SECTION 07 11 10 - COMPOSITE SHEET WATERPROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:
   1. Rubberized asphalt sheet waterproofing and accessories.
   2. Insulation/protection/drainage board: vertical and horizontal surfaces.
   3. Scope: Contractor shall provide rubberized asphalt sheet waterproofing and accessories and insulation/protection/drainage board for complete coverage on all exterior walls below elevation 100’-0”; under all topping slabs at all covered ground floor areas over habitable basement.

B. Related Sections: The following Sections contain requirements that relate to this Section:
   1. Section 03300 "Cast-in-Place Concrete" for concrete placement, curing, and finishing.
   2. Section 07900 "Joint Sealants" for joint sealant materials and installation.

C. Scope: Contractor shall provide rubberized asphalt sheet waterproofing and accessories and insulation/protection/drainage board for complete coverage on all exterior walls below elevation 100’-0” and bentonite sheet and accessories at elevator walls below elevation100’-0”.

1.3 PERFORMANCE REQUIREMENTS

A. General: Provide waterproofing that prevents the passage of water under hydrostatic pressure and complies with requirements as demonstrated by testing performed by an independent testing agency of manufacturer's current sheet membrane.

1.4 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

B. Product Data for each type of waterproofing specified, including manufacturer's printed instructions for evaluating, preparing, and treating substrate, technical data, and tested physical and performance properties; installation instructions, use limitations and recommendations. Include certificate of data indicating volatile organic compound (VOC) content of all components of waterproofing system.

C. 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, all joints, corners and turns.

D. Samples, 3-by-6-inch (75-by-150-mm) minimum size, of each waterproofing material required for Project including, but not limited to, sheet membrane, protection/drainage board.

E. Installer certificates signed by manufacturer certifying that Installers comply with requirements under the "Quality Assurance" Article. Include a list of projects of similar design and complexity completed within the past five years.

F. Product test reports from a qualified independent testing agency evidencing compliance of waterproofing with requirements and other physical properties reported by manufacturer based on comprehensive testing of products according to current standard test methods within previous 5 years.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced Installer of minimum 5 years experience who is certified in writing by waterproofing manufacturer as qualified to install manufacturer's waterproofing. Submit signed certification.

B. Single-Source Responsibility: Obtain waterproofing materials from a single manufacturer regularly engaged in manufacturing waterproofing with at least 10 years experience in this type of application. To the greatest extent possible, provide secondary materials only as recommended by manufacturer of primary materials.

C. Pre-Installation Conference: Conduct conference at Project site to comply with requirements of Division 1 Section "Project Meetings."
   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.

D. Manufacturer's Representative: General Contractor to coordinate schedule ensuring a trained employee of the manufacturer be on site periodically during membrane waterproofing work to review installation procedures. A direct employee of the waterproofing manufacturer must review the surface before waterproofing work is begun, inspect the system at start-up and periodically, throughout the work. This employee shall also be present at a pre-construction meeting to discuss the work, and shall inspect and approve the finished work prior to final acceptance by the Owner. This employee shall also inform the installer of any conditions requiring special preparation on details.

E. Do not proceed with work until conditions are corrected to ensure manufacturer's recommendations for application.

F. Codes and Standards: Comply with all rules, regulations, laws and ordinances of the city, state and all other authorities.

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. Do not double stack pallets of membrane. Provide cover on top and all sides, allowing adequate ventilation. Store only as much material at point of use as required for each day's work.

C. Protection of Plastic Insulate:
   1. Do not expose to sunlight, except to extent necessary for period of installation and concealment.
   2. Protect against ignition at all times. Do not deliver plastic insulating materials to project site ahead of installation time.
   3. Complete installation and concealment of plastic materials as rapidly as possible.

D. Vapors: Carefully read detailed precaution statement on product labels before use, or contact manufacturer's representative for written instructions.

1.7 PROJECT CONDITIONS

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

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

C. Proceed with installation only when substrate construction and preparation work is complete and in condition to receive sheet membrane waterproofing.

D. Compatibility: Verify new products are compatible with each other as well as with existing conditions. Products may be incompatible with certain new or existing waterproofing products, joint sealants, etc., containing fresh tar or polysulfide polymer. Contact the nearest manufacturer's representative before application.

1.8 WARRANTY

A. General Warranty: The special warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.
   1. Warranty Period: 5 years after date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products: Subject to compliance with requirements, provide one of the following:
   1. Rubberized-Asphalt Composite Sheet:
      QSC 701; Carlisle Corporation, Carlisle Coatings & Waterproofing Inc.
      Bituthene 4000; Grace: W.R. Grace & Co. (specification based on this mfg.)
      Mel-rol; Meadows: W.R. Meadows, Inc.
      Miradri; Nicolon/Mirafi Inc.
   2. Insulation/Protection Drainage Board:
      Styrofoam/Thermady Brand, Insulating Drainage Panel, Dow Chemical USA.
   3. Single Sheet System:
      Bituthene System 4000 waterproof membrane by Grace Const Products.
      QSC 701: Carlisle Corp.
      Miradri 860: Nicolon/Mirafi, Inc.

2.2 SELF-ADHERING COMPOSITE SHEET

A. Rubberized-Asphalt Composite Sheet: 60-mil- (1.5-mm-) thick self-adhering sheet cold-applied composite sheet consisting of 56 mils (1.4 mm) of rubberized asphalt laminated to a 4-mil- (0.10-mm-) thick polyethylene film with release liner on adhesive side.
   1. Sheet Type: Manufacturer's standard composite sheet for use when ambient and substrate temperatures exceed 25 deg F (minus 4 deg C).
   2. Physical Properties: Provide waterproofing complying with the following:
      Tensile Strength: 250 psi (1.7 MPa) minimum; ASTM D 412, Die C, modified.
      Ultimate Elongation: 300 percent minimum; ASTM D 412, Die C, modified.
      Pliability: No cracks when bent 180 degrees over a 1-inch (25-mm) mandrel at minus 25 deg F (minus 32 deg C); ASTM D 146.
      Crack Cycling: Unaffected after 100 cycles of 1/8-inch (3.2-mm) movement; ASTM C 836.
      Puncture Resistance: 40 lbf (180 N) minimum; ASTM E 154.
      Hydrostatic-Head Resistance: 231 feet (45 m) minimum; ASTM D 5385.
      Water Absorption: 0.15 percent weight-gain maximum after 48-hour immersion at 70 deg F (21 deg C); ASTM D 570.
   3. No additional adhesive or heat shall be required to form laps.
   4. System is based on Bituthene 4000 Membrane System.

2.3 SINGLE SHEET WATERPROOFING SYSTEM

A. Uniform flexible sheets not less than 60 mils thick, complying with the following:
   1. Tensile Strength: 5,000 psi; ASTM D 412 DIE C.
   2. Ultimate Elongation: 300 percent; ASTM D 412.
   3. Resistance to Water Absorption: Less than 1.0 % volume gain after 72 hrs of water immersion at 212 deg F; ASTM D 471.
      Sheet Type: Manufacturer's standard composite sheet for use when ambient and substrate temperatures exceed 25 deg F (minus 4 deg C).

2.4 AUXILIARY MATERIALS

A. General: Furnish auxiliary materials recommended by waterproofing manufacturer for intended use and compatible with waterproofing sheet membrane.
   1. Furnish liquid-type auxiliary materials that meet VOC limits of authorities having jurisdiction.

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

C. Sheet Flashing: Self-adhering, rubberized-asphalt composite sheet of same material, construction, and thickness as waterproofing sheet membrane.

D. Liquid Membrane: Elastomeric, 2-component, liquid, cold fluid-applied, trowel grade or low viscosity as recommended by waterproofing manufacturer for application.

E. Mastic, Adhesives, and Tape: Liquid mastic and adhesives, and adhesive tapes recommended by waterproofing manufacturer.

F. Metal Termination Bars: Aluminum bars, approximately 1 by 1/8 inch (25 by 3 mm) thick, pre-drilled at 9-inch (225-mm) centers.

G. Protection Course: See insulation/drainage board, Paragraph 2.04.

H. Self-Expanding Cork Joint Filler: Preformed strips complying with ASTM D1752 for Type III.

I. Soil Separator Membrane: Equivalent opening size of 70-120 per COE CW-00215. Flow rate of 120 gallons per minute per square foot (minimum) per ASTM D4491. Weight of 4 ounces per square yard per ASTM D3776 grab strength of 100 (minimum) per ASTM D1682.

2.5 INSULATION/PROTECTION/DRAINAGE BOARD

A. General: Insulation-drainage board will be used as a protection board for waterproofing.

B. For Walls: Fabric-Faced, Extruded-Polystyrene Board Insulation: Rigid, cellular polystyrene thermal insulation formed by the expansion of polystyrene base resin in an extrusion process using hydrochlorofluorocarbons as the blowing agents to comply with ASTM C 578 for type and other requirements indicated below. Provide products fabricated with tongue-and-groove edges and with one side having a matrix of vertical and horizontal drainage channels faced with manufacturer's standard non-woven filtration fabric. Spunbonded polyester filtration fabric applied to channeled face of insulation board, Type 1750, 2-1/4 inches thick. Compressive strength: ASTM D1621, 3800 psf. R-value as per ASTM C177, 10.6 (aged value). Water absorption: max. 0.3 percent volume, ASTM C272. Apply with adhesive as approved by manufacturer of product.
   1. Type VII, 2.2-lb/cu. ft. (35-kg/cu. m) minimum density and 60-lb/sq. in. (414-kPa) minimum compressive strength.
   2. Minimum Flow Rate: 10 gpm/foot (2 L/s/1000 mm) at a hydraulic gradient of 1.0 and 1500-psf (72-kPa) normal pressure when tested according to ASTM D 4716.

C. See section 07200 Insulation for under slab insulation over waterproofing.

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.
   4. General Contractor to ensure work will proceed after any unsatisfactory conditions are corrected.

3.2 SURFACE PREPARATION

A. Clean, prepare, and treat substrate according to manufacturer's written instructions. Provide clean, dust-free, and dry substrate for waterproofing application. Surfaces shall be structurally sound. Treat joints and install flashing as recommended by manufacturer.

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

C. Remove grease, oil, form release agents, paints & other penetrating contaminants from conc.

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

E. Prepare, fill, prime, and treat joints and cracks in substrate. Remove dust and dirt from joints and cracks according to ASTM D 4258.
   1. Install membrane strip and center over construction and control joints and cracks exceeding a width of 1/16 inch (1.6 mm).

F. Inside Corners: Prepare, prime, and treat inside corners according to waterproofing manufacturer's written instructions.
   1. Install membrane strip centered over vertical inside corners. Install 3/4-inch (19-mm) fillets of liquid membrane on horizontal inside corners and as follows:
      a. At footing-to-wall intersections, extend liquid membrane each direction from corner or install membrane strip centered over corner.
      b. At deck-to-wall intersections, extend liquid membrane or sheet membrane flashing onto deck waterproofing and to finished height of sheet flashing.

G. Outside Corners: Prepare and treat outside corners according to waterproofing manufacturer's written instructions.
   1. Install strip of membrane 12 inches (300 mm) wide, centered over corner.

H. Prepare, treat, and seal vertical and horizontal surfaces at terminations and penetrations through waterproofing and at drains and protrusions according to waterproofing manufacturer's written instructions.
   1. At expansion joints and discontinuous deck-to-wall or deck-to-deck joints, bridge and cover with sheet membrane strips.

3.3 SELF-ADHERING COMPOSITE SHEET APPLICATION

A. Install self-adhering composite sheet according to waterproofing manufacturer's written instructions.
   1. Apply surface conditioner or primer to substrate at required rate and allow to dry. Limit priming to areas that will be covered by waterproofing membrane in same day. Re-prime areas exposed for more than 24 hours. Mask and protect adjoining exposed finish surfaces to protect those surfaces from excessive application of primer.
   2. Delay application of membrane until surface conditioner and primer are complete dry. Drying time will vary with weather conditions.
   3. Apply and firmly adhere sheet membrane over area to receive waterproofing. Accurately align sheets and maintain uniform 2-1/2-inch- (64-mm-) minimum lap widths and end laps. Overlap and seal seams and stagger end laps to ensure watertight installation. When ambient and substrate temperatures exceed 25 deg F, install manufacturer's standard rubberized-asphalt composite sheet.
   4. Seal daily terminations with troweled bead of mastic.
   5. Apply protection board and related materials in accordance with manufacturer's recommendations.

3.4 INSULATION/PROTECTION/DRAINAGE BOARD

A. General: Install this board in horizontal and vertical conditions as indicated on drawings.

B. On surfaces, set units in adhesive applied in accordance with manufacturer's instructions. **Use type of adhesive recommended by manufacturer of insulation and waterproofing.**

3.5 FIELD QUALITY CONTROL

A. Test each area for leaks after waterproofing and before protection course and overlaying construction are placed. Plug or dam drains and fill with water to a depth of 2 inches (50 mm) or to within 3 inches (75 mm) of top of sheet flashings. Maximum water depth shall not exceed 4 inches (100 mm). Flood each area for 24 hours.
   1. Testing agency will examine underside of decks and terminations for evidence of leaks.

B. Correct deficiencies in or remove waterproofing that does not comply with requirements, repair substrates, reapply waterproofing, and repair sheet flashings.
   1. After flood tests, repair leaks and make further repairs until waterproofing **installation is watertight.**

3.5 PROTECTING AND CLEANING

A. Protect waterproofing from damage and wear during application and remainder of construction period, according to manufacturer's written instructions. Protect completed system from subsequent construction activities as recommended by manufacturer.

B. Remove any masking materials after installation. Clean any stains on materials which would be exposed in the completed work.

C. 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.

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

END

SECTION 07 20 00 - INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 DESCRIPTION OF WORK:

A. Extent of insulation work is shown on dwgs and indicated by provisions of this section.

B. Applications of insulation & vapor barrier specified in this section include the following:
   1. Board-type building insulation, concealed.
   2. Blanket/batt-type building insulation.
   3. Vapor barriers:
      a. Exterior walls.
   4. Building wrap:
      a. Exterior walls and as indicated on Drawings.

1.3 QUALITY ASSURANCE:

A. Thermal Resistivity: Where thermal resistivity properties of insulation materials are designated by r-values they represent the rate of heat flow through a homogenous material exactly 1" thick, measured by test method included in referenced material standard or otherwise indicated. They are expressed by the temperature difference in degrees F between the two exposed faces required to cause one BTU to flow through one square foot per hour at mean temperatures indicated.

B. Fire Performance Characteristics: Provide insulation materials identical to those whose fire performance characteristics, as listed for each material or assembly of which insulation is a part, have been determined by testing, per methods indicated below, by UL or other testing & inspecting agency acceptable to authorities having jurisdiction.
   1. Surface Burning Characteristics: ASTM E 84.
   2. Fire Resistance Ratings: ASTM E 119.
   3. Combustion Characteristics: ASTM E 136.

C. Maximum Allowable Asbestos Content of Inorganic Insulations: Insulation composed of mineral fibers or mineral ores which contain asbestos of any type is prohibited from use on this project.

1.4 SUBMITTALS:

A. Product Data: Submit manufacturer's product literature and installation instructions for each type of insulation and vapor retarder material required.

B. Certified Test Reports: With product data, submit copies of certified test reports showing compliance with specified performance values, including r-values (5-year aged values for plastic insulations), densities, compression strengths, fire performance characteristics, perm ratings, water absorption ratings and similar properties.

1.5 DELIVERY, STORAGE, AND HANDLING:

A. General Protection: Protect insulations from physical damage and from becoming wet, soiled, or covered with ice or snow. Comply with manufacturer's recommendations for handling, storage and protection during installation.

B. Protection for Plastic Insulation:
   1. Do not expose to sunlight, except to extent necessary for period of installation and concealment.
   2. Protect against ignition at all times. Do not deliver plastic insulating materials to project site ahead of installation time.

3. Complete installation and concealment of plastic materials as rapidly as possible in each area of work.
4. Keep dry and free from moisture.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS:

A. Manufacturers: Subject to compliance with req's, provide products of one of the following:
1. Manufacturers of Extruded Polystyrene Board Insulation:
Dow Chemical U.S.A.
2. Manufacturers of Glass Fiber Insulation:
(Specification is based on Owens-Corning Fiberglass Corp.)
CertainTeed Corp.
Manville Corp.
Owens-Corning Fiberglas Corp.

2.2 INSULATING MATERIALS:

A. General: Provide insulating materials which comply with requirements indicated for materials, compliance with referenced standards, and other characteristics.
1. Preformed Units: Sizes to fit applications indicated, selected from manufacturer's standard thicknesses, widths and lengths.

B. Extruded Polystyrene Board Insulation: Rigid, cellular thermal insulation with closed-cells and integral high density skin, formed by the expansion of polystyrene base resin in an extrusion process to comply with ASTM C 578 for Type indicated; with 5-year aged r-values of 5.4 and 5 at 40 and 75 deg.F (4.4 and 23.9 deg.C), respectively; and as follows:
1. Type IV, 1.6 lb./cu. ft. min. density, unless otherwise indicated.
2. Surface Burning Characteristics: Maximum flame spread and smoke developed values of 5 and 165, respectively.
3. Use 2" x 2'-0" min. thick, below slab, at foundation perimeter.
4. Below grade and behind brick use Extruded Polystyrene Board Insulation with integral drainage grooves; and complying with AEIMA Guideline Specification for Expanded Polystyrene Insulation Boards for more stringent requirements for material performance & qualities of insulation, including dimensions and permissible variations.

C. Faced Glass Fiber Blanket/Batt Insulation: Thermal insulation produced by combining mineral fibers of type described below with thermosetting resins to comply with ASTM C 665 for Type III, Class A (blankets with reflective vapor-retarder membrane facing with flame spread of 25 or less); foil-scrim-kraft vapor-retarder membrane on one face and as follows:
1. Mineral Fiber Type: Fibers manufactured from glass.
2. Combustion Characteristics: Passes ASTM E 136 test.
3. Applications and values: (to include, but not limited to):
a. 6-1/4" thick above third floor ceilings, R-19 (use spikes or other mechanical means to fix insulation and to prevent future voids due to sagging or improper installation). Provide preformed manufactured baffles at all eaves to provide free passage of ventilation air.
4. Surface Burning Characteristics: Maximum flame spread and smoke developed values of 25 and 50, respectively., Perm-Rating: .05.

2.3 AUXILIARY INSULATING MATERIALS:

A. Adhesive for Bonding Insulation: Type recommended by insulation manufacturer, and complying with requirements for fire performance characteristics.

B. Mechanical Anchors: Type and size indicated or, if not indicated as recommended by insulation mfgr for type of application & condition of substrate, or req'd by Architect.

C. Mastic Sealer: Type recommended by insulation manufacturer for bonding edge joints between units and filling voids in work.

D. Protection Board: Premolded, semi-rigid asphalt/fiber composition board, 1/4" thick, formed under heat and pressure, standard sizes.
E. Eave Ventilation Troughs: Preformed rigid fiberboard or plastic sheet designed and sized to fit between roof framing members and to provide cross ventilation between insulated attic spaces and vented eaves.
F. Crack Sealer for Board Insulation: Provide polymeric insulating foam in aerosol dispenser designed for filling voids in board insulation.
   1. Product: Subject to compliance with requirements, provide "Polycel 100" by Construction Products Div., W.R. Grace & Co.

2.4 UNDERLAYMENT WRAP

A. Building wrap weatherization system: Spun bond olefin, breathable wrap, “Tyvek Commercial Wrap D”, as manufactured by DuPont. Provide at all walls.

PART 3 - EXECUTION

3.1 INSPECTION AND PREPARATION:

A. Require Installer to examine substrates and conditions under which insulation work is to be performed. A satisfactory substrate is one that complies with requirements of the section in which substrate and related work is specified. Obtain Installer's written report listing conditions detrimental to performance of work in this section. Do not proceed with installation of insulation until unsatisfactory conditions have been corrected.
B. Clean substrates of substances harmful to insulations or vapor retarders, including removal of projections which might puncture vapor retarders.
C. Close off openings in cavities to receive poured-in-place insulation, sufficiently to prevent escape of insulation. Provide bronze or stainless steel screen (inside) where openings must be maintained for drainage or ventilation.

3.2 INSTALLATION, GENERAL:

A. Comply with manufacturer's instructions for particular conditions of installation in each case. If printed instructions are not available or do not apply to project conditions, consult manufacturer's technical representative for specific recommendations before work proceeds.
B. Extend insulation full thickness as shown over entire area insulated. Cut & fit tightly around obstructions, & fill voids with insulation. Remove projections which interfere with placement.
C. Apply a single layer of insulation of required thickness, unless otherwise shown or required to make up total thickness.

3.3 INSTALLATION OF PERIMETER INSULATION:

A. On vertical surfaces, set units in adhesive applied in accordance with manufacturer's instructions. Use type of adhesive recommended by manufacturer of insulation.
B. Protect insulation on vertical surfaces (from damage during back-filling) by application of protection board. Set in adhesive in accordance with recommendations of manufacturer of insulation.

3.4 INSTALLATION OF GENERAL BUILDING INSULATION:

A. Apply insulation units to substrate by method indicated, complying with manufacturer's recommendations. 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. Seal joints between closed-cell (non-breathing) insulation units by applying 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 mastic or sealant.

3.5 PROTECTION:

A. General: Protect installed insulation from harmful weather exposures and from possible physical abuses, where possible by non-delayed installation of concealing work or, where that is not possible, by temporary covering or enclosure.

END

SECTION 073113 - ASPHALT SHINGLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Asphalt shingles.
   2. Underlayment.

B. Related Sections:
   1. Division 06 Section "Rough Carpentry" for wood framing and roof sheathing.
   2. Division 07 Section "Sheet Metal Flashing and Trim" for metal roof penetration flashings, counterflashings and flashings.

1.3 DEFINITION

A. Roofing Terminology: See ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" for definitions of terms related to roofing work in this Section.

1.4 SUBMITTALS

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

B. Samples for Initial Selection: For each type of asphalt shingle ridge and hip cap shingles, ridge vent and exposed valley lining indicated.
   1. Include similar Samples of trim and accessories involving color selection.

C. Samples for Verification: For the following products, of sizes indicated, to verify color selected:
   1. Asphalt Shingle: 12-inch- long Sample.

D. Qualification Data: For qualified Installer.

E. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for asphalt shingles.

F. Research/Evaluation Reports: For each type of asphalt shingle required, from the ICC.

G. Maintenance Data: For each type of asphalt shingle to include in maintenance manuals.

H. Warranties: Sample of special warranties.

I. Shop Drawings: Indicate specially configured metal flashing, jointing methods and locations, fastening methods and locations and installation details.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.

B. Source Limitations: Obtain ridge and hip cap shingles ridge vents, felt underlayment and self-adhering sheet underlayment from single source from single manufacturer.

C. Fire-Resistance Characteristics: Where indicated, provide asphalt shingles and related roofing materials identical to those of assemblies tested for fire resistance per test method below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify products with appropriate markings of applicable testing agency.
   1. Exterior Fire-Test Exposure: Class A; ASTM E 108 or UL 790, for application and roof slopes indicated.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store roofing materials in a dry, well-ventilated, weathertight location according to asphalt shingle manufacturer's written instructions. Store underlayment rolls on end on pallets or other raised surfaces. Do not double stack rolls.
   1. Handle, store, and place roofing materials in a manner to avoid significant or permanent damage to roof deck or structural supporting members.

B. Protect unused underlayment from weather, sunlight, and moisture when left overnight or when roofing work is not in progress.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install asphalt shingles until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
   1. Install self-adhering sheet underlayment within the range of ambient and substrate temperatures recommended by manufacturer.

1.8 WARRANTY

A. Special Warranty: Standard form in which manufacturer agrees to repair or replace asphalt shingles that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Manufacturing defects.
      b. Structural failures including failure of asphalt shingles to self-seal after a reasonable time.
   2. Material Warranty Period: 50 years from date of Substantial Completion, prorated, with first five years nonprorated.
   3. Wind-Speed Warranty Period: Asphalt shingles will resist blow-off or damage caused by wind speeds up to 90 mph for five years from date of Substantial Completion.
   4. Algae-Discoloration Warranty Period: Asphalt shingles will not discolor 10 years from date of Substantial Completion.
   5. Workmanship Warranty Period: 10 years from date of Substantial Completion.

B. Special Project Warranty: Roofing Installer's Warranty, or warranty form at end of this Section, signed by roofing Installer, covering the Work of this Section, in which roofing Installer agrees to repair or replace components of asphalt shingle roofing that fail in materials or workmanship within specified warranty period.
   1. Warranty Period: Five years from date of Substantial Completion.

1.9 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Asphalt Shingles: 100 sq. ft of each type, in unbroken bundles.

PART 2 - PRODUCTS

2.1 GLASS FIBER MAT ASPHALT SHINGLES

A. Laminated-Strip Asphalt Shingles: ASTM D 3462, laminated, multi-ply overlay construction, glass-fiber reinforced, mineral-granule surfaced, and self-sealing.
   1. Manufacturer: CertainTeed Corporation.
   2. Grand Manor Shingles: Conforming to ASTM D 3018 Type I – Self-Sealing; UL Certification of ASTM D 3462, ASTM D 3161 Class “F” (110-mph) /UL997 Wind Resistance and UL Class A Fire Resistance; glass fiber mat base; ceramically colored/UV resistant mineral surface granules across the entire face of the shingle; algae-resistant; full two layer laminated four tab shingle, plus additional random tabs.
   3. Weight: 425 pounds per square (100 square feet) (20.7 kg/sq m) Butt Edge: Straight cut.
   4. Algae Resistance: Granules treated to resist algae discoloration.
   5. Color: Black Pearl

B. Hip and Ridge Shingles: Manufacturer's standard units to match asphalt shingles.

2.2 UNDERLAYMENT MATERIALS

A. Felt: ASTM D 226 or ASTM D 4869, Type I, asphalt-saturated organic felts, nonperforated.

B. Self-Adhering Sheet Underlayment, Granular Surfaced: ASTM D 1970, minimum of 55-mil-thick sheet; glass-fiber-mat-reinforced, SBS-modified asphalt; mineral-granule surfaced; with release paper backing; cold applied.
   1. Manufacturers: CertainTeed Corporation.

C. Self-Adhering Sheet Underlayment, High Temperature: Minimum of 30- to 40-mil- thick, slip-resisting, polyethylene-film-reinforced top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release paper backing; cold applied.
   1. Thermal Stability: Stable after testing at 240 deg F; ASTM D 1970.
   2. Low-Temperature Flexibility: Passes after testing at minus 20 deg F; ASTM D 1970.
   3. Manufacturers: CertainTeed Corporation

D. Granular-Surfaced Valley Lining: ASTM D 3909, mineral-granular-surfaced, glass-felt-based, asphalt roll roofing; 36 inches wide.

E. Ice Guard: Eaves Protection: CertainTeed “WinterGuard”; ASTM D1970 sheet barrier of self-adhering rubberized asphalt membrane shingle underlayment having internal reinforcement and “split” back plastic release film; provide material warranty equal in duration to that of shingles being applied.

2.3 RIDGE VENTS

A. Rigid Ridge Vent: Manufacturer's standard, rigid section high-density polypropylene or other UV-stabilized plastic ridge vent with nonwoven geotextile filter strips and external deflector baffles; for use under ridge shingles.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Air Vent, Inc.; a Gibraltar Industries company.
      b. Cor-A-Vent, Inc.
      c. GAF Materials Corporation.
      d. Lomanco, Inc.
      e. Mid-America Building Products.
      f. Obdyke, Benjamin Incorporated.
      g. Owens Corning.
      h. RGM Products, Inc.
      i. Trimline Building Products.

2.4 ACCESSORIES

A. Asphalt Roofing Cement: ASTM D 4586, Type II, asbestos free.

B. Roofing Nails: ASTM F 1667; aluminum, stainless-steel, copper, or hot-dip galvanized-steel wire shingle nails, minimum 0.120-inch- diameter, barbed shank, sharp-pointed, with a minimum 3/8-inch- diameter flat head and of sufficient length to penetrate 3/4 inch into solid wood decking or extend at least 1/8 inch through OSB or plywood sheathing.
   1. Where nails are in contact with metal flashing, use nails made from same metal as flashing.

C. Felt Underlayment Nails: Aluminum, stainless-steel, or hot-dip galvanized-steel wire with low-profile capped heads or disc caps, 1-inch minimum diameter.

D. Ice Guards: Berger Stainless Steel Modified #100 Snow Guard for Asphalt Shingled Roofs. (SGS100HP)

2.5 METAL FLASHING AND TRIM

A. General: Comply with requirements in Division 07 Section "Sheet Metal Flashing and Trim."
   1. Sheet Metal: Aluminum, mill finished.

B. Fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of the item.
   1. Apron Flashings: Fabricate with lower flange a minimum of 4 inches over and 4 inches beyond each side of downslope asphalt shingles and 6 inches up the vertical surface.
   2. Drip Edges: Fabricate in lengths not exceeding 10 feet with 2-inch roof-deck flange and 1-1/2-inch fascia flange with 3/8-inch drip at lower edge.

C. Vent Pipe Flashings: ASTM B 749, Type L51121, at least 1/16 inch thick. Provide lead sleeve sized to slip over and turn down into pipe, soldered to skirt at slope of roof, and extending at least 4 inches from pipe onto roof.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
   1. Examine roof sheathing to verify that sheathing joints are supported by framing and blocking or metal clips and that installation is within flatness tolerances.
   2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and completely anchored; and that provision has been made for flashings and penetrations through asphalt shingles.

B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

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

3.2 UNDERLAYMENT INSTALLATION

A. General: Comply with underlayment manufacturer's written installation instructions applicable to products and applications indicated unless more stringent requirements apply.

B. Single-Layer Felt Underlayment: Install on roof deck parallel with and starting at the eaves. Lap sides a minimum of 2 inches over underlying course. Lap ends a minimum of 4 inches. Stagger end laps between succeeding courses at least 72 inches. Fasten with felt underlayment nails.
   1. Install felt underlayment on roof deck not covered by self-adhering sheet underlayment. Lap sides of felt over self-adhering sheet underlayment not less than 3 inches in direction to shed water. Lap ends of felt not less than 6 inches over self-adhering sheet underlayment.
   2. Install fasteners at no more than 36 inch o.c.

C. Self-Adhering Sheet Underlayment: Install, wrinkle free, on roof deck. Comply with low-temperature installation restrictions of underlayment manufacturer if applicable. Install at locations indicated below, lapped in direction to shed water. Lap sides not less than 3-1/2 inches. Lap ends not less than 6 inches staggered 24 inches between courses. Roll laps with roller. Cover underlayment within seven days.
   1. Eaves: Extend from edges of eaves 24 inches beyond interior face of exterior wall.
   2. Rakes: Extend from edges of rake 24 inches beyond interior face of exterior wall.
   3. Valleys: Extend from lowest to highest point 18 inches on each side.
   4. Hips: Extend 18 inches on each side without obstructing continuous ridge vent slot.
   5. Ridges: Extend 36 inches on each side without obstructing continuous ridge vent slot.
   6. Roof Slope Transitions: Extend 18 inches on each roof slope.

D. Concealed, Closed-Cut Valley Lining: Comply with NRCA's recommendations. Install a 36-inch- wide felt underlayment centered in valley. Fasten to roof deck with roofing nails.
   1. Lap roof-deck felt underlayment over valley felt underlayment at least 6 inches.

3.3 METAL FLASHING INSTALLATION

A. General: Install metal flashings and other sheet metal to comply with requirements in Division 07 Section "Sheet Metal Flashing and Trim."
   1. Install metal flashings according to recommendations in ARMA's "Residential Asphalt Roofing Manual" and asphalt shingle recommendations in NRCA's "The NRCA Roofing and Waterproofing Manual."

B. Apron Flashings: Extend lower flange over and beyond each side of downslope asphalt shingles and up the vertical surface.

C. Rake Drip Edges: Install rake drip edge flashings over underlayment and fasten to roof deck.

D. Eave Drip Edges: Install eave drip edge flashings below underlayment and fasten to roof sheathing.

E. Pipe Flashings: Form flashing around pipe penetrations and asphalt shingles. Fasten and seal to asphalt shingles as recommended by manufacturer.

3.4 ASPHALT SHINGLE INSTALLATION

A. General: Install asphalt shingles according to manufacturer's written instructions, recommendations in ARMA's "Residential Asphalt Roofing Manual," and asphalt shingle recommendations in NRCA's "The NRCA Roofing and Waterproofing Manual."

B. Install starter strip along lowest roof edge, consisting of an asphalt shingle strip with tabs removed at least 7 inches wide with self-sealing strip face up at roof edge.
   1. Extend asphalt shingles 1/2 inch over fasciae at eaves and rakes.
   2. Install starter strip along rake edge.

C. Install first and remaining courses of asphalt shingles stair-stepping diagonally across roof deck with manufacturer's recommended offset pattern at succeeding courses, maintaining uniform exposure.

D. Fasten asphalt shingle strips with a minimum of four roofing nails located according to manufacturer's written instructions.
   1. Where roof slope exceeds 20:12, seal asphalt shingles with asphalt roofing cement spots after fastening with additional roofing nails.
   2. Where roof slope is less than 4:12, seal asphalt shingles with asphalt roofing cement spots.
   3. When ambient temperature during installation is below 50 deg F, seal asphalt shingles with asphalt roofing cement spots.

E. Closed-Cut Valleys: Extend asphalt shingle strips from one side of valley 12 inches beyond center of valley. Use one-piece shingle strips without joints in valley. Fasten with extra nail in upper end of shingle. Install asphalt shingle courses from other side of valley and cut back to a straight line 2 inches short of valley centerline. Trim upper concealed corners of cut-back shingle strips.
   1. Do not nail asphalt shingles within 6 inches of valley center.
   2. Set trimmed, concealed-corner asphalt shingles in a 3-inch- wide bed of asphalt roofing cement.

F. Ridge and Hip Vents: Install continuous ridge vents over asphalt shingles according to manufacturer's written instructions. Fasten with roofing nails of sufficient length to penetrate sheathing.

G. Ridge and Hip Cap Shingles: Maintain same exposure of cap shingles as roofing shingle exposure. Lap cap shingles at ridges to shed water away from direction of prevailing winds. Fasten with roofing nails of sufficient length to penetrate sheathing.
   1. Fasten ridge cap asphalt shingles to cover ridge vent without obstructing airflow.

3.5 ROOFING INSTALLER'S WARRANTY

A. WHEREAS <Insert name> of <Insert address>, herein called the "Roofing Installer," has performed roofing and associated work ("work") on the following project:
   1. Owner: <Insert name of Owner>.
   2. Address: <Insert address>.
   3. Building Name/Type: <Insert information>.
   4. Address: <Insert address>.
   5. Area of Work: <Insert information>.
   6. Acceptance Date: <Insert date>.
   7. Warranty Period: <Insert time>.
   8. Expiration Date: <Insert date>.

B. AND WHEREAS Roofing Installer has contracted (either directly with Owner or indirectly as a subcontractor) to warrant said work against leaks and faulty or defective materials and workmanship for designated Warranty Period,

C. NOW THEREFORE Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period he will, at his own cost and expense, make or cause to be made such repairs to or replacements of said work as are necessary to correct faulty and defective work and as are necessary to maintain said work in a watertight condition.

D. This Warranty is made subject to the following terms and conditions:
   1. Specifically excluded from this Warranty are damages to work and other parts of the building, and to building contents, caused by:
      a. Lightning;
      b. Peak gust wind speed exceeding <Insert wind speed> mph;
      c. Fire;

d. Failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;
e. Faulty construction of parapet walls, copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of the work;
f. Vapor condensation on bottom of roofing; and
g. Activity on roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner.

2. When work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Roofing Installer and until cost and expense thereof have been paid by Owner or by another responsible party so designated.
3. Roofing Installer is responsible for damage to work covered by this Warranty but is not liable for consequential damages to building or building contents resulting from leaks or faults or defects of work.
4. During Warranty Period, if Owner allows alteration of work by anyone other than Roofing Installer, including cutting, patching, and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty shall become null and void on date of said alterations, but only to the extent said alterations affect work covered by this Warranty. If Owner engages Roofing Installer to perform said alterations, Warranty shall not become null and void unless Roofing Installer, before starting said work, shall have notified Owner in writing, showing reasonable cause for claim, that said alterations would likely damage or deteriorate work, thereby reasonably justifying a limitation or termination of this Warranty.
5. During Warranty Period, if original use of roof is changed and it becomes used for, but was not originally specified for, a promenade, work deck, spray-cooled surface, flooded basin, or other use or service more severe than originally specified, this Warranty shall become null and void on date of said change, but only to the extent said change affects work covered by this Warranty.
6. Owner shall promptly notify Roofing Installer of observed, known, or suspected leaks, defects, or deterioration and shall afford reasonable opportunity for Roofing Installer to inspect work and to examine evidence of such leaks, defects, or deterioration.
7. This Warranty is recognized to be the only warranty of Roofing Installer on said work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Installer of responsibility for performance of original work according to requirements of the Contract Documents, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's General Contractor.

E. IN WITNESS THEREOF, this instrument has been duly executed this <Insert day> day of <Insert month>, <Insert year>.
1. Authorized Signature: <Insert signature>.
2. Name: <Insert name>.
3. Title: <Insert title>.

END

SECTION 07 41 00 - STANDING SEAM COPPER ROOFING

PART I - GENERAL

1.1 DESCRIPTION OF WORK:

A. Section Includes:

The scope of work includes, but shall not be limited to: preformed metal roof panels, (straight), flashing required to weatherproof the system (ridge, hip, valley, cleat, eave, outside corner, drip sill, end wall, and other miscellaneous flashing), related accessories necessary for attachment of the roofing system, all butyl tape and sealant used in conjunction with the roofing system, and necessary attachment hardware as required to meet the performance standards and complete the roofing enclosure as indicated by Contract Documents.

1.2 RELATED SECTIONS:

A. Division 5: Cold Formed Metal Framing
B. Division 6: Rough Carpentry
C. Division 7: Roofing Underlayment
D. Division 7: Flashing and Sheet Metal
E. Division 7: Joint Sealers

1.3 REFERENCES

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

1. ASTM A792: Specification for Sheet Steel, Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
2. ASTM E283-91: Test Method for Rate of Air Leakage over Solid Substrate.
3. ASTM E331-93: Test Method for Rate of Water Penetration over Solid Substrate.
4. ASTM E1680-95: Test Method for Rate of Air Leakage over Open Framed Structure.ASTM E1646-95: Test Method for Rate of Water Penetration over Open Framed Structure.
5. ASTM E1592-95: Standard Test Method for Structural Performance of Sheet Metal and Siding Systems by Uniform Static Air Pressure Difference.

B. Sheet Metal and Air Conditioning Contractors National Association (SMACNA):

1. Architectural Sheet Metal Manual (1987 edition).

C. Underwriter's Laboratory (UL) Roofing Materials and Systems Directory:

1. Roofing Materials and Systems Directory (1997 edition) listings and classifications of Underwriter's Laboratory roofing construction assemblies.

1.4 SYSTEM DESCRIPTION:

A. Design Requirements:
1. Continuous, one-piece, preformed, prefinished single length 16 oz. copper roof panels.
2. Panels, clips, and other components required for specific project conditions.
3. Manufacturer is responsible for providing evidence acceptable to Architect that manufacturer's specified roof system is capable of meeting thermal, wind uplift, and performance requirements specified.

B. Thermal Movement:
1. Complete 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.
2. Interface between panel and expansion clip shall provide for applicable thermal movement in each direction along longitudinal direction.

C. Performance Requirements:
1. Underwriter's Laboratories, Inc. (UL) Wind Uplift Resistance Classification for Roof Assembly shall be Class 90, as installed, pursuant to Construction Number (selected from available assemblies in technical section of architectural binder) 431, 431A, 432, 433, 498, 498A, or 498B as defined by UL 580. Certified statements from manufacturer without proper UL classification will not be acceptable.
2. Complete metal roof system shall have maximum static pressure air infiltration of 0.046 cfm / square foot with 1.57 psf air pressure differential when tested in accordance with ASTM E283-91 or 0.014 cfm / square foot with 1.57 psf air pressure differential when tested in accordance with ASTM E1680-95.Complete metal roof system shall have no uncontrolled water penetration (dynamic water pressure), other than condensation, when exposed to dynamic rain at 6.24 psf differential static pressure when tested for not less than fifteen (15) minutes in duration in accordance with ASTM E331-93 or ASTM E1646-95.
3. Entire roofing system (metal panels, flashing, expansion joints, and penetrations), are to be detailed to provide watertight roof under peak weather conditions.

1.5 SUBMITTALS

A. Shop Drawings Submittals:
1. Manufacturer of the metal roof system shall provide complete shop drawings in accordance with the requirements specified in Section 01340. Drawings of all details must be included.
2. Shop drawings must be submitted and returned as acceptable prior to the beginning of product production.

B. Product Data Submittals:
1. Submit manufacturer's detailed product literature including the system profile sheet, system description including: material base-sheet gauge, ice and water shield membrane, seam height, panel on-center, finish, and sealant as required.
2. Submit manufacturer's installation guidelines of the specified product.
3. Submit a sample of ice and water shield, and each type of roof panel, complete with factory finish. In the case where custom color is specified, send a custom color chip for written approval along with a standard color product sample for review.
   a. Ice and Water Shield shall be provided at all copper roofs.

C. Quality Control Submittals:
1. Submit shop drawings signed by a registered engineer licensed to practice in the State where the project is located certifying the design of the roof system meets the specified performance criteria.

1.6 QUALITY ASSURANCE:

A. Qualification of installers:
1. Competent and skilled sheet metal applicators familiar with Dimensional Metals' products, standard details and recommendations. Applicator shall have at least two (2) years experience applying these types of materials with successful completion of projects with similar scope.

2. Installers shall be thoroughly trained and experienced in the necessary crafts and who are completely familiar with and comply to the recommendations and details of the manufacturer and the “Architectural Sheet Metal Manual” published by SMACNA.
3. Installers shall follow the manufacturers' installation details without exception unless written authorization from the manufacturer and architect are provided on an installation detail revision. Detail revision authorization must be made in advance of product installation.

B. Qualification of the product manufacturer:
1. Manufacturer shall be a company specializing in Architectural Sheet Metal Products with at least ten (10) years experience. Being listed as a prequalified manufacturer does not release manufacturer from providing complete, current and acceptable test data for each performance, thermal, and wind load requirement specified for specific profile proposed.
2. Manufacturer shall operate a permanent, full-time, manufacturing facility where the metal roof panels are produced on fixed based roll forming machines that are included in the Underwriter's Laboratory field inspection services. These facilities must be currently under inspection at least four times per year by Underwriter's Laboratory personnel to verify compliance that the products fabricated are in accordance with the specifications of the products which were originally tested.

C. Product Substitutions:
1. Substitutions to the specified systems shall be submitted to the Architect as described in the documents.
2. No product substitutions will be permitted without meeting all of the performance criteria set forth in this specification.
3. No product substitutions shall be submitted after the official bid date.

1.7 DELIVERY, STORAGE AND HANDLING

A. Deliver roof system components to project site in manufacturer's unopened original containers.

B. Protect roof system components during shipment, storage, handling and erection from mechanical abuse, stains, discoloration and corrosion.

C. Provide strippable plastic film on all painted surfaces between contact areas to prevent abrasion during shipping, storage and handling.

D. Store materials off the ground, providing for drainage, under protective cover which allows for air circulation and protection from foreign material contamination, mechanical damage, cement, lime, or other corrosive materials.

E. Handle materials to prevent damage to surfaces, edges and ends of roofing components. Damaged material shall be rejected and removed from site.

F. Examine materials upon delivery to jobsite. Reject and remove physically damaged, stained or marred material from project site.

G. Metal roof components with strippable film must not be stored with exposure to direct sunlight.

H. Stack material to prevent damage and allow for adequate ventilation and drainage.

1.8 SITE CONDITIONS

A. Determine that work of other trades will not hamper or conflict with necessary fabrication and storage requirements for preformed metal roofing system.

B. Protection:
   1. Provide protection or avoid traffic on completed roof surfaces.
   2. Do not overload roof with stored materials.
   3. Support no roof-mounted equipment directly on roofing system.

C. Determine that work of other trades which penetrates roof or is to be made watertight by roof is coordinated by location, in place, and accepted prior to installation of roofing system.

1.9 WARRANTIES

A. Furnish manufacturer's Standard Twenty (20) Year Warranty stating the architectural fluorocarbon coating will:
   1. Not crack, chip, peel or exhibit any other mechanical failure of paint to adhere to the substrate.
   2. Not exhibit fading or color change in excess of five (5) hunter delta E units as determined by ASTM D2244-79.
   3. Not chalk in excess of a numerical rating of eight (8) as determined by ASTM D4214-89

B. Furnish manufacturer's Standard Watertightness Warranty for a period of ten (10) years after the date of completion. Entire source of material and labor shall be the sole responsibility of one subcontractor.

   1. Warranty shall be limited to the value of the installed metal roof assembly.
   2. Warranty shall be signed by the manufacturer of the metal roof system and his authorized installer, agreeing at their option to replace or repair defective materials and workmanship as required to maintain the metal roof system in watertight condition.
   3. Warranty shall not exclude any conditions such as flashing, valleys, interior gutters, penetrations, etc. that are an integral part of the roof system.
   4. The manufacturer of the metal roof system shall review installation details and perform on site inspections as required to certify proper watertight roofing material installation.

PART 2 - PRODUCT

2.1 MANUFACTURERS

A. Dimensional Metals, Inc., 58 Klema Drive North, Reynoldsburg, Ohio 43068 (specification based on this manufacturer); System SS1012.

B. Centria Architectural Systems, 1005 Beaver Grade Road, Moon Township, Pa. 15108-2944; System SRS-2.

C. Peterson Aluminum Corporation, 1005 Tonne Road, Elk Grove Village, Ill. 60007; Snap-Clad Panels system.

D. Grace Construction Products (Ice and Water Shield), 321 Prince George Street, Laurel, Md. 20707.

E. Being listed as a prequalified manufacturer does not release the manufacturer from providing a similar product that meets the performance criteria as listed in this specification. It is the responsibility of the manufacturers to provide evidence of meeting the specification parameters.

2.2 SHEET MATERIALS

A. Material shall be 16 oz. Copper.

B. Strippable film shall be applied to the topside of the coil to protect the finish during fabrication, shipping and field handling. This strippable film must be removed during installation.

2.3 PREFORMED METAL ROOFING SYSTEM

A. Preformed Metal Panels:
   1. System Name: SS1012
   2. Model Number: SS1012
   3. Seam Height: 1 inch
   4. Seam On-center: 12 inches

B. Standing seams shall incorporate a continuous engineered interlocking connection with concealed anchor clips that prevents the entrance of water passage. Standing seams at Mixed Grille Room shall also be continuously soldered at all seamed connections.

C. Standing seams shall contain factory injected butyl sealant that runs continuously throughout the panel length as job conditions dictate.

D. Panel clips shall be as recommended by the manufacturer to meet the performance criteria of this specification.

E. All exposed adjacent flashing shall be of the same material and finish as the roof panels.

F. Fasteners:
   1. Exposed screw fasteners shall be 300 series alloy stainless steel with integrally bonded neoprene washers or Zinc Aluminum Cast head covers with integral neoprene gaskets.
   2. Exposed pop rivets shall be stainless steel, rivet and mandrel, self plugging type #44 - 1/8" diameter 1/4" grip range minimum. Exposed pop rivets shall be painted to match the metal roof system.
   3. Concealed fasteners for anchor clips shall be #10 -12 - 1” long pancake head #2 Phillips drive screw as required to meet the performance criteria in this specification.
   4. Concealed fasteners for flashing attachment shall be #8 -15 - 1 1/4” long truss head #2 Phillips drive screw as required to meet the performance criteria in this specification.
   5. There shall be no exposed fasteners except to fasten flashing, at fixing points, or as indicated on the shop drawings.

G. Closures:

   1. Hip and ridge closures shall be factory fabricated from similar material to the roof panels. Hip and ridge closures shall be field cut to fit properly between the panel seams, and shall be continuously soldered at the Mixed Grille Room.

H. Sealant:

   1. Factory-applied seam sealant shall be non-curing butyl designed for metal to metal connection in concealed joints, if specified.
   2. Field applied sealant and/or butyl tape shall be as recommended by the manufacturer of the metal roof system.

2.4 FABRICATION

A. Panels shall be fabricated in permanent fabrication facilities in continuous lengths. No horizontal end lap joints will be accepted.

B. Panel design shall incorporate concealed clips and fasteners. Exposed fasteners in roofing panels will not be accepted.

C. Standing seam design shall prevent water infiltration by utilizing a capillary break to prevent siphoning.

D. Fabricate roofing and related sheet metal work in accordance with approved shop drawings and applicable standards set forth in the Sheet Metal and Air Conditioning Contractors National Association - Architectural Sheet Metal Manual (1987 edition).

E. All roofing and sheet metal flashing shall be fabricated in minimum 10'-0" lengths except as noted otherwise. All flashing shall have a minimum 1/2″ hemmed edges in exposed locations. Provide field fabricated miters for components that change direction on the project.

PART 3 – EXECUTION

3.1 INSPECTION:

A. Examine alignment and placement of building roof structure before proceeding with installation of preformed metal roofing.

B. Examine roof deck before starting installation. Deck must be clear, clean and smooth, free of depressions, waves, or projections, dry and must remain dry and free of ice and snow, after roofing application commences. Deck flutes must be clean and dry.

C. Field check dimensions and check support alignment with taut string or wire. Support misalignment may cause additional stresses in the panels and contribute to oil canning.

D. Do not proceed with installation until conditions are satisfactory. Notify the architect in writing of unsatisfactory conditions.

E. Felting:

1. Verify that Ice and Water Shield underlayment has been installed over solid substrate.
2. Ensure felt is installed horizontally, starting at the eave working to the ridge with a 6" minimum overlap.
3. Ensure that all fasteners are totally flush with the substrate.

3.2 INSTALLATION:

A. General Requirements:

1. Install roofing and flashing in accordance with approved shop drawings and manufacturer's product data, within specified tolerances.
2. Isolate dissimilar metals, masonry and concrete from metal roof system with bituminous coating.
3. Anchorage shall allow for thermal expansion and contraction without stress or elongation of panels, clips or anchors.Coordinate flashing and sheet metal work to provide watertight conditions at roof terminations. Fabricate and install in accordance with standards set forth in the SMACNA Manual using continuous cleats at all exposed edges.

B. Underlayment:

1. Rigid Insulation board: Approved extruded polystyrene Foam Insulation Board with minimum 1.5 pound density, where shown on drawings.
2. Install proper protection to finished substrate to prevent moisture infiltration to roofing assembly prior to placement of panels. Cover complete roof area to receive metal roof panels with an Ice & Watershield membrane, including the eaves, ridges, hips, valleys, rake walls, rake edges, and around all penetrations.

C. Preformed Metal Panels:
   1. Fasten anchor clips with fasteners as recommended by the manufacturer as required to meet the performance criteria specified.
   2. Install starter and edge trim before installing roof panels.
   3. Remove strippable plastic film prior to installation of roof panels.
   4. Erect metal roofing with lines, planes, rises and angles sharp and true, and plane surfaces free from objectionable warp, dents, buckle or other physical defects.
   5. Do not allow traffic on completed roof.
   6. Protect installed roof panels and trim from damage caused by adjacent construction until completion of installation.
   7. Remove and replace any panels or flashing components that are damaged beyond successful repair.

D. Flashing:
   1. Comply with SMACNA "Architectural Sheet Metal Manual" recommendations for installation work where the manufacturer's approved shop drawings do not define a specific detail.
   2. Conceal fasteners and expansion provisions wherever possible.
   3. Hem all exposed edges of sheet metal flashing that are exposed with at least 1/2" fold under.
   4. Insert metal flashing into reglets, anchor with wedges and seal all joints.
   5. Set sheet metal items level, true to line and plumb.
   6. Secure all metal flashing to wood nailers with screws as indicated on the approved shop drawings.
   7. Use cleats to keep flashing endlaps closed when face width exceeds eight (8) inches.

3.3 FIELD QUALITY CONTROL

A. Tolerances:
   1. Applicable erection tolerances: Maximum variation from true planes or lies shall be 1/4" in 20'-0" or 3/8" in 40'-0".
   2. Metal roof systems can not correct any previously installed support or wood nailer problems that do not meet the above tolerances.

B. Manufacturer's Field Service:
   1. Manufacturer's representative shall inspect all Watertight Warranted projects during the installation of the metal roof system.
   2. Inspections shall be scheduled as required by the manufacturer of the roofing system.
   3. Three mandatory visits are required:
      a. Inspection of substrate and proper underlayment.
      b. Inspection of proper panel and flashing installation.
      c. Final inspection upon completion of the metal roof installation.
   4. Upon final inspection a report will be issued to the installer of any discrepancies and requirements for additional work. If additional work required the manufacturer will provide another final inspection to verify acceptance of completed work.

3.4 CLEANING

A. Clean exposed surfaces of work promptly after completion of installation. To prevent rust from staining the painted finish immediately remove filings produced by drilling or cutting.

B. Clean roof in accordance with manufacturer's recommendations.

C. Touch up minor abrasions and scratches in finish.

D. Remove all scrap and construction debris from the site.

END

SECTION 07 46 10 – FIBER CEMENT SIDING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:
   1. Fiber Cement Siding

B. Related Sections include the following:
   1. Div. 7 Section for exterior sheathing and Building Wrap

   2. Div. 7 Section “Joint Sealants” for Caulking and Sealants.

   3. Div. 9 Section “Gypsum Drywall” for metal studs.

1.3 SUBMITTALS

A. Product Data: For each type of product specified. Include identification of materials; dimensions of individual components; installation instructions; & available profiles, textures, & colors.

B. Samples for Initial Selection: Manufacturer's sample finishes showing the full range of colors, profiles, and textures available.

C. Samples for Verification: Full-size units of each type of siding and trim indicated; in sets for each color, texture, and pattern specified.

D. Research/Evaluation Reports: Evidence of siding's compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced installer who has completed siding installations similar in material, design, and extent to that indicated for Project that has resulted in construction with a record of successful in-service performance.

B. Source Limitations for Siding and Accessories: Obtain each color, texture, pattern, and type of siding and related accessories from one source with resources to provide products of consistent quality in appearance and physical properties without delaying the Work.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in mfgr's unopened packages or bundles with labels intact.

B. Store materials in a dry, well-ventilated, weather-tight place. Comply with manufacturer's written instructions for storage, handling, and protection.

1.6 PROJECT CONDITIONS

A. Weather Limitations: Proceed with siding installation only if existing and forecasted weather conditions permit siding to be installed according to manufacturer's written instructions and if substrate is completely dry.

1.7 WARRANTY

A. General Warranty: The special warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.

B. Special Project Warranty: Submit a written warranty, executed by siding manufacturer, agreeing to repair or replace siding that fails in materials or workmanship within the specified warranty period. Failures include, but are not limited to, cracking, deforming, fading, or otherwise deteriorating beyond normal weathering.
   1. Warranty Period: Manufacturer’s standard Lifetime limited warranty.

1.8 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels describing contents.
   1. Furnish full lengths of siding in a quantity equal to 2 percent of amount installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Shall be JamesHardie, HardiePlank Smooth Lap Siding, 4/4 HardieTrim NT3 Boards Smooth and HardieTrim Crown Moulding, or equals as determined solely by architect.

2.2 MATERIALS

A. Fiber Cement Siding: Smooth Lap Siding, Smooth Batten Boards, and Crown Moulding and as selected by Architect. See drawings for sizes required.

B. Caulking: Shall be latex sealant that complies with ASTM C 834 or ASTM C 920, (Class 25).

C. Primer: PrimePlus factory-applied sealer.

D. Paint: Shall be as specified in Section 09 90 00 Painting.

2.2 PROFILES AND TEXTURES

A. Where manufacturer's standard products are indicated, provide siding and accessories complying with the following requirements:
   1. Provide Architect's selections from manufacturer's full range of profiles, textures and accessories for of type products indicated. Accessories may be required to match siding or to be of a different color or texture as selected by Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates for compliance with requirements for substrates, installation tolerances, and other conditions affecting performance of siding. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrates of projections and substances detrimental to application.

B. Coordinate installation with flashings and other adjoining construction to ensure proper sequencing.

3.3 INSTALLATION

A. General: Comply with siding manufacturer's written installation instructions applicable to products and applications indicated, unless more stringent requirements apply. Locate nails as recommended without binding or siding to allow for thermal movement. Butt joints per manufacturer’s recommendations.

B. Isolate dissimilar metals by separating from siding with rubber gaskets, elastomeric sealant, or rubber washers where fasteners penetrate siding. Dissimilar metals behind siding may be isolated by covering with polyethylene film.

C. Provide manufacturer’s recommended clearances from roofing, decks, steps, and other adjacent forms and materials.

D. Sealant must be applied in accordance with the caulking manufacturer’s written instructions.

E. Do not apply paint when wet. Products should be painted within 180 days for factory primed items.

3.4 ADJUSTING AND CLEANING

A. Remove and replace damaged, improperly installed, or otherwise defective siding materials with new materials complying with specified requirements.

B. Clean finished surfaces according to siding manufacturer's written instructions and maintain in a clean condition during construction.

END

SECTION 07 53 10 – EPDM MEMBRANE ROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes installation of a new single ply roofing system.

B. Types of roofing systems specified in this section utilizing single ply roofing membranes include the following:
   1. Fully adhered systems, 60 mils.

C. Membranes include the following:
   1. Ethylene Propylene Diene Monomer (EPDM)

D. Wood nailers, blocking, and other related items are specified in Division 6.

1.3 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Product data, installation instructions, and general recommendations from manufacturer of single ply membrane system for types of roofing required. Include data substantiating that materials comply with requirements.

C. Samples of finished roofing sheets, including T-shaped side/end-lap seam. Also include samples of required insulation.

D. Shop drawings showing roof configuration, layout, seam locations, membrane terminations, colors (as applicable), details at perimeter, and special conditions.
   1. Provide complete details of all terminations..

E. Pre-roofing Conference records.

F. Test data for pullout resistance of fastening systems.

1.4 QUALITY ASSURANCE

A. Manufacturer: Obtain primary flexible sheet roofing from a single manufacturer. Provide secondary materials as recommended by manufacturer of primary materials.

B. Installer: Engage an experienced Installer to apply single ply membrane roofing who has specialized in installing roofing systems for 5 yrs similar to those required for this project. Installer must be acceptable to or licensed by manufacturer of primary roofing material.
   1. Work included with single ply membrane roofing, including (but not limited to) insulation, flashing and counter-flashing, expansion joints, and joint sealers, is to be performed by Installer of this work.

C. Pre-Roofing Conference: Prior to installation of roofing and associated work, meet at project site, or other mutually agreed location, with Installer, a direct representative of the roofing sheet manufacturer, installers of related work, and other entities concerned with roofing performance, including (where applicable) Owner's insurer, test agencies, governing authorities, Architect, and Owner. Record discussions and agreements and furnish copy to each participant. Provide at least 72 hours' advance notice to participants prior to convening pre-roofing conference.

D. Exterior Fire Test Exposure: Class A, comply with ASTM E108

E. UL Listing: Provide labeled materials that have been tested and listed by UL in "Building Materials Directory" or by other nationally recognized testing laboratory for application indicated, with "Class A" rated materials/system for roof slopes shown.

1.5 PROJECT CONDITIONS

A. Weather: Proceed with roofing work when existing and forecasted weather conditions permit work to be performed in accordance with manufacturers' recommendations and warranty requirements.

B. Substrate Conditions: Do not begin roofing installation until substrates have been inspected and are determined to be in satisfactory condition.

1.6 WARRANTY

A. Project Warranty: Submit two executed copies of 15-year "Roofing Warranty" covering work of this section including roofing membrane, composition flashing, roof insulation, and roof accessories, signed by manufacturer of roofing system agreeing to replace any defective materials and workmanship and to repair any leaks as required to maintain the roof in watertight condition **without financial limit**. The warranty period is for l5 years after date of final acceptance.

PART 2 - PRODUCTS

2.1 GENERAL

A. Compatibility: Provide products that are recommended by manufacturers to be fully compatible with indicated substrates, or provide separation materials as required to eliminate contact between incompatible materials.

2.2 EPDM ROOFING MEMBRANE

A. EPDM Roofing Membrane: ASTM D 4637, Type I, nonreinforced uniform, flexible sheet made from EPDM, and as follows:

1. Manufacturers:

   a. Carlisle SynTec Incorporated.
   b. Celotex Corporation.
   c. Firestone Building Products Company.
   d. GenFlex Roofing Systems.
   e. Johns Manville International, Inc.

2. Thickness: 60 mils (1.5 mm), nominal.
3. Exposed Face Color: Black.

2.3 AUXILIARY MATERIALS

A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with membrane roofing.

1. Liquid-type auxiliary materials shall meet VOC limits of authorities having jurisdiction.

B. Sheet Flashing: 60-mil- (1.5-mm-) thick EPDM, partially cured or cured, according to application.

C. Epichlorohydrin Sheet: 60-mil- (1.5-mm-) thick, unreinforced flexible sheet with the following typical properties as determined per ASTM test method indicated:

1. Tensile Strength: 1500 psi (10.3 MPa); ASTM D 412.
2. Ultimate Elongation: 200 percent; ASTM D 412.
3. Tear Resistance: 150 lbf/in. (26.3 kN/m); ASTM D 412.
4. Brittleness Temperature: Minus 20 deg F (Minus 29 deg C); ASTM D 746.
5. Resistance to Ozone Aging: No cracks after 168 hours' exposure of 50 percent elongated sample at 104 deg F (40 deg C) and 100-pphm (100-MPa) ozone; ASTM D 1149.
6. Resistance to Oil Aging: 15 percent maximum mass change after 168 hours' immersion in diesel fuel No. 2 at 158 deg F (70 deg C); ASTM D 471.

D. Bonding Adhesive: Manufacturer's standard bonding adhesive.

E. Cold Fluid-Applied Membrane Adhesive: Manufacturer's standard cold fluid-applied bonding adhesive formulated to adhere fleece-backed roofing membrane to substrate.

F. Seaming Material: Single-component butyl splicing adhesive and splice cleaner or manufacturer's standard synthetic-rubber polymer primer and 3-inch- (75-mm-) wide minimum, butyl splice tape with release film.

G. Lap Sealant: Manufacturer's standard single-component sealant, color to match roofing membrane.

H. Water Cutoff Mastic: Manufacturer's standard butyl mastic sealant.

I. Metal Termination Bars: Manufacturer's standard predrilled stainless-steel or aluminum bars, approximately 1 by 1/8 inch (25 by 3 mm) thick; with anchors.

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

K. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, in-seam sealants, termination reglets, cover strips, and other accessories.

2.4 ASPHALT MATERIALS

A. Roofing Asphalt: ASTM D 312, Type III or IV.

B. Asphalt Primer: ASTM D 41

PART 3 - EXECUTION

3.1 PREPARATION OF SUBSTRATE

A. General: Comply with manufacturers' instructions for preparation of substrate to receive single ply membrane system.
   1. Verify that penetrations, expansion joints, and blocking are in placed and secured and that roof drains if any are properly clamped into position.

B. Clean substrate of dust, debris, and other substances detrimental to Roofing system work. Remove sharp projections.

C. Install flashings and accessory items as shown, and as recommended by manufacturer if not shown.

D. Prime substrate where recommended by manufacturer of materials being installed.

E. Prevent compounds from entering and clogging drains and conductors and from spilling or migrating onto surfaces of other work.

3.3 MEMBRANE INSTALLATION

A. Install roofing membrane over area to receive roofing according to membrane roofing system manufacturer's written instructions. Unroll roofing membrane and allow to relax before installing.

B. Start installation of roofing membrane in presence of membrane roofing system manufacturer's technical personnel.

C. Accurately align roofing membrane and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.

D. Bonding Adhesive: Apply bonding adhesive to substrate and underside of roofing membrane at rate required by manufacturer and allow to partially dry before installing roofing membrane. Do not apply bonding adhesive to splice area of roofing membrane.

E. Mechanically or adhesively fasten roofing membrane securely at terminations, penetrations, and perimeter of roofing.

F. Apply roofing membrane with side laps shingled with slope of roof deck where possible.

G. Adhesive Seam Installation: Clean both faces of splice areas, apply splicing cement, and firmly roll side and end laps of overlapping roofing membranes according to manufacturer's written instructions to ensure a watertight seam installation. Apply lap sealant and seal exposed edges of roofing membrane terminations.

   1. Apply a continuous bead of in-seam sealant before closing splice if required by membrane roofing system manufacturer.

H. Tape Seam Installation: Clean and prime both faces of splice areas, apply splice tape, and firmly roll side and end laps of overlapping roofing membranes according to manufacturer's written instructions to ensure a watertight seam installation. Apply lap sealant and seal exposed edges of roofing membrane terminations.

I. Repair tears, voids, and lapped seams in roofing that does not meet requirements.

J. Spread sealant or mastic bed over deck drain flange at deck drains and securely seal roofing membrane in place with clamping ring.

3.4 PROTECTION OF ROOFING

A. Upon completion of roofing (including associated work), institute appropriate procedures for surveillance and protection of roofing during remainder of construction period. At end of construction period, or at a time when remaining construction will in no way affect or endanger roofing, make a final inspection of roofing and prepare a written report to Owner, describing nature and extent of deterioration or damage found.

B. Repair or replace (as required) deteriorated or defective work found at time of final inspection to a condition free of damage and deterioration at time of Substantial Completion and in accordance with requirements of specified warranty.

END

SECTION 07 60 00 - FLASHING AND SHEET METAL

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. This Section includes the following:
   l. Two piece metal counter flashing and base flashing at exterior Masonry walls
   2. Metal wall flashing and expansion joints.
   3. Miscellaneous sheet metal accessories.
   4. Laminated and composition flashing, (thru-wall & masonry cap flashing).
   5. Reglets and counter-flashing.
   6. All gutters, eaves, rakes, fascia, trim conditions.
   7. Cavity Wall Moisture Control and Weep Systems
   8. Cast Iron downspout boots.

B. Related Sections:
   1. Roofing accessories installed integral with roofing membrane are specified in roofing system sections as roofing work.
   2. Roof accessory units of pre-manufactured, set-on type are specified in Division 7 Section "Roof Accessories."

1.03 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Product data, Flashing, Sheet Metal, and Accessories: Manufacturer's technical product data, installation instructions and general recommendations for each specified sheet material and fabricated product.

C. Samples of the following flashing, sheet metal, and accessory items:
   1. 8-inch-square samples of specified sheet materials to be exposed as finished surfaces.
   2. 12-inch-long samples of factory-fabricated products exposed as finished work. Provide complete with specified factory finish.
      a. Provide color samples for selection of final color of gutters and downspouts by architect; color to match fascias and copings; based on medium grey.

D. Shop drawings showing layout, profiles, methods of joining, and anchorages details, including major counter-flashings, trim/fascia units, gutters, downspouts and expansion joint systems. Provide layouts at 1/4-inch scale and details at 3-inch scale.

1.04 PROJECT CONDITIONS

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

PART 2 - PRODUCTS

2.01 SHEET METAL FLASHING AND TRIM MATERIALS

A. Provide for thermal expansion of running sheet metal work, by overlaps of expansion joints in fabricated work. Where required for water-tight construction, provide hooked flanges filled with polyisobutylene mastic for 1" embedment of flanges. Space joints at intervals of not more than 50 ft. for steel, 24 ft. for copper or stainless steel, or 30 ft. for zinc alloy or aluminum. Conceal expansion provisions where possible. Reference ASTM A 653.

B. Zinc-Coated Steel: Commercial quality with 0.20 percent copper, ASTM A 526 except ASTM A 527 for lock-forming, G90 hot-dip galvanized, mill phosphatized where indicated for painting; 0.0359-inch thick (20 gage) except as otherwise indicated.

C. Stainless Steel: AISI Type 302/304, complying with ASTM A 167, 2D annealed finish, soft, except where harder temper required for forming or performance; 0.0156-inch thick (26 gage) except as otherwise indicated.

D. Sheet Aluminum: ASTM B 209, alloy 3003, temper H14, AA-C22A41 clear anodized finish; 0.032-inch thick (20 gage) except as otherwise indicated.

E. Extruded Aluminum: Manufacturer's standard extrusions of sizes and profiles indicated, 6063-T52, ASTM B221, AA-C22A41 clear anodized finish; 0.080-inch minimum thickness for primary legs of extrusions.

F. Sheet Copper: Type m 5 oz. Per square ft. except as otherwise indicated.

2.02 FLEXIBLE SHEET MEMBRANE FLASHING

A. Elastic Sheet Flashing/Membrane: Non-reinforced flexible, black elastic sheet flashing of 50 to 65 mils' thickness and complying with the following:
Shore A Hardness (ASTM D 2240): 50 to 70.
Tensile Strength (ASTM D 412): 1200 psi.
Tear Resistance (ASTM D 624, Die C): 20 lbs. per linear inch.
Ultimate elongation (ASTM D 412): 250 percent.
Low temperature brittleness (ASTM D 746): minus 30 deg F (minus 35 deg C). Resistance to ozone aging (ASTM D 1149): no cracks for 10 percent elongated sample for 100 hours in 50 pphm (50.5 mPa) ozone at 104 deg F (70 deg C).
Resistance to Heat Aging (ASTM D 573): maximum hardness increase of 15 points, elongation reduction of 40 percent, and tensile strength reduction of 30 percent, for 70 hours at 212 deg F (100 deg C).

B. Acceptable Products:
Neoprene synthetic rubber sheet.
Butyl synthetic rubber sheet.
EPDM synthetic rubber sheet.

2.03 LAMINATED COMPOSITION SHEET FLASHING (THRU-WALL & MAS CAP FLASHING)

A. Copper/Fabric Flashing: 3-oz. copper sheet bonded with asphalt between 2 layers of glass fiber cloth.At Flashings above all masonry openings provide end dams.

B. Products: Subject to compliance with requirements, provide one of the following:
Afco Products, Inc.; "Cop-A-Bond Duplex."
Phoenix Building Products, Inc.; "Duplex Cop-R Flash."
York Manufacturing, Inc.; "Cop-R-Tex Duplex."

2.04 MISCELLANEOUS MATERIALS AND ACCESSORIES:

A. Solder: For use with steel or copper, provide 50 - 50 tin/lead solder (ASTM B 32), with rosin flux.

B. Solder: For use with stainless steel, provide 60 - 40 tin/lead solder (ASTM B 32), with acid-chloride type flux, except use rosin flux over tinned surfaces.

C. Fasteners: Same metal as flashing/sheet metal or other non- corrosive metal as recommended by sheet manufacturer. Match finish of exposed heads with material being fastened.

D. Bituminous Coating: SSPC - Paint 12, solvent-type bituminous mastic, nominally free of sulfur, compounded for 15-mil dry film thickness per coat.

E. Mastic Sealant: Polyisobutylene; non-hardening, non-skinning, non-drying, non-migrating sealant.

F. Elastomeric Sealant: Generic type recommended by manufacturer of metal and fabricator of components being sealed and complying with requirements for joint sealants as specified in Division 7 Section "Joint Sealers."

G. Epoxy Seam Sealer: 2-part non-corrosive metal seam cementing compound, recommended by metal manufacturer for exterior/interior nonmoving joints including riveted joints.

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

I. Paper Slip Sheet: 5-lb. rosin-sized building paper.

J. Polyethylene Underlayment: Minimum 6-mil carbonated polyethylene film resistant to decay when tested in accordance with ASTM E 154.

K. Reglets: Metal or plastic units of type and profile indicated, compatible with flashing indicated, non-corrosive.

L. Metal Accessories: Provide sheet metal clips, straps, anchoring devices, and similar accessory units as required for installation of work, matching or compatible with material being installed, non-corrosive, size and gage required for performance.

M. Cast-Iron Drainage Boots: Grey iron castings of size and pattern indicated, ASTM A 48, bituminous shop-coated. Rainwater (Downspout) leaders shall be cast iron and extend 3 Feet above grade; shall be Neenah Series R-4926—29 series.

N. Samples and Conductor-Head Guards: 20-gage bronze or nonmagnetic stainless steel mesh or fabricated units, with selvaged edges and non-corrosive fasteners. Select materials for compatibility with scuppers and downspouts.

O. Elastic Flashing Filler: Closed-cell polyethylene or other soft closed-cell material recommended by elastic flashing manufacturer as filler under flashing loops to ensure movement with minimum stress on flashing sheet.

P. Roofing Cement: ASTM D 2822, asphaltic.

2.05 FABRICATED UNITS

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: Fabricate nonmoving seams in sheet metal with flat-lock seams. For metal other than aluminum, tin edges to be seamed, form seams, and solder. Form aluminum seams with epoxy seam sealer; rivet joints for additional strength where required.

C. Expansion Provisions: Provide for thermal expansion. Space joints not more than 50 ft. for steel, 24 feet for copper or stainless steel, or 30 ft. for zinc alloy or aluminum. Conceal expansion provisions, where possible. Where lapped or bayonet-type expansion provisions in work cannot be used or would not be sufficiently water/weatherproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

D. Sealant Joints: Where movable, non-expansion type joints are indicated or required for proper performance of work, form metal to provide for proper installation of elastomeric sealant, in compliance with SMACNA standards.

E. Separations: Provide for separation of metal from non-compatible metal or corrosive substrates by coating concealed surfaces at locations of contact, with bituminous coating or other permanent separation as recommended by manufacturer/fabricator.

F. Aluminum Extrusion Units: Fabricate extruded aluminum running units with formed or extruded aluminum joint covers for installation behind main members where possible. Fabricate mitered and welded corner units.

G. Shop Finish, Rain Drainage: Provide manufacturer's baked-on acrylic shop finish on sheet metal rain drainage units (gutters, downspouts, and similar exposed units); 1.0-mil dry film thickness. (color shall be custom as selected by architect from unlimited range of colors).

H. Scuppers, Gutters, and Downspouts: Gutters shall be 4 inch, unless otherwise indicated on drawings. Downspouts shall be 4” by 5”, unless otherwise indicated on drawings. Gutters shall be of minimum 0.050” thickness, extruded aluminum. Color selected by Architect. Gutters shall be supported by heavy duty brackets, fastened directly to fascia or roof deck at 3’-0” spacing. Site extruded factory welded, and fabricated, as manufactured by:
   a. Hickman Construction Products, Inc.
   b. Petersen Aluminum Corp.
   c. Southern Aluminum Finishing Co.

I. Splashblocks: All downspouts terminating at a rooftop will have splashblocks. All downspouts terminating at grade shall have cast iron drainage boots as specified above.

J. Sealants: Provided by installer. See Division 7, Section "Sealants", for additional information.

2.06 ELASTIC EXPANSION JOINTS

A. General: Provide factory-fabricated units of size and profile indicated, complete with prefabricated corner units, intersection units, and splicing materials. Provide complete with elastic sheet flashing forming the primary joint membrane, in a supported, "bellows" arrangement designed for securement to both sides of expansion joints. Underside of bellows insulated with adhesively applied, flexible, closed-cell rubber or plastic not less than 3/8-inch thick.

B. Type: Metal flanged edges, 3 to 4 inches wide, formed to profiles as indicated to fit curbs & designed for nailing to curb substrate. Provide metal flanges in the following thicknesses:
Zinc-coated steel: 0.0179 inch (26 gage).
Copper: 16 oz.
Stainless Steel: 0.0187 inch (26 gage).
Aluminum: 0.032 inch.

C. Looped Bellows Width: 5 to 6 inches, exclusive of flanges.

D. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
Afco Products, Inc.
Celotex Corporation
International Permalite/Roofing Components Group.
Manville/Roofing Systems Division.
Phoenix Building Products, Inc.
York Manufacturing, Inc.

E. Expansion Joint Fabrication:
1. General: Provide manufacturer's standard units of size and type indicated, complete with prefabricated corner and intersection units and splicing materials; with extruded aluminum expansion joint 6063-T5, clear anodized, to be secured to both sides of expansion joints; with bellows insulated from below with continuous EPDM membrane holding insulation in place, compressible, closed-cell rubber or plastic shall be l" larger than joint; insulation shall be batt type insulation appropriate for expansion joint application.
2. Acceptable Manufacturers: Subject to compliance of requirements and application, provide one of the following:
Hickman Construction Products
MM Systems Corporation

2.07 REGLETS:

A. Provide size and shape as indicated on drawings and as required. Reglets shall be min. .020 stainless steel Type 302 fasteners shall be max. 24" o.c. Factory fabricate all corners. Sealant by installer. See Division 7, Section "Sealants", for additional information.

B. Acceptable Manufacturers: Subject to compliance of requirements and application, provide one of the following:
Fry Reglet Corporation
The Keystone Flashing Company
AFCO Products, Inc.

2.08 MASONRY CAVITY WALL MOISTURE CONTROL SYSTEM:

A. Place 2” wide by 10” min. ht. Mortar Net Drainage System on top of thru-wall flashing in the wall cavity at the brick veneer termination at door headers, window headers, and at the foundation line as indicated on the drawings.

B. Material to be compliant with ASTM E-514.

C. Manufacturers;
Subject to compliance with requirements, provide products by one of the following:
Hickman Building Products
Mortar Net
Advanced Building Products

2.09 MASONRY CAVITY WALL MORTAR DIVERTER AND VENT:

A. Place continuous V-shape plastic trash Mortar Diverter on top of a plastic Cavity Vent Weep System. These are to be used in conjunction with thru-wall flashing at high roof transition walls only.

B. Cavity Vent to create min. 4 plastic weep holes every 9 to 12 inches. All weeps to be at lowest point of cavity and to be transparent plastic to blend in with the mortar.

C. Manufacturers:

Subject to compliance with requirements, provide products by one of the following:
Hickman Building Products (#365 diverter, #366 Weep System)
Mortar Net (TMD 9548 diverter, CV 5010 Weep System)
Advanced Building Products

PART 3 - EXECUTION

3.01 INSTALLATION REQUIREMENTS

A. General: Except as otherwise indicated, comply with manufacturer's installation instructions and recommendations and with SMACNA "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.
1. Performance: Water-tight, weatherproof performance of flashing and sheet metal work are required.

B. Underlayment: Where stainless steel or aluminum is to be installed directly on cementitious or wood substrates, install a slip sheet of red rosin paper and a course of polyethylene underlayment.

C. Bed flanges of work in a thick coat of bituminous roofing cement where required for waterproof performance.

D. Install reglets to receive counterflashing in manner and by methods indicated. Where shown in concrete, furnish reglets to trades of concrete work for installation as work of Division 3 sections. Where shown in masonry, furnish reglets to trades of masonry work, for installation as work of Division 4 sections.
1. Install counterflashing in reglets, either by snap-in seal arrangement or by welding in place for anchorage and filling reglet with mastic or elastomeric sealant, as indicated and depending on degree of sealant exposure.

E. Install elastic flashing in accordance with manufacturer's recommendations. Where required, provide for movement at joints by forming loops or bellows in width of flashing. Locate cover or filler strips at joints to facilitate complete drainage of water from flashing. Seam adjacent flashing sheets with adhesive, seal and anchor edges in accordance with manufacturer's recommendations.

F. Nail flanges of expansion joint units to curb nailers, at maximum spacing of 6 inches o.c. Fabricate seams at joints between units with minimum 3-inch overlap, to form a continuous, waterproof system.

G. Install continuous gutter guards on gutters, arranged as hinged units to swing open for cleaning gutters. Install "beehive"-type strainer-guard at conductor heads, removable for cleaning downspouts.

H. Seal all laps in through wall flashings with mastic, and turn up ends to provide water dam to direct water to exterior of wall.

3.02 CLEANING AND PROTECTION

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

B. Protection: Advise Contractor of required procedures for surveillance and protection of flashings and sheet metal work during construction to ensure that work will be without damage or deterioration other than natural weathering at time of Substantial Completion.

3.03 TESTS

A. Upon request of the Architect, demonstrate by hose or standing water that all flashing and sheet metal systems are completely watertight.

END

SECTION 07 90 00 - JOINT SEALERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

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

1.2 DESCRIPTION OF THE WORK:

A. In general, seal all openings, & other locations which normally require sealant, seal against infiltration from air, water & most insects, including, but not limited to the following:
   1. Construction and expansion joints, joints between dissimilar materials. Joints around windows, door frames, louvers and other penetrations and openings in the exterior wall. Interior walls as detailed or specified.
   2. Note details on Drawings for additional sealant requirements, joints between horizontal; vertical surfaces.
   3. Specification is based on Tremco Manufacturing Company. Acceptable manufactures are referred to in these Specifications.

B. Extent of each form and type of joint sealer required is listed below.

C. The work shall include joint sealers, provided for the following locations:
   1. Exterior joints in vertical surfaces & non-traffic horizontal surfaces as indicated below;
      Control and expansion joints in cast-in-place concrete.
      Joints between architectural precast concrete units.
      Control and expansion joints in unit masonry.
      Joints between different materials listed above.
      Perimeter joints between materials listed above and frames of doors and windows.
      Control and expansion joints in ceiling and overhead surfaces.
      Other joints as indicated or required.
   2. Exterior joints in horizontal traffic surfaces as indicated below:
      Control, expansion & isolation joints in cast-in-place conc slabs for floors & paving.
      Joints between architectural precast concrete paving units.
      Joints in stone paving units, including steps.
      Tile control and expansion joints.
      Joints between different materials listed above.
      Other joints as indicated or required.
   3. Interior joints in vertical and horizontal non-traffic surfaces as indicated below:
      Control and expansion joints on exposed interior surfaces of exterior walls.
      Perimeter joints of exterior openings where indicated.
      Joints between tops of non-load-bearing unit masonry walls and underside of cast-in-place concrete slabs and beams.
      Tile control and expansion joints.
      Vertical control jts on exposed surfaces of interior unit mas & conc walls & partitions.
      Joints on underside of precast beams and planks.
      Perimeter joints between interior wall surfaces and frames of interior doors, windows, and elevator entrances.
      Perimeter joints of toilet fixtures.
      Other joints as indicated or required.
   4. Interior joints in horizontal traffic surfaces as indicated below:
      Control and expansion joints in cast-in-place concrete slabs.
      Control and expansion joints in stone flooring.
      Control and expansion joints in brick flooring.
      Control and expansion joints in tile flooring.
      Other joints as indicated or required.

D. Sealants for glazing purposes are specified in Division-8 Section "Glass and Glazing."

E. Sealing concealed perimeter joints of gypsum drywall partitions to reduce sound transmission characteristics is specified in Division-9 Section "Gypsum Drywall."

F. Sealing joints related to flashing and sheet metal for roofing as specified in Division-7 Section "Flashing and Sheet Metal".

G. Related work specified as follows:
   1. Division 3, Concrete
   2. Division 4, Masonry
   3. Division 7, Thermal and Moisture Protection
   4. Division 7, Flashing and Sheet Metal
   5. Division 7, Exterior Insulation and Finish System
   6. Division 8, Doors and Windows
   7. Division 9, Gypsum Drywall

1.3 SYSTEM PERFORMANCES:

A. Provide joint sealers that have been produced and installed to establish and maintain watertight and airtight continuous seals.

1.4 SUBMITTALS:

A. Product Data from manufacturers for each joint sealer product required, including instructions for joint preparation and joint sealer application.

B. Samples for Initial Selection Purposes: Manufacturer's standard bead samples consisting of strips of actual products showing full range of colors available, for each product exposed to view. Colors to be mixed as required to match adjacent materials; submit samples on section of material to be matched.

C. Samples for verification purposes of each type and color of joint sealer required. Install joint sealer samples in 1/2 inch wide joints formed between two 6 inch long strips of material matching the appearance of exposed surfaces adjacent to joint sealers.

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

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

F. 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.

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

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

I. Sealant Conractor to furnish a 5-year warranty, in writing.

1.5 QUALITY ASSURANCE:

A. Installer Qualifications: Engage a Sealant Installer, recognized as such, who has successfully completed within the last 5 years, prior to this installation, at least 3 joint sealer applications similar in type and size to that of this Project.

B. Testing Laboratory Qualifications: To qualify for acceptance, an independent testing laboratory must demonstrate to Associate Architect's satisfaction, based on evaluation of laboratory-submitted criteria conforming to ASTM E 699, that it has experience and capability to conduct satisfactorily testing indicated without delaying progress of the Work.

C. Single Source Responsibility for Joint Sealer Materials: Obtain joint sealer materials from a single manufacturer for each different product required.

D. Preconstruction Compatibility and Adhesion Testing: Submit samples of all materials that will contact or affect joint sealers to joint sealer manufacturers for compatibility and adhesion testing, as indicated below:

1. Use test methods standard with manufacturer to determine if priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealers to joint substrates.
    a. Perform tests under normal environmental conditions that will exist during actual installation.
2. Submit not less than 9 pieces of each type of material, including joint substrates, shims, joint sealant backings, secondary seals, and miscellaneous materials.
3. Schedule sufficient time for testing and analysis of results to prevent delay in the progress of the Work.
4. Investigate materials failing compatibility or adhesion tests and obtain joint sealer manufacturer's written recommendations for corrective measures, including use of specially formulated primers.

E. Product Testing: Provide comprehensive test data for each type of joint sealer based on tests conducted by a qualified independent testing laboratory on current product formulations within a 24-month period preceding date of Contractor's submittal of test results to Associate Architect.

1. Test elastomeric sealants for compliance with requirements specified by reference to ASTM C 920. Include test results for hardness, stain resistance, adhesion and cohesion under cyclic movement (per ASTM C 719), low-temperature flexibility, modulus of elasticity at 100 percent strain, effects of heat aging, and effects of accelerated weathering.
2. Include test results performed on joint sealers after they have cured 1 year.

F. 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. Arrange for tests to take place with both Architect and joint sealer manufacturer's technical representative present.
4. Test Method: Test joint sealers by hand pull method described below:
    a. Install joint sealants in 5-feet 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 as follows: A horizontal cut from one side of joint to the other followed by 2 vertical cuts approximately 2 inches long at side of joint and meeting horizontal cut at top of 2 inch cuts. Place a mark 1 inch from top of 2 inch piece.
    c. Use fingers to grasp 2 inch piece of sealant just above 1 inch 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.

5. 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.
6. 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 which fail to adhere to joint substrates during testing.

G. Pre-Installation Conference: Conduct conference at Project site to comply with requirements of the Division-1 section covering this activity.

1.6 DELIVERY, STORAGE, AND HANDLING:

A. Deliver materials to Project site in original unopened containers or bundles with labels informing about 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 manufacturers' 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 sealers under the following conditions:
1. When ambient and substrate temperature conditions are outside the limits permitted by joint sealer manufacturer or below 40 deg F (4.4 deg C).
2. When joint substrates are wet due to rain, frost, condensation, or other causes.

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

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

1.8 SEQUENCING AND SCHEDULING:

A. Sequence installation of joint sealers to be installed per manufacturer's written recommendations.

1.9 WARRANTY:

A. Provide a 5-year warranty, in writing, to replace any or all joints failing within the warranty period at no cost to the Owners, labor and material inclusive after acceptance by University.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL:

A. Compatibility: Provide joint sealers, 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 sealers indicated or, if not otherwise indicated, as selected by Associate Architect from manufacturer's standard colors.

C. Exterior Joints:
1. Joints between metal frame and precast concrete, poured-in-place concrete, or masonry: Sealant #l, #2, #3, #5 and #6.
2. Joints between poured-in-place concrete sections and precast concrete sections: Sealant #l, #2 and #3.
3. Expansion and control joints: Sealant #l and #2.
4. Cross joints in all copings & cross joints in all projecting stone work: Sealant #l & #2.

5. Exterior sills, jambs, window head frames, door frames, louvers & similar openings, and where metal, wood or other materials abut or join masonry, concrete or each other, shall have sealant applied around their perimeters: Sealant #l, #2, #3, #5 and #6.
6. Horizontal joints in sidewalks, terraces, decks, concrete floors, driveways and parking garages: Sealant #l and #4.
7. Other exterior joints as indicated or shown: Sealant #l, #2, #3, #4, #5, #6 and #7.

D. Interior Joints:
1. Expansion and control joints: Sealant #l, #2, and #4.
2. Other interior joints as indicated or shown: Sealant #l, #2, #3, #4, #7 and #8.
3. Hidden metal-to-metal curtain wall joints expected to undergo minimal movement: Sealant #7 and #9.
4. Perimeter or joints created by penetrations in rated wall assembly: Sealant #l0.
5. Fire-resistant joints: Sealant #l0.

2.2 MATERIALS:

A. Sealant #l shall be a three-part polyepoxide urethane sealant meeting Fed. Spec. TT-S-0227E, Class A, Type II, and/or ASTM C920, Type M, Grade NS, Class 25, use MT, M, A, and O, such as Tremco Dymeric, as manufactured by Tremco Inc., Cleveland, OH.

B. Use continuous strip of Sealant #l, Tremco Dymeric at vertical joint of aluminum panels and sat cap up to angle at parapet at horizontal coping surface. Use bond breaker tape at back surface of joint so sealant does not stick to aluminum at this location. Sealant is to fully adhere to aluminum at sides of joint, continuous from bottom to top.

C. Sealant #2 shall be a one-part moisture curing modified polyurethane sealant meeting Fed. Spec. TT-S-0023OC, Class A, Type II, and/or ASTM C920, Type S, Grade NS, Class 25, Use NT, M, A and O, such as Tremco Dymonic, as manufactured by Tremco Inc., Cleveland, OH, or Sonneborn NPI.

D. Sealant #3 shall be a one-part solvent cure acrylic sealant meeting Fed. Spec. TT-S-00230, such as Tremco Mono, as manufactured by Tremco Inc., Cleveland, OH, Acryl R, or Unicrylic 60T.

E. Sealant #4 shall be a three-part chemically curing polyurethane meeting Fed. Spec. TT-S-00227E, Class A, Typel, (self-leveling), and/or ASTM C920, Type M, Grade P, Class 25, Use T, M, A and O, such as THC-900, as manufactured by Tremco Inc., Cleveland, OH, Sonneborn, or NR-200.

F. Sealant #5 shall be a one-part low modulus moisture curing silicone meeting Fed. Spec. TT-S-00230C, Type II, Class A, TT-S-00l543A, Class A, and/or ASTM C-920, Type S, Grade NS, Class 25, Use NT, M, G, A and O, and capable of withstanding movement of l00% in expansion and 50% in compression in service, such as Spectrem 1, as manufactured by Tremco Inc., Cleveland, OH, or Dow 790.

G. Sealant #6 shall be a one-part neutral cure medium modulus moisture curing silicone meeting Fed. Spec. TT-S-00230C, Type II, Class A, and/or ASTM C-920, Type S, Grade NS, Class 25, Use NT, M, G, A and O, and capable of withstanding movement of 50% in extension and compression in service, such as Spectrem 2, as manufactured by Tremco, Inc., Cleveland, OH, Dow 795 or GE Silpruf.

H. Sealant #7 shall be a high grade butyl sealant such as Tremco Butyl Sealant as manufactured by Tremco Inc., Cleveland, OH.

I. Sealant #8 shall be a one-part acrylic latex sealant such as Tremco Acrylic Latex Caulk manufactured by Tremco Inc., Cleveland, OH, PTI or Pecora. Use at all sealed non-rated walls at perimeter and penetrations.

J. Sealant #9 shall be a one-part, non-drying, non-skinning sealing compound meeting AAMA Spec. 809.l, such as Tremco Curtain Wall Sealant as manufactured by Tremco Inc., Cleveland, OH.

K. Sealant #l0 shall be manufacturer's standard fire-stopping sealant, be UL rated, with accessory materials, having fire-resistance rating indicated and as established by testing identical assemblies per ASTM E8l4 by Underwriters Laboratory, Inc., or other testing and inspecting agency acceptable to authorities having jurisdiction.
   1. Foamed-In-Place Fire-Stopping Sealant: Two-part, foamed-in-place, silicone sealant formulated for use in a through-penetration fire-stop system for filling openings around cables, conduit, pipes and similar penetrations through walls and floors.
   2. One-Part Fire-Stopping Sealant: One part elastomeric sealant formulated for use in a through-penetration fire-stop system for sealing openings around cables, conduit, pipes and similar penetrations through walls and floors.
   3. Products: Verify application with manufacturer's written recommendations. Subject to compliance with requirements, provide one of the following:
      a. Foamed-In-Place Fire-Stopping Sealant:
         "Dow Corning Fire Stop Foam"; Dow Corning Corp.
         "Pensil 851"; General Electric Co.
         “Tremco Firestop Systems”
      b. One-Part Fire-Stopping Sealant:
         "Dow Corning Fire Stop Sealant"; Dow Corning Corp.
         "3M Fire Barrier Caulk CP-25"; Electrical Products Div./3M.
         "RTV 7403"; General Electric Co.
         "Fyre Putty"; Standard Oil Engineered Materials Co.
         “Tremco Firestop Systems”

2.3 JOINT FILLERS FOR CONCRETE PAVING:

A. General: Provide joint fillers of thickness and widths indicated.

B. Bituminous Fiber Joint Filler: Preformed strips of composition below, complying with ASTM D 1751:
   1. Asphalt saturated fiberboard.

2.4 JOINT SEALANT BACKING:

A. General: Provide sealant backings of material and type which are non-staining; 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, non-waxing, non-extruding strips of flexible, non-staining, non-gassing plastic foam of material indicated below; nonabsorbent to water and gas; and of size, shape and density to control sealant depth and otherwise contribute to producing optimum sealant performance. Verify acceptability of closed-cell foam with sealants selected.
   1. Either open-cell polyurethane foam for cold-applied Sealants #5 and #6 only, or closed-cell polyethylene foam as acceptable to application in writing by sealant manufacturer.
   2. Elastomeric Tubing Joint Fillers: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D 1056, nonabsorbent to water and gas, capable of remaining resilient at temperatures down to -26 deg F (-15 deg C). Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and otherwise contribute to optimum sealant performance.
      a. Close-cell as manufactured by Hercules.
      b. Open-cell as manufactured by Denver Foam (Plateau Supply).
   3. 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.

2.5 MISCELLANEOUS MATERIALS:

A. Primer: Provide type recommended by joint sealer manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint sealer-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Provide non-staining, chemical cleaners of type which are acceptable to manufacturers of sealants and sealant backing materials, which are not harmful to substrates and adjacent nonporous materials, and which do not leave oily residues or otherwise have a detrimental effect on sealant adhesion or in-service performance.

C. Masking Tape: Provide non-staining, nonabsorbent type compatible with joint sealants and to surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION:

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

3.2 PREPARATION:

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealers to comply with recommendations of joint sealer manufacturers and the following requirements:

1. Remove all foreign material from joint substrates which could interfere with adhesion of joint sealer, loose mortar, including dust; paints, except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer; old joint sealers; oil; grease; waterproofing; water repellants; 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 sealers. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air. The joint interface must be free of foam release agents or chemical retardants which may interfere with sealant adhesion and performance.
3. Remove laitance and form release agents from concrete.
4. Clean metal, glass, porcelain enamel, glazed surfaces of ceramic tile; and other nonporous surfaces by chemical cleaners or other means which are not harmful to substrates or leave residues capable of interfering with adhesion of joint sealers.
5. Clean ferrous metals of all rust, mill scale and coatings by wire brush, grinding, or sandblasting. Remove oil, grease and/or temporary protective coatings with high performance cleaners, as approved by sealant mfgr, such as Tremco #200 Cleaner.
6. Joint dimensions for sealant should be reviewed and installed in accordance with sealant manufacturer's printed instructions. In no case should the sealant application be less than l/4 inch wide, and l/4 inch deep, except in specific metal-to-metal curtain wall applications, and then as recommended by the sealant manufacturer.

B. Joint Priming: Prime joint substrates where indicated or where recommended by joint sealer manufacturer based on preconstruction joint sealer-substrate tests or prior experience. Apply primer to comply with joint sealer manufacturer's recommendations. Confine primers to areas of joint sealer 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 which 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 SEALERS:

A. General: Comply with joint sealer manufacturers' printed installation instructions applicable to products and applications indicated, except where more stringent requirements apply. Workmanship shall be of the highest quality in accordance with best practice and in strict compliance with the recommendations of the manufacturers of the material being used.

1. Sealants shall not be applied to masonry joints where a water repellent or masonry preservative has been applied prior to caulking. Waterproofing treatments should be applied after caulking, when called for.
2. Do not caulk joints until they are in compliance with requirements of the approved manufacturer of the materials, the details as shown on the drawings, and the specific requirements of other sections of the specification.
3. Do not adulterate or thin compounds. Deliver to job in manufacturer's labeled containers, unopened.
4. All exterior joints shall be backed with joint backing material to eliminate back bond. Where width of exterior joint is 1/2" or less, prepare joint so depth of caulking bead is approximately equal to its width. Where width of exterior joint exceeds 1/2", prepare joint so depth of bead is approximately equal to l/2 its width.
5. Backing of interior joints where depth of joint exceeds 3/4". In such cases, fill with joint backing material to approximately 3/4" from surface.
6. Sealant compounds shall generally be applied by means of a hand gun per manufacturer's written instructions. Exercise extreme care to prevent smearing of adjacent surfaces. Use sufficient pressure to fill all voids and joints solidly. Where required by manufacturer's instructions, heat sealant to recommended temperature before application.
7. Seal joints before final coat of paint is applied to adjacent surfaces.
8. Saddles on thresholds of all types of exterior doors shall be set in a full bed of exterior sealant compound, minimum 3/8" thick. Clean-off excess compound after installing.
9. Remove excess sealant compound and sealant and leave surfaces neat, smooth and clean, without smears on surrounding work. Tool joints where recommended by manufacturer or required by Architect.
10. Major authorities recommend a 40-degree F minimum application temperature for joint sealant installations because of the possibility of moisture and/or frost contamination on sealing surfaces. However, it is recognized that applications must be made at lower temperature. When this is necessary, steps must be taken to assure clean, dry, frost-free surfaces, and must be approved by the General Contractor and manufacturer.
11. After joints have been completely filled, they shall be neatly tooled to eliminate air pockets or voids, and to provide a smooth, neat appearing finish in intimate contact with interfaces. After tooling, surface of sealant shall be free of ridges, wrinkles, sags, air pockets and embedded impurities, uniform in width.
12. Immediately clean adjacent materials which have been soiled; leave work in a neat, clean condition.

B. Elastomeric Sealant Installation Standard: Comply with recommendations of ASTM C 962 for use of joint sealants as applicable to materials, applications and conditions indicated.

C. Solvent-Release-Curing Sealant Installation Standard: Comply with requirements of ASTM C 804 for use of solvent-release-curing sealants.

D. Latex Sealant Installation Standard: Comply with requirements of ASTM C 790 for use of latex sealants.

E. Acoustical Sealant Application Standard: Comply with recommendations of ASTM C 919 for use of joint sealants in acoustical applications as applicable to materials, applications, and conditions indicated.

F. 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 which 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 which have become wet prior to sealant application and replace with dry material.

2. Install bond breaker tape between sealants & joint fillers, compression seals, or back of joints where adhesion of sealant to surfaces at back of joints would result in sealant failure.
3. Install compressible seals serving as sealant backings to comply with requirements indicated above for joint fillers.

G. 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 which allow optimum sealant movement capability.

H. Tooling of Non-sag 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 which discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.
1. Provide concave joint configuration per Figure 6A in ASTM C 962, unless otherwise indicated.
2. Provide flush joint configuration per Figure 6B in ASTM C 962, where indicated.
a. Use masking tape to protect adjacent surfaces of recessed tooled joints.
3. Provide Recessed joint configuration per Figure 6C in ASTM C 962, of recess depth and at locations indicated.

I. 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 which 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.

J. Installation of Preformed Hollow Neoprene Gaskets: Install gaskets, with minimum number of end joints, in joint recesses with edges free of spalls and sides straight and parallel, both within tolerances specified by gasket manufacturer. Apply manufacturer's recommended adhesive to joint substrates immediately prior to installing gaskets. For straight sections provide gaskets in continuous lengths; where changes in direction occur, adhesively splice gasket together to provide watertight joint. Recess gasket below adjoining joint surfaces by 1/8 inch to 1/4 inch.

K. Installation of Fire-Stopping Sealant: Install sealant, including forming, packing, and other accessory materials to fill openings around mechanical and electrical services penetrating floors and walls to provide fire-stops with fire resistance ratings indicated for floor or wall assembly in which penetration occurs. Comply with installation requirements established by testing and inspecting agency.

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 sealers and of products in which joints occur.

3.5 PROTECTION:

A. Protect joint sealers 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 & remove damaged or deteriorated joint sealers immediately & installations with repaired areas indistinguishable from original work.

END