# SECTION 07080
# ROOF INSULATION

## PART 1 - GENERAL

### 1.01 SCOPE

A. Contractor shall furnish all labor, materials, equipment and incidentals required to provide roof insulation as specified.

B. Coordination: Review installation procedures under other Section and coordinate the installation of items that must be installed with the roof insulation.

### 1.02 SUBMITTALS

A. Submittals shall be made in accordance with the requirements of the General Conditions of the Contract Documents. In addition, the following specific information shall be provided:

1. Manufacturer's specifications and installation instructions for type of insulation required. Include data substantiating that the materials comply with specified requirements.
2. Weights of all equipment to be used on roof.
3. Copies of written guarantee, as specified.
4. Tapers layout.

### 1.03 QUALITY ASSURANCE

A. Installer Qualifications: Insulation work to be performed by roofing contractor.

B. Design Criteria: The thicknesses shown are for the thermal conductivity, K-value at 75 degrees F, Expanded Polystyrene or foamglas with minimum thickness of 1-1/2 inches, 1.5-pound density.

C. Requirements of Regulatory Agencies: Comply with fire resistance ratings required by governing authorities and the Standard Building Code and comply with the following roof insulation requirements:

D. U.L. requirements for Roof Deck Constructions which are rated "UL Construction No. 1".

E. Factory Mutual requirements for "Class I" construction, for fire hazard and wind resistance.

F. Reference Standards: Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified.

1. ASTM C-177, Steady-State Thermal Transmission Properties by Means of the Guarded Hot Plate.
2. ASTM C-355, Water Vapor Transmission of Thick Materials.
3. ASTM C-518, Thermal Conductivity of Materials by Means of Heat Flow Meter.
4. ASTM C-1621, Compressive Properties of Rigid Cellular Plastics.

5. ASTM C-1622, Apparent Density of Rigid Cellular Plastics.
6. Federal Specification, HH-I-526C, Thermal (Mineral Fiber) Insulation Board.
7. Federal Specification, HH-530A, Insulation Board, Thermal (Urethane).
8. FM, Approval Guide.
9. U.L., Building Materials Directory.

## 1.04 JOB CONDITIONS

A. Environmental Requirements:

1. Do not install insulation when weather conditions are such that the deck is not completely dry, or where there is no assurance that the insulation can be completely covered with the complete roofing system by the end of the day.
2. If the insulation becomes wet after installation, do not proceed with the installation of the roofing membrane until the insulation is completely dry.

B. Protection:

1. Do not overload the building structure with the weight of stored materials or use of equipment.
2. Secure building in water-tight manner each night or over a prolonged period of time.
3. Secure roofing material from wind.

C. Sequencing:

1. Proceed with and complete the Work only when materials, equipment and tradesmen required for the installation of the roofing membrane over the insulation are at the site and are ready to follow with this Work immediately (same day) behind the board-type insulation Work.
2. Do not install any more board-type insulation each day than can be covered with complete roofing system by the end of that working day.

## 1.05 SUBSTITUTIONS

A. Manufacturer of the primary roofing system shall provide either one of the types of roofing insulation specified for complete product and performance responsibility. Any material used must comply with Manufacturer Warranty requirements.

B. The thickness of the insulation shall not vary from what is specified, except for approved tapers.

## 1.06 WARRANTY

A. Provide a warranty against defective equipment and workmanship in accordance with the requirements of the General Conditions of the Contract Documents.

B. Insulation is included in the roof system warranty specified in Section 07400.

## PART 2 - PRODUCTS

### 2.01 MATERIALS

A. General:

1. Calcium Chloride: Not permitted.
2. Pregenerated foam or similar admixtures: Not permitted.

B. Expanded Polystyrene Board (EPS).

1. Minimums:
   a. Thermal Conductance (k), ASTM C-518 and minimum 2-inch thickness, and 1.5 pounds per square feet density. Minimum R-5.0 at 75 degrees F mean temperature.
   b. Vapor transmission, ASTM C-355: Highly permeable.
   c. Meet requirements of Federal Specification HH-1-526C.

