimited thermal movement in each direction along the longitudinal dimension.
   b. Gable anchor clips for:
      1) Standing Seam style.
         a) Stainless steel, alloy 316L, minimum thickness: 16 gauge.
   c. Concealed I-SPAN Anchors: I-SPAN Anchors are extruded aluminum, alloy

6005-T5, with projecting legs for additional panel alignment and provision for unlimited thermal movement in each direction along the longitudinal dimension. Provide anchors of continuous lengths with a 0.062 inch minimum thickness.

d. Fasteners:
   1) Concealed fasteners: Corrosion resistant steel fasteners (zinc plated, stainless steel or equal) designed to meet structural loading requirements.
   2) Exposed fasteners: Series 410 stainless steel fasteners or 1/8 inch diameter stainless steel waterproof rivets. All exposed fasteners shall be factory painted to match the color of the standing seam panels.

e. Closures: Factory precut closed cell foam meeting ASTM D 1056 or ASTM D 3575, enclosed in metal channel matching panels when used at hip, ridge, rake, and jamb.

f. Provide all miscellaneous accessories for complete installation.

2.3 STANDING SEAM METAL ROOFING ACCESSORIES

A. Underlayment:
   1. RMer Seal: 40 mil minimum high temp self adhesive membrane, installed in accordance with manufacturer's recommendations.

B. Bearing Plates:
   1. Galvanized steel bearing plates 3 inches by 5 inches by 16 gauge, minimum.
   2. Pre-punch with a hole pattern matching that of the panel anchor clips. Slotted holes are acceptable.

2.4 METAL ROOFING ACCESSORIES

A. R-Mer SS Sheet Stock: High gloss, factory painted aluminum
   1. Material and Thickness:
      a. 0.040 inch aluminum
   2. Color: Selected by Owner

B. S-5! Snow Retention System: Compatible with Garland's R-Mer Shield and R-Mer Span and R-Mer Loc metal panel systems.

C. Snow Guard:
   1. 6005-T5 aircraft grade aluminum.

2.5 COLOR OPTIONS

A. Standard collection:
   1. Selected by Owner

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine surfaces to receive metal roofing. Notify the Architect in writing of any defective conditions encountered. Starting of work shall constitute acceptance of such conditions.

B. Structural Deck Substrate:
   1. Inspect roof deck to verify deck is clean and smooth, free of depressions, waves, or projections, and properly sloped.
   2. Verify deck is dry and joints are solidly supported and fastened.
   3. Verify wood nailers are installed and correctly located. Do not use pressure-treated wood containing salt-based preservatives or materials corrosive to steel.

C. Structural Framing Substrate:
   1. Verify primary and secondary framing members are installed and fastened, properly aligned and sloped.
   2. Verify damaged shop coatings are repaired with touch up paint.

D. Verify roof openings, curbs, pipes, sleeves, ducts, or vents through roof are solidly set, reglets are in place, and nailing strips located.

E. Correct defective conditions before beginning work.

3.2 INSTALLATION

A. Install in conformance with the NRCA Roofing and Waterproofing Manual and Manufacturers installation requirements.

B. Form panel shape as indicated on Drawings, accurate in size, square, and free from distortion or defects.

C. Install underlayment and eave protection sheet underlayment as recommended by the Manufacturer.

D. Coordinate with installation of rigid board insulation as specified in Section 07 25 00 - WeatherBarriers.

E. Install all panels continuous from ridge to eave. Transverse seams are not permitted.

F. Panel lengths that exceed maximum shipping lengths shall be field rolled on equipment owned by the panel manufacturer. Seam sealant must be factory applied.

G. Exposed fasteners, screws and/or roof mastic are unacceptable and will be rejected. System configuration only allows for exposed fasteners at panel overlap, if required, and at trim details in accordance with the Manufacturer's requirements.

H. Where not otherwise indicated conform to SMACNA details including flashings and trim.

I. Install sealants where indicated to clean dry surfaces only without skips or voids..

J. Install metal edge treatment in accordance with the manufacturer's instructions and the approved shop drawings.

K. Install metal roofing accessories in accordance with the manufacturer's instructions and the approved shop drawings.

3.3 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 074200
FORMED METAL WALL

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Exposed-fastener, lap-seam metal wall panels used for wall applications.
2. Concealed-fastener, lock-seam metal wall panels used for soffit applications.
3. Metal wall panel accessories including closures, fasteners and clips, copings, fascia, sills, corners, flashings, and other components of wall panel system.
4. Rain screen siding vents/insect screens

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Meet with Owner, Architect, metal panel Installer, metal panel manufacturer's representative, and installers whose work interfaces with or affects metal panels, including installers of doors, windows, and louvers.
2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
3. Review methods and procedures related to metal panel installation, including manufacturer's written instructions.
4. Examine support conditions for compliance with requirements, including alignment between and attachment to structural members.
5. Review flashings, special siding details, wall penetrations, openings, and condition of other construction that affect metal panels.
6. Review governing regulations and requirements for insurance, certificates, and tests and inspections if applicable.
7. Review temporary protection requirements for metal panel assembly during and after installation.
8. Review of procedures for repair of metal panels damaged after installation.
9. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.

B. Shop Drawings:

1. Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.

2. Accessories: Include details of the flashing, trim, and anchorage systems, at a scale of not less than 1-1/2 inches per 12 inches (1:10).
3. Indicate coordination dimensions related to structural support system elements provided by others.

C. Samples for Verification: For each type of exposed finish, prepared on Samples of size indicated below:

1. Metal Panels: 12 inches (305 mm) long by actual panel width, for each type of metal panel.
2. Copings, Trim and Other Closures: 12 inches (305 mm) long. Include fasteners and other exposed accessories

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Test Reports: For each product, for tests performed by a qualified testing agency.

C. Sample Warranties: For special warranties.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For metal panels to include in maintenance manuals.

1.6 QUALITY ASSURANCE

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

B. Mockups: Build mockups of wall panel system to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.

1. Build mockup of typical metal wall panel assembly minimum 25 sq. ft. in size, in location directed by Architect, including supports, attachments, and accessories.
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.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, 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 panels during installation.

1.8 FIELD CONDITIONS

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

1.9 COORDINATION

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

1.10 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
   a. Structural failures including rupturing, cracking, or puncturing.
   b. Deterioration of metals and other materials beyond normal weathering.

2. Warranty Period: Twenty years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Basis-of-Design Products are manufactured by McElroy Metal, Inc. Subject to compliance with requirements, provide specified products or equal products by one of the following:

1. ATAS International, Inc.
2. AEP Span
3. Bridger Steel Inc.
4. Fabral
5. Firestone Metal Products
6. Morin; a Kingspan Group Company

2.2 EXPOSED-FASTENER, LAP-SEAM METAL WALL PANELS

A. General: Provide factory-formed metal panels designed to be field assembled by overlapping side edges of adjacent panels and mechanically fastening panels together, and mechanically attaching panel to supports using exposed fasteners. Include accessories required for weathertight installation.

B. Metal Wall Panels: Formed with raised, tapered major ribs and intermediate stiffening ribs symmetrically spaced between major ribs.

1. Basis-of-Design Product: “Max-Rib Panel” manufactured by McElroy Metal, Inc. or approved equivalent.
2. Metallic-Coated Steel Sheet: Aluminum-zinc alloy-coated steel sheet complying with ASTM A792/A792M, Class AZ55 coating designation; structural quality.
   a. Thickness: 29 gauge
   b. Surface: Ribbed, with main ribs ¾” high spaced 9” o.c. and intermediate pencil ribs 1/8” high spaced 3-1/8” o.c.
   c. Exterior Finish: Bare acrylic coated Galvalume; “Galvalume Plus.”

3. Panel Coverage: 36 inches.
4. Panel Height: Max 3/4 inch.

2.3 CONCEALED-FASTENER, LOCK-SEAM METAL SOFFIT PANELS

A. General: Provide factory-formed metal panels designed to be field assembled by interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners. Include accessories required for weathertight installation.

B. Metal Soffit Panels: Flat pan profile, vented and non-vented panels.

1. Basis-of-Design Product: “Marquee-Lok Soffit Panel” manufactured by McElroy Metal, Inc. or approved equivalent.
2. Metallic-Coated Steel Sheet: Aluminum-zinc alloy-coated steel sheet complying with ASTM A792/A792M, Class AZ55 coating designation; structural quality.
   a. Thickness: 24 gauge
   b. Surface: Smooth, flat finish.
   c. Exterior Finish: Bare acrylic coated Galvalume; “Galvalume Plus.”
   d. Vented Panels: 8% net free area.

3. Panel Coverage: 12 inches.
4. Panel Height: 1 inch.

2.4 MISCELLANEOUS MATERIALS

A. Miscellaneous Wood Subframing and Furring: Specified in Section 061053.

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. Corners: Provide inside and outside corners as indicated on the Drawings fabricated of same metal and finish as metal panels.
2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
3. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- (25-mm-) thick, flexible closure strips; cut or premolded to match metal panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
4. Air-Space Vent: Rigid polymer air space vent/insect screen; SV-5 Rain Screen Siding Vent by Cor-A Vent, or equal.

C. 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 panels.

D. Panel Fasteners: Self-tapping screws designed to withstand design loads. Provide exposed fasteners with heads matching color of metal panels by means of plastic caps or factory-applied coating. Provide EPDM or PVC sealing washers for exposed fasteners.

E. Panel Sealants: Provide sealant type recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.

1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.
2. Joint Sealant: ASTM C 920; elastomeric polyurethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended in writing by metal panel manufacturer.
3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C 1311.

2.5 FABRICATION

A. General: Fabricate and finish metal panels and accessories at the factory, 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. 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 Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
3. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate sealant and 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 in writing by metal 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.

2.6 FINISHES

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

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

PART 3 - EXECUTION

3.1 EXAMINATION

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

1. 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 installation.

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

3.2 PREPARATION

A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to metal panel manufacturer's written recommendations.

3.3 METAL PANEL INSTALLATION

A. General: Install metal panels according to manufacturer's written instructions in orientation, sizes, and locations indicated. Install panels perpendicular to supports unless otherwise indicated. Anchor metal 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 panels.
2. Flash and seal metal panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal panels are installed.
3. Install screw fasteners in predrilled holes.
4. Locate and space fastenings in uniform vertical and horizontal alignment.
5. Install flashing and trim as metal 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. Align bottoms of metal panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.
8. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.

B. Fasteners:

1. Steel Panels: Use stainless steel fasteners for surfaces exposed to the exterior; use galvanized-steel fasteners for surfaces exposed to the interior.

C. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal panel manufacturer.

D. Lap-Seam Metal Panels: Fasten metal 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. Apply panels and associated items true to line for neat and weathertight enclosure.
2. Provide metal-backed washers under heads of exposed fasteners bearing on weather side of metal 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. Flash and seal panels with weather closures at perimeter of all openings.

E. Watertight Installation:

1. Apply a continuous ribbon of sealant or tape to seal lapped joints of metal panels, using sealant or tape as recommend by manufacturer on side laps of nesting-type panels; and elsewhere as needed to make panels watertight.

2. Provide sealant or tape between panels and protruding equipment, vents, and accessories.
3. At panel splices, nest panels with minimum 6-inch (152-mm) end lap, sealed with sealant and fastened together by interlocking clamping plates.

F. Accessory Installation: 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 system including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by metal wall panel manufacturer; or, if not indicated, provide types recommended by metal panel manufacturer.

G. 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 are permanently watertight.

1. Install exposed flashing and trim that is without 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 achieve waterproof performance.
2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet (3 m) with no joints allowed within 24 inches (610 mm) of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with mastic sealant (concealed within joints).

3.4 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.

END OF SECTION 074213

SECTION 076200
SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes sheet metal flashing and trim in the following categories:

1. Metal flashing.
2. Reglets.
3. Fascia.
4. Gravel stop.
5. Coping
6. Metal trim.
7. Gutters and leaders
8. Metal edge securement for roofing.

1.2 PERFORMANCE REQUIREMENTS

A. General: Sheet metal flashing and trim assemblies as indicated shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.

B. Low-slope membrane roof system metal edge securement, except gutters, shall be designed and installed for wind loads in accordance with Building Code of NY, Chapter 16 and tested for resistance in accordance with ANSI/SPRI ES-1.

1. Fabricate and install roof edge flashing, metal edge securement, fascia, copings and gravel stops capable of resisting the wind loads as indicated on Structural Drawings.

C. Thermal Movements: Provide sheet metal flashing and trim that allows for thermal movements from ambient and surface temperature changes.

1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces

1.3 ACTION SUBMITTALS.

A. Product Data including manufacturer's material and finish data, installation instructions, and general recommendations for each specified flashing material and fabricated product.

B. Shop Drawings of each item specified showing layout, profiles, methods of joining, and anchorage details.

C. Samples for Verification: Samples of sheet metal flashing, trim, and accessory items, in the specified finish. Where finish involves normal color and texture variations, include Sample sets composed of 2 or more units showing the full range of variations expected.

1. 8-inch- (200-mm-) square Samples of specified sheet materials to be exposed as finished surfaces.

2. 12-inch- (300-mm-) long samples of factory-fabricated products exposed as finished Work and accessories, as specified below.
   a. Gutters
   b. Downspouts.
   c. Fascia
   d. Gravel stop
   e. Coping

1.4 INFORMATIONAL SUBMITTALS

A. Qualification data for firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

B. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for gravel stops, fascia, roof-edge securement and flashings.

C. Warranty: Sample of special warranty.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experience Installer who has completed sheet metal flashing and trim work similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

B. Sheet Metal Flashing and Trim Standard: Comply with SMACNA's "Architectural Sheet Metal Manual." Conform to dimensions and profiles shown unless more stringent requirements are indicated.

1.6 PROJECT CONDITIONS

A. Coordinate Work of this Section with interfacing and adjoining Work for proper sequencing of each installation. Ensure best possible weather resistance, durability of Work, and protection of materials and finishes.

1.7 WARRANTY

A. Special Warranty on Painted Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace roof specialties that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Fluoropolymer Finish: Deterioration 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. Finish Warranty Period: 20 years from date of Substantial Completion.

B. Performance Warranty: Include gravel stops, coping, fascia and roof edge flashings and securement in Total System Warranty provided by roofing membrane manufacturer.

PART 2 - PRODUCTS

2.1 METALS

A. Aluminum: Alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated and with not less than the strength and durability of alloy and temper designated below:

1. Aluminum Sheet: ASTM B 209, Alclad 3003-H14, with a minimum thickness as indicated.
2. Extruded Aluminum: ASTM B 221, alloy 6063-T52, with a minimum thickness of 0.080 inch for primary legs of extrusions, unless otherwise indicated.

B. Metallic-Coated Steel Sheet: Aluminum-zinc alloy-coated steel sheet complying with ASTM A792/A792M, Class AZ55 coating designation; structural quality.

1. Exterior Finish: Bare acrylic coated Galvalume; "Galvalume Plus."

2.2 MISCELLANEOUS MATERIALS AND ACCESSORIES

A. Fasteners: Same metal as sheet metal flashing or other noncorrosive metal as recommended by sheet metal manufacturer. Match finish of exposed heads with material being fastened.

B. Asphalt Mastic: SSPC-Paint 12, solvent-type asphalt mastic, nominally free of sulfur and containing no asbestos fibers, compounded for 15-mil (0.4-mm) dry film thickness per coat.

C. Mastic Sealant: Polyisobutylene; nonhardening, nonskinning, nondrying, nonmigrating sealant.

D. Elastomeric Sealant: Generic type recommended by sheet metal manufacturer and fabricator of components being sealed and complying with requirements for joint sealants as specified in Division 07 Section "Joint Sealants."

E. Epoxy Seam Sealer: 2-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior and interior nonmoving joints, including riveted joints.

F. Adhesives: Type recommended by flashing sheet metal manufacturer for waterproof and weather-resistant seaming and adhesive application of flashing sheet metal.

G. Felt Underlayment: ASTM D 226, Type II (No. 30), asphalt-saturated organic felt, nonperforated.

H. Slip Sheet: 3-lb. rosin-sized building paper or Tyvek by DuPont.

I. Self-Adhering Sheet Underlayment, Polyethylene Faced: ASTM D 1970, minimum of 40 mils (1.0 mm) thick; slip-resisting, polyethylene-film-reinforced top surface laminated to SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.

1. Product: Ice and Water Shield by GCP Applied Technologies.or equal.

J. Metal Accessories: Provide sheet metal clips, straps, anchoring devices, and similar accessory units as required for installation of Work, matching or compatible with material being installed; noncorrosive; size and thickness required for performance.

K. Roofing Cement: ASTM D 4586, Type I, asbestos free, asphalt based.

2.3 MANUFACTURED SHEET METAL FLASHING AND TRIM

A. General: Provide items designed and fabricated to fit applications indicated and to perform optimally with respect to weather resistance, water tightness, durability, strength, and uniform appearance.

B. Expansion Provisions: Fabricate running lengths to allow controlled expansion not only for movement of metal components in relationship to one another but also to adjoining dissimilar materials, including flashing and roofing membrane materials, in a manner sufficient to prevent water leakage, deformation or damage.

C. Reglets: Units of type, material, and profile indicated, formed to provide secure interlocking of separate reglet and counterflashing pieces and compatible with flashing indicated.

1. 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.
2. 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.
3. Masonry Type: Provide with offset top flange for embedment in masonry mortar joint.
4. 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.
5. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of the counterflashing lower edge.
6. Material: Fabricate reglets from the following metal, in thickness indicated:
   a. Stainless steel, 0.020 inch thick.
7. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Fry Reglet Corporation.
   b. Hickman: W.P. Hickman Co.
   c. Keystone Flashing Company.

D. Hanging Gutters: Provide gutters in profile and size indicated on the Drawings, complete with end pieces, outlet tubes, and other accessories as required. Fabricate in minimum 96-inch- (2400-mm-) long sections. Furnish flat-stock gutter spacers and gutter brackets fabricated from same metal as gutters, of two times size recommended by SMACNA but not less than twice the gutter thickness. Fabricate expansion joints, expansion-joint covers, and gutter accessories from same metal as gutters.

1. Basis of Design Product: Box gutters manufactured by Mule-Hide Products, or equal.

2. Gutters shall be provided by TPO roofing manufacturer, or shall be from a company approved by the TPO roofing manufacturer, and shall be included in the total roof warranty for TPO roofing.
3. Gutter Material: Galvalume 24 gauge.
4. Finish: Bare acrylic coated Galvalume; "Galvalume Plus."

E. Downspouts: Provide downspouts in profile and size indicated on the Drawings, complete with mitered elbows. Furnish with metal hangers, from same material as downspouts, and anchors.

1. Basis of Design Product: Retangular downspouts manufactured by Mule-Hide Products, or equal.
2. Downspouts shall be provided by TPO roofing manufacturer, or shall be from a company approved by the TPO roofing manufacturer, and shall be included in the total roof warranty for TPO roofing.
3. Downspout Material: Galvalume 24 gauge.
4. Finish: Bare acrylic coated Galvalume; "Galvalume Plus."

F. Copings: Manufactured coping system consisting of formed-metal coping cap in section lengths not exceeding 10 feet (3.3 m), concealed anchorage; corner units, end cap units, and concealed splice plates with same finish as coping caps.

1. Basis of Design Product: Snap Coping manufactured by Mule-Hide Products, or equal.
2. Copings shall be provided by TPO roofing manufacturer, or shall be from a company approved by the TPO roofing manufacturer, and shall be included in the total roof warranty for TPO roofing.
3. Copingr Material: Galvalume 24 gauge.
4. Finish: Bare acrylic coated Galvalume; "Galvalume Plus."
5. Corners: Factory mitered and continuously welded
6. Coping-Cap Attachment Method: Snap-on, fabricated from coping-cap material .
7. Snap-on-Coping Anchor Plates: Concealed, galvanized-steel sheet, with integral cleats.
8. Vertical Face and Back Leg Height: As indicated on Drawings.

2.4 FABRICATION, GENERAL

A. General Metal Fabrication: Shop-fabricate work to greatest extent possible. Comply with details shown and with applicable requirements of SMACNA "Architectural Sheet Metal Manual" and other recognized industry practices. Fabricate for waterproof and weather-resistant performance, with expansion provisions for running work, sufficient to permanently prevent leakage, damage, or deterioration of the work. Form work to fit substrates. Comply with material manufacturer instructions and recommendations for forming material. Form exposed sheet metal work without excessive oil-canning, buckling, and tool marks, true to line and levels indicated, with exposed edges folded back to form hems.

B. Seams in Aluminum: Fabricate nonmoving seams in aluminum with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.

C. Seams in Steel: Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.

D. Expansion Provisions: Space movement joints at maximum of 10 feet with no joints allowed within 24 inches (600 mm)of corner or intersection. Where lapped or bayonet-type expansion provisions in Work cannot be used or would not be sufficiently weatherproof and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25.4 mm) deep, filled with mastic sealant (concealed within joints.)

E. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.

F. Separate metal from noncompatible metal or corrosive substrates by coating concealed surfaces at locations of contact with asphalt mastic or other permanent separation as recommended by manufacturer.

G. Conceal fasteners and expansion provisions unless noted otherwise. Exposed fasteners are not allowed on faces of sheet metal exposed to public view.

H. Fabricate cleats and attachment devices from same material as sheet metal component being anchored or from compatible, noncorrosive metal recommended by sheet metal manufacturer.

1. Size: As recommended by SMACNA manual or sheet metal manufacturer for application but never less than thickness of metal being secured.

2.5 SHEET METAL FABRICATIONS

A. General: Fabricate sheet metal items in thickness or weight needed to comply with performance requirements but not less than that listed below for each application and metal.

B. Miscellaneous Exposed Trim: Fabricate from the following material:

1. Aluminum (administration building): 0.040 inch (1 mm) thick
2. Galvalume (headhouse): 24 gauge

C. Fascia, Gravel Stop, Base Flashing: Fabricate from the following material:

1. Aluminum: 0.040 inch (1 mm) thick

D. Counterflashing, Flashing Receivers: Fabricate from the following material:

1. Aluminum: 0.032 inch (0.813 mm) thick

2.6 ALUMINUM FINISHES

A. General: Comply with Aluminum Association's (AA) "Designation System for Aluminum Finishes" for finish designations and application recommendations.

B. High-Performance Organic Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

1. Fluoropolymer 3-Coat System: Manufacturer's standard 3-coat thermocured system consisting of specially formulated inhibitive primer, fluoropolymer color topcoat and clear topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 2605.
2. Colors: Match existing

C. Class I, Clear Anodic Finish: AA-M12C22A41 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.

2.7 METALLIC COATED STEEL FINISHES

A. Metallic-Coated Steel Sheet: Bare acrylic coated Galvalume; "Galvalume Plus."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions under which sheet metal flashing and trim are to be installed and verify that Work may properly commence. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Unless otherwise indicated, install sheet metal flashing and trim to comply with performance requirements, manufacturer's installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Anchor units of Work securely in place by methods indicated, providing for thermal expansion of metal units; conceal 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 weatherproof.

B. Install exposed sheet metal Work that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.

C. Roof-Edge Flashings and Edge Securement: Secure metal flashings and edge securement at roof edges according to Building Code of NY, Chapter 16 for specified wind zone.

D. Isolation: Where metal surfaces of units are installed in contact with dissimilar metal or corrosive substrates, including wood, apply bituminous coating on concealed metal surfaces, or provide other permanent separation as recommended by sheet metal producer.

E. Expansion Provisions: Provide for thermal expansion of exposed sheet metal Work. Space movement joints at maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped or bayonet-type expansion provisions in Work cannot be used or would

not be sufficiently weatherproof and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

F. Sealed Joints: Form nonexpansion, but movable, joints in aluminum to accommodate elastomeric sealant to comply with SMACNA standards. Fill joint with sealant and form metal to completely conceal sealant.

1. Use joint adhesive for nonmoving joints specified not to be soldered.

G. Seams in Aluminum: Fabricate nonmoving seams in aluminum with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.

H. Separations: Separate metal from noncompatible metal or corrosive substrates by coating concealed surfaces, at locations of contact, with asphalt mastic or other permanent separation as recommended by manufacturer.

1. Underlayment: Where installing copper or aluminum directly on cementitious or wood substrates, install a slip sheet of red-rosin paper over one layer of felt underlayment before installing sheet metal.
2. Bed flanges in a thick coat of roofing cement where required for waterproof performance.

I. Install reglets to receive counterflashing according to the following requirements:

1. Where reglets are shown in concrete, furnish reglets for installation under Division 03 Section "Cast-in-Place Concrete."
2. Where reglets are shown in masonry, furnish reglets for installation under Division 04 Sections.

J. Counterflashings: Coordinate installation of counterflashings with installation of assemblies to be protected by counterflashing. Install counterflashings in reglets or receivers. Secure in a waterproof manner by means of snap-in installation and sealant, lead wedges and sealant, interlocking folded seam, or blind rivets and sealant. Lap counterflashing joints a minimum of 2 inches (50 mm) and bed with sealant.

K. Copings: Install cleats, anchor plates, and other anchoring and attachment accessories and devices with concealed fasteners. Anchor copings to meet performance requirements.

1. Interlock face and back leg drip edges of snap-on coping cap into cleated anchor plates anchored to substrate at manufacturer's required spacing that meets performance requirements

3.3 CLEANING AND PROTECTION

A. Clean exposed metal surfaces, removing substances that might cause corrosion of metal or deterioration of finishes.

B. Provide final protection and maintain conditions that ensure sheet metal flashing and trim Work during construction is without damage or deterioration other than natural weathering at the time of Substantial Completion.

END OF SECTION

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SECTION 079200
JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes joint sealants for the following locations:

1. Exterior joints in the following vertical surfaces and nontraffic horizontal surfaces:

a. Control and expansion joints in cast-in-place concrete
b. Joints in metal panel wall surfaces.
c. Perimeter joints between materials listed above and frames of doors, louvers and windows.
d. Control and expansion joints in ceiling and overhead surfaces.
e. Other joints as indicated.

2. Exterior joints in the following horizontal traffic surfaces:

a. Control, expansion, and isolation joints in cast-in-place concrete slabs.
b. Other joints as indicated.

3. Interior joints in the following vertical surfaces and horizontal nontraffic surfaces:

a. Control and expansion joints on exposed interior surfaces of exterior walls.
b. Perimeter joints of exterior openings where indicated.
c. Vertical control joints on exposed surfaces of interior unit masonry and concrete walls and partitions.
d. Perimeter joints between interior wall surfaces and frames of interior doors.
e. Joints between plumbing fixtures and adjoining walls, floors, and counters.
f. Other joints as indicated.

4. Interior joints in the following horizontal traffic surfaces:

a. Control and expansion joints in cast-in-place concrete slabs.
b. Other joints as indicated.

B. Related Sections include the following:

1. Sealants used in glazing are specified in Division 08 "Glazing."
2. Coordinate work of this section with all sections referencing it.

1.2 SYSTEM PERFORMANCE REQUIREMENTS

A. Provide elastomeric joint sealants that establish and maintain watertight and airtight continuous joint seals without staining or deteriorating joint substrates.
B. Provide joint sealants for interior applications that establish and maintain airtight and water-resistant continuous joint seals without staining or deteriorating joint substrates.

1.3 ACTION SUBMITTALS

A. Product Data: For each joint-sealant product indicated.

B. Samples for initial selection purposes in form of manufacturer's standard bead samples, consisting of strips of actual products showing full range of colors available, for each product exposed to view.

C. Samples for verification purposes of each type and color of joint sealant required. Install joint sealant samples in 1/2-inch (13-mm)) wide joints formed between two 6-inch (150-mm) long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

1.4 INFORMATIONAL SUBMITTALS

A. Certificates from manufacturers of joint sealants attesting that their products comply with specification requirements and are suitable for the use indicated.

B. Qualification data complying with requirements specified in "Quality Assurance" article. Include list of completed projects with project names addresses, names of Architects and Owners, plus other information specified.

C. Compatibility and adhesion test reports from elastomeric sealant manufacturer indicating that materials forming joint substrates and joint sealant backings have been tested for compatibility and adhesion with joint sealants. Include sealant manufacturer's interpretation of test results relative to sealant performance and recommendations for primers and substrate preparation needed to obtain adhesion.

D. Product test reports for each type of joint sealants indicated, evidencing compliance with requirements specified.

E. Preconstruction field test reports indicating which products and joint preparation methods demonstrate acceptable adhesion to joint substrates.

F. Warranties: Special warranties specified in this Section.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Engage an installer who has successfully completed at least three (3) joint sealer applications similar in type and size to that of this project within the last five (5) years. All workers used for work of this Section shall be experienced in the techniques of sealant application and shall be completely familiar with the published recommendations of the manufacturer of the joint sealant materials being used.

B. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.

C. Preconstruction Field Testing: Prior to installation of joint sealants, field-test their adhesion to joint substrates as follows:

1. Locate test joints where indicated or, if not indicated, as directed by Architect.

2. Conduct field tests for each application indicated below:
   a. Each type of elastomeric sealant and joint substrate indicated.
   b. Each type of non-elastomeric sealant and joint substrate indicated.

3. Notify Architect one week in advance of the dates and times when mock-ups will be erected.
4. Arrange for tests to take place with joint sealant manufacturer's technical representative present.
5. Test Method: Test joint sealants by hand pull method described below:
   a. Install joint sealants in 60 inches (1500 mm)) joint lengths using same materials and methods for joint preparation and joint sealant installation required for completed Work. Allow sealants to cure fully before testing.
   b. Make knife cuts horizontally from one side of joint to the other followed by 2 vertical cuts approximately 2 inches (50 mm) long at side of joint and meeting horizontal cut at top of 2-inch (50-mm) cuts. Place a mark 1 inch (25 mm) from top of 2-inch (50-mm) piece.
   c. Use fingers to grasp 2-inch (50-mm) piece of sealant just above 1-inch (25-mm) mark; pull firmly down at a 90-degree angle or more while holding a ruler along side of sealant. Pull sealant out of joint to the distance recommended by sealant manufacturer for testing adhesive capability, but not less than that equaling specified maximum movement capability in extension; hold this position for 10 seconds.

6. Report whether or not sealant in joint connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each type of product and joint substrate.
7. Evaluation of Field Test Results: Sealants not evidencing adhesive failure from testing, in absence of other indications of noncompliance with requirements, will be considered satisfactory. Do not use sealants that fail to adhere to joint substrates during testing.

D. Random Field Tests: Periodically test sealants, in place, for adhesion, using methods recommended by sealant manufacturer. Promptly replace any sealant that does not adhere, fails to cure, or fails to perform as specified by the sealant manufacturer.

E. Field Water Test: Perform two field water tests on completed areas including as many conditions as possible. If leakage occurs during testing, repair as required, and re-test area and also test two additional locations.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration period for use, pot life, curing time, and mixing instructions for multicomponent materials.

B. Store and handle materials in compliance with manufacturer's recommendations to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

1.7 PROJECT CONDITIONS

A. Environmental Conditions: Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside the limits permitted by joint sealant manufacturer or below 40 deg F (4 deg C).
2. When joint substrates are wet.

B. Joint Width Conditions: Do not proceed with installation of joint sealants where joint widths are less than allowed by joint sealant manufacturer for application indicated.

C. Joint Substrate Conditions: Do not proceed with installation of joint sealants until contaminants capable of interfering with their adhesion are removed from joint substrates.

1.8 COORDINATION

A. Coordinate the work with all sections referencing this section.

1.9 WARRANTY

A. Special Installer's Warranty: Installer's standard form in which Installer agrees to repair or replace elastomeric joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

B. Manufacturer’s Warranty: Provide written warranty agreeing to repair or replace, at no cost to Owner, defective materials for twenty (20) years, and workmanship for two (2) years from the Date of Substantial Completion. Defective materials and workmanship shall include, but are not limited to:

1. Deterioration, aging or weathering of the work;
2. Water leakage and/or air leakage;
3. Sealant loss of adhesion, loss of cohesion, cracking or discoloration;
4. Staining or discoloration of adjacent surfaces;
5. Joint failure due to building or joint movement up to the limits prescribed by the manufacturer;
6. Cracks or bubbles on sealant surface.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, joint fillers, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.

B. Colors: Provide color of exposed joint sealants to comply with the following:

1. Provide selections made by Architect from manufacturer’s standards or custom colors to match Architect's samples, as directed by Architect.

C. Additional Movement Capability: Where additional movement capability is specified, provide products with the capability, when tested for adhesion and cohesion under maximum cyclic movement per ASTM C 719, to withstand the specified percentage change in the joint width existing at time of installation and remain in compliance with other requirements of ASTM C 920 for Uses indicated.

D. VOC Content of Interior Sealants: Provide sealants and sealant primers for use inside the weatherproofing system that comply with the following limits for VOC content when calculated according to 40 CFR 59, Part 59, Subpart D (EPA Method 24):

1. Architectural Sealants: 250 g/L.
2. Sealant Primers for Nonporous Substrates: 250 g/L.
3. Sealant Primers for Porous Substrates: 775 g/L.

E. Stain-Test-Response Characteristics: Where sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project

2.2 LATEX JOINT SEALANT

A. Acrylic-Emulsion Sealant: Manufacturer's standard, one part, nonsag, mildew-resistant, paintable latex acrylic-emulsion sealant complying with ASTM C 834, formulated to be paintable and recommended for exposed applications on interior locations involving joint movement of not more than plus or minus 5 percent.

1. Available Products: Subject to compliance with requirements, latex joint sealants that may be incorporated in the Work include, but are not limited to, the following:
   a. AC-20; Pecora Corporation.
   b. Tremflex 834; Tremco.
   c. ALEX PLUS; DAP .
   d. Or equal

B. Uses: General interior use, paintable.

2.3 MILDEW-RESISTANT SILICONE JOINT SEALANT

A. Single-Component Mildew-Resistant Silicone Sealant: Manufacturer's standard, non-modified, one-part, silicone sealant; complying with ASTM C 920, Type S, Grade NS, Class 25, Uses NT, G, A, and, as applicable to non-porous joint substrates indicated, O. Formulate sealant with fungicide and specifically intended for sealing interior joints with nonporous substrates and subject to in-service exposure to conditions of high humidity and temperature extremes.

1. Available Products: Subject to compliance with requirements, silicone joint sealants that may be incorporated in the Work include, but are not limited to, the following:
   a. 786 Mildew Resistant; Dow Corning.
   b. Sanitary 1700; GE Silicones.
   c. 898 Silicone Sanitary Sealant; Pecora Corporation.
   d. Tremsil 600 White; Tremco.
   e. Or equal

B. Uses: Interior use in wet locations, and all toilet rooms.

2.4 NONSAG URETHANE JOINT SEALANT

A. Multicomponent Nonsag Urethane Sealant: Manufacturer's standard, non-modified, multi-part, nonsag urethane sealant; complying with ASTM C 920, Type M, Grade NS, Class 25, Uses NT, M, G, A, and as applicable to joint substrates indicated, O.

1. Available Products: Subject to compliance with requirements, urethane joint sealants that may be incorporated in the Work include, but are not limited to, the following:
   a. Dynatrol II, Pecora Corporation
   b. Sikaflex-2c NS, Sika Corporation
   c. Dymeric 240FC; Tremco.
   d. Masterseal NP 2; Master Builders Solutions Div., BASF
   e. Or equal

B. Uses: Interior use for exposed concrete or masonry wall control joints

2.5 SILICONE JOINT SEALANT

A. Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 100, for Use G, A, M, O; non-staining and field-tintable.

1. Basis of Design Product: Provide Pecora Corporation “890FTS” sealant or equal manufactured by one of the following:
   a. Dow Corning Corporation.
   b. GE Advanced Materials - Silicones
   c. Sika Corporation, Construction Products Division
   d. Tremco Incorporated

B. Additional Movement Capability: 100 percent movement in extension and 50 percent in compression for a total of 150 percent movement.

C. Uses: General exterior use.

2.6 POURABLE URETHANE JOINT SEALANT

A. Multicomponent Pourable Urethane Sealant: Manufacturer's standard, non-modified, two-part, urethane sealant; complying with ASTM C 920, Type M, Grade P, Class 25, Uses T, M, A and, as applicable to joint substrates indicated, O.

1. Available Products: Subject to compliance with requirements, urethane joint sealants that may be incorporated in the Work include, but are not limited to, the following:
   a. NR-200 Urexpan, Pecora Corporation
   b. Sikaflex 2c SL, Sika Corporation
   c. Masterseal SL 2; Master Builders Solutions Div., BASF
   d. Or equal

B. Uses: Interior or exterior use for level pavement or slab joints.

2.7 NONSAG URETHANE JOINT SEALANT

A. Multi-Part Non-Sag Urethane Sealant: Except as otherwise indicated, provide manufacturer's standard, non-modified, two-part, urethane sealant; complying with ASTM C 920, Type M, Grade NS, Class 25, Uses T, M, A and, as applicable to joint substrates indicated, O.

1. Available Products: Subject to compliance with requirements, urethane joint sealants that may be incorporated in the Work include, but are not limited to, the following:
   a. Sikaflex 2c NS; Sika Corp
   b. Dynatred, Pecora Corporation
   c. Masterseal NP 2; Master Builders Solutions Div., BASF
   d. Or equal

B. Uses: Interior or exterior use for pavement or slab joints where slope exceeds one percent.

2.8 PREFORMED FOAM SEALANTS

A. Preformed Foam Sealants: Manufacturer's standard preformed, precompressed, impregnated open-cell foam sealant manufactured from high-density urethane foam impregnated with a nondrying, water repellent agent; factory-produced in precompressed sizes and in roll or stick form to fit joint widths indicated and to develop a watertight and airtight seal when compressed to the degree specified by manufacturer; and complying with the following requirements:

1. Properties: Permanently elastic, mildew-resistant, nonmigratory, nonstaining, and compatible with joint substrates and other joint sealants.
2. Impregnating Agent: Chemically stabilized acrylic.
3. Density: Manufacturer's standard.
4. Backing: None.
5. Available Products: Subject to compliance with requirements, preformed foam sealants that may be incorporated in the Work include, but are not limited to, the following:
   a. "Emseal," Emseal Corp.
   b. "Emseal Greyflex," Emseal Corp.
   c. "Wil-Seal 150," Wil-Seal Construction Foams Div., Illbruck.
   d. "Wil-Seal 250," Wil-Seal Construction Foams Div., Illbruck.

2.9 JOINT SEALANT BACKING

A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Plastic Foam Joint Fillers: Preformed, compressible, resilient, nonstaining, nonwaxing, nonextruding strips of flexible plastic foam of material indicated below and of size, shape, and density to control sealant depth and otherwise contribute to producing optimum sealant performance:

1. Closed-cell polyethylene foam, nonabsorbent to liquid water and gas, nonoutgassing in unruptured state.
2. Manufacturer: Provide Cera-Rod manufactured by W.R. Meadows, Inc., or equivalent.

C. Bond-Breaker Tape: Polyethylene tape or other plastic tape as 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.

2.10 JOINT FILLERS FOR EXTERIOR CONCRETE SLABS

A. General: Provide joint fillers of thickness and depth indicated, or if not indicated 1/2" thick by depth of joint.

B. Bituminous Fiber Joint Filler: Provide preformed strips of with asphalt binder encased between two layers of saturated felt or glass-fiber felt, complying with ASTM D 1751.

1. Protect top edge of joint filler during concrete placement with a metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint and seal with sealant.

2.11 MISCELLANEOUS MATERIALS

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 Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming in any way joint substrates and adjacent nonporous surfaces, and formulated to promote optimum adhesion of sealants with joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint sealant performance. Do not proceed with installation of joint sealants until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply

with recommendations of joint sealant manufacturer and the following requirements:

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
2. Clean concrete, masonry, unglazed surfaces of ceramic tile, and similar porous joint substrate surfaces by brushing, grinding, blast cleaning, 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 from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air.
3. Remove laitance and form release agents from concrete.
4. Clean metal, glass, porcelain enamel, glazed surfaces of ceramic tile, and other nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.

B. Joint Priming: Prime joint substrates where indicated or where recommended by joint sealant manufacturer based on preconstruction joint sealant-substrate tests or prior experience. Apply primer to comply with joint sealant manufacturer's recommendations. Confine primers to areas of joint sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant 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.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint sealant manufacturer's printed installation instructions applicable to products and applications indicated, except where more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations of ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Installation of Sealant Backings: Install sealant backings to comply with the following requirements:

1. Install joint fillers of type indicated to provide support of sealants during application and at position required to produce the cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
    a. Do not leave gaps between ends of joint fillers.
    b. Do not stretch, twist, puncture, or tear joint fillers.
    c. Remove absorbent joint fillers that have become wet prior to sealant application and replace with dry material.

2. Install bond breaker tape between sealants where backer rods are not used between sealants and joint fillers or back of joints.

D. Installation of Sealants: Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint

configuration, and providing uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability. Install sealants at the same time sealant backings are installed.

E. Tooling of Nonsag Sealants: Immediately after sealant application and prior to time skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated, to eliminate air pockets, and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents that discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.

1. Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.
    a. Use masking tape to protect adjacent surfaces of recessed tooled joints.

F. Installation of Preformed Foam Sealants: Install each length of sealant immediately after removing protective wrapping, taking care not to pull or stretch material, and to comply with sealant manufacturer's directions for installation methods, materials, and tools that produce seal continuity at ends, turns, and intersections of joints. For applications at low ambient temperatures where expansion of sealant requires acceleration to produce seal, apply heat to sealant in conformance with sealant manufacturer's recommendations.

3.4 CLEANING

A. Clean off excess sealants or sealant smears adjacent to joints as work progresses by methods and with cleaning materials approved by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they 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 that and installations with repaired areas are indistinguishable from original work.

END OF SECTION