C. Miscellaneous Materials:

1. Joint Tape: 6-inch wide glass fiber tape.
2. Adhesive for Bonding Insulation: The type recommended by the insulation manufacturer, and complying with fire-resistance requirements.
3. Mastic Sealer: Type recommended by insulation manufacturer for bonding edge joints between units and filling voids, must be compatible with EPDM.
4. All cants, tapers and slope: Are to be accomplished with the same material and in addition to the 1-1/2-inch minimum thickness.
5. Wood Nailers: Are to be pressure treated #2 pine (i.e., Wolmanized or Osmose K-33) no creosote lumber is to be used near EPDM.
6. No petroleum based product or bitumen is to come in contact with the area receiving EPDM.

## PART 3 - EXECUTION

### 3.01 PRODUCT DELIVERY STORAGE AND HANDLING

A. Delivery of Materials: Do not deliver insulation materials to the project site before time of installation.

B. Storage Materials: Do not allow insulation materials to become wet or soiled, or covered with ice or snow.

C. Handling of Materials: Comply with manufacturer's recommendations for handling, storage and protection.

### 3.02 INSPECTION

A. Contractor and his installer must examine the substrate and the conditions under which the insulation Work is to be performed and notify the Engineer in writing of any unsatisfactory

conditions. Do not proceed with the Work until unsatisfactory conditions have been corrected in a manner acceptable to the Engineer.

## 3.03 INSTALLATION

A. General:

1. Comply with manufacturer's instructions for the particular conditions of installation in each case. If printed instructions are not available or do not apply to the project conditions, consult the manufacturer's technical representative for specific recommendations before proceeding with the Work.
2. Extend insulation full thickness over entire surface to be insulated, using tapers to slope.
3. Cut and fit board-type insulation tightly around obstructions, and fill voids with insulation. Keep back ¼-inch for all vertical flashings.

B. Laying Board-Type Insulation Units:

1. Set units in adhesive and mechanically fasten in accordance with the requirements of the applicable fire and insurance ratings and roofing membrane manufacturer's recommendations, and applied in accordance with the recommendations of the manufacturer of the insulation, adhesive and completed roofing system.
2. Clean existing areas of any mopped or flooded asphalt that will be recovered with EPDM, and cover existing asphaltic materials with protective sheets compatible with EPDM.
3. Install insulation board with the long joints between boards parallel with incline of deck.

## 3.04 PERFORMANCE

A. Roof insulation Work shall withstand the uplift forces of wind, as defined by the roofing guarantee. Failures of the insulation Work in bond or anchorage to the substrate, or within the insulation, will be considered failures of materials or workmanship under the Roofing Guarantee.

B. The Contractor is responsible for positive roof drainage. No areas of standing or puddling water will be excepted in the new roof surface. The entire roof surface must drain to the existing roof drains.

## 3.05 PROTECTION

A. Do not permit construction period traffic over completed insulation Work, except as required for roofing.

B. Protect insulation Work from exposure to moisture, damage and deterioration, primarily by prompt installation of roofing Work to be placed over the insulation.

## 3.06 INSPECTION AND ACCEPTANCE

A. Insulation which has become wet, damaged or deteriorated, as determined by the Engineer, shall be promptly removed from the job at the Contractor's expense.

END OF SECTION 07080

# SECTION 07081
# FLASHING AND SHEET METAL

## PART 1 - GENERAL

### 1.01 SCOPE

A. Work covered in this section includes furnishing all labor, materials, equipment and incidentals required to provide and install flashing and sheet metal as shown and as specified.

B. Contract drawings show only functional features and some of the required external connections. They do not show all components required for a complete installation nor exact dimensions particular to any manufacturer's equipment. Contractor shall supply all parts, devices and equipment necessary to meet the requirements of the Contract Documents and shall make all dimensional adjustments particular to the equipment being furnished. All costs associated with such changes and adjustments shall be considered as being included in the price bid for the work shown and specified.

C. Coordination:

1. Review installation procedures under other section and coordinate the installation of items that must be installed with the roof insulation.

D. Related Work specified elsewhere:

1. Section 04255 - Veneer Masonry Systems.
2. Section 04400 - Masonry.
3. Skylight, Section 08635.

### 1.02 SUBMITTALS

A. Submittals shall be made in accordance with the requirements of the General Conditions of the Contract Documents. In addition, the following specific information shall be provided:

1. Product data: Indicate product description, finishes and installation instructions, including interface with adjacent materials and surfaces.
2. Shop drawings:
   a. Indicate material types, sizes, shapes, thicknesses, finishes, fabrication details, joint details, anchors, connections, expansion joints, and relations to adjacent work.
   b. Draw details and profiles to quarter size scale.
   c. Include on detailed shop drawings, locations of sleepers and required fastening strips to secure metal work where sheet metal is applied to other than wood surfaces.
3. Samples, submit as follows:
   a. Special finishes: 8" x 8" samples of manufacturer's standard colors for Engineer's color selection, including a clear coated mill finish sample.
   b. Manufactured expansion joint covers, copings, gravel stops, flashing reglets, and other flashing items: 1'-0" length in style and finish specified.
4. Certificates indicating materials supplied or installed are asbestos free.

## 1.03 QUALITY ASSURANCE

A. Reference Standards. Comply with all federal and state laws or ordinances, as well as all applicable codes, standards, regulations and/or regulatory agency requirements including the partial listing below:

1. American Iron and Steel Institute (AISI).
2. American Society for Testing and Materials (ASTM).
3. Copper Development Association, Inc. (CDA).
4. Sheet metal and Air Conditioning Contractors National Association, Inc. (SMACNA).

B. Industry Standards:

1. AISI: Stainless Steel Data Manual, 1968 Edition.
2. CDA: Contemporary Copper in Architecture, 1973 Edition.
3. SMACNA: Architectural Sheet Metal Manual, 4th Edition, October 1987.

C. Pre-installation conference:

1. Prior to beginning work, conference will be held to review work to be accomplished.
2. Particular requirements are specified in Loose Single Ply Membrane section.

## 1.04 DELIVERY, STORAGE AND HANDLING

A. Acceptance at site: Handle materials to prevent damage to surfaces, edges and ends of sheet metal items. Reject and promptly remove damaged materials from site.

B. Storage and protection: Store materials off ground, under cover. Protect from damage and deterioration.

## 1.05 SEQUENCING AND SCHEDULING

A. Coordinate requirements of this section with work described under Manufactured Roof section. Use flat stock matching respective roofing for shop fabricated flashings, closures and accessories.

## 1.06 WARRANTY

A. Warrant sheet metal and flashing work provided under this section shall be free of defects in materials and workmanship.and shall be watertight for 5 years after substantial completion. Warranty shall include that other work and materials damaged by leaks shall be promptly repaired at no cost to the Owner. Warrant flashing and sheet metal work to be free of defects in materials and workmanship; combine warranty with roofing warranty.

B. Warranty shall be in accordance with the requirements of the General Conditions of the Contract Documents.

## PART 2 - PRODUCTS

### 2.01 MATERIALS

A. Galvanized Steel Sheet: ASTM A 526, commercial quality, G90 hot-dip galvanized.

1. Finish: Mill phosphatized (paint-grip).

B. Prefinished Galvanized Steel Sheet: Coil coated, commercial quality steel sheet, ASTM A 526 or ASTM A 527, G90 hot-dip galvanized.

1. Finish: 70 percent "Kynar 500" or "Hylar 5000" resin finish over epoxy primer; minimum system thickness 1.0 mil. Provide manufacturer's standard prime coat on underside.
   a. Color: Selected by J. W. Robinson & Associates, Inc, after contract award, from manufacturer's standard color selection.
2. Provide strippable plastic protective film on prefinished surface.

C. Copper Sheet: ASTM B 370, of temper appropriate for use.

D. Bonded Copper: 3 ounces per square foot bonded on both sides by asphalt to heavy waterproofed, reinforced creped kraft paper.

E. EPDM Flashing: Uncured EPDM sheet; minimum 60-mil thickness; minimum properties as follows:

1. Tensile strength (ASTM D 412): 1305 pounds per square inch.
2. Elongation (ASTM D 412): 300 percent.
3. Tear resistance (ASTM D 412): 150 pounds per inch.
4. Ozone resistance (ASTM D 1149): No cracks after 168-hour exposure to one part per million ozone at 104 degrees F and 20 percent strain.
5. Maximum brittleness temperature (ASTM D 746): Minus 49 degrees F.
6. Resistance to heat aging (ASTM D 573): Minimum properties (ASTM D 412) after aging at 240 degrees F for 672 hours:
   a. Tensile strength: 1205 pounds per square inch.
   b. Elongation: 200 percent.
   c. Tear resistance: 125 pounds per inch.
7. Products: Provide one of the following:
   a. "Sure-Seal Elastoform Flashing"; Carlisle Syntec Systems, or equal.
   b. "SPM Flashing"; Manville Roofing Systems, a Division of Schuller International, Inc.

F. Foam Backing For Flexible Flashings: Closed-cell foam rubber; polyethylene, neoprene, or similar soft, compatible material.

1. General: Follow gauge, thickness, or weight requirements in SMACNA Manual for intended use, but not less than indicated below.

2. Sheet Aluminum at .038" min. allow. Standard Color Kynar.
3. Sheet lead: Minimum 4 lbs. PSF hard type.

G. Soldering Materials:

1. Solder: Meeting ASTM 032-76, alloy grade 50A, 50% pig lead and 50% block tin.
2. Solder flux for:
   a. Stainless steel and copper: Muriatic acid neutralized with zinc.
   b. Lead: Non-corrosive rosin.

H. Fasteners: Same material or compatible with sheet metal being fastened.

1. Nails: Flathead, needlepoint, not less than 12 gauge; sufficient length to penetrate substrate 1" minimum.
2. Expansion shields: Lead sleeves.
3. Screws: Self-tapping type with round heads.
4. Bolts: Furnished complete with nuts and washers.
5. Rivets: Round head, solid shank.
6. Blind clips and cleats: Same gauge as sheet metal.

I. Sealant: As specified in Division 7.

1. Use noncuring type for concealed joints.
2. Use nonsag elastomeric type for exposed.

J. Gutter and Conductor-Head Guards: 20-gage bronze or nonmagnetic stainless steel mesh or fabricated units, with selvaged edges and noncorrosive fasteners. Select materials for compatibility with gutters and downspouts.

## 2.02 FABRICATION

A. Shop Assembly:

1. General:
   a. Fabricate sheet metal in accord with reviewed shop drawings and industry standards.
   b. Form sheet metal work with clear, sharp and uniform arises. Hem exposed edges.
   c. Fabricate corners with minimum 2'-0" returns each side of return; fully seal joints.
2. Stainless steel, aluminum and copper materials:
   a. Roughen edges of stainless steel with emery cloth before soldering.
   b. Solder sheet metal joints with heavy, well heated coppers. Pre-tie joints not less than 1-1/2" wide. Sweat solder through seam's full width.
   c. Provide 1" minimum soldered joints.
   d. Neutralize remaining acid with ammonia or baking powder solution; rinse with water.
3. Provide linear sheet metal items in 10'-0" sections minimum, except as otherwise noted. Form flashing using single pieces for full width.

4. Form specified sheet metal items in accord with SMACNA details and existing adjacent work; gauge indicated in SMACNA description of particular plate, but no less than .038" thickness.

## 2.03 SHEET METAL GENERAL FABRICATIONS

A. General: As a minimum, fabricate flashings using materials in the thickness listed for each flashing application.

B. Exposed Flashings - Low Slope Roofs or Waterproofing:

1. Scuppers:

2. Galvanized sheet steel: 24 gage (0.0239 inch).

C. Semi concealed Flashings - Low Slope Roofs or Waterproofing:

1. Counter flashing:
   a. Galvanized sheet steel: 24 gage (0.0239 inch).

D. Concealed Wall Flashings:

1. Masonry through-wall flashing:
   a. Bonded Copper: 3 ounces per square foot bonded on both sides by asphalt to heavy waterproofed, reinforced creped kraft paper.

E. Miscellaneous Flashings:

1. Ledge flashing:
   a. Prefinished galvanized steel sheet: 24 gage (0.0239 inch).

F. Vent Stack Flashing: Fabricate from 2-1/2-lb soft sheet lead.

## 2.04 PREFORMED REGLET FLASHING SYSTEMS

A. General: Fabricate reglet flashing system from 16-oz. copper sheet formed to provide secure interlocking of separate reglet and counter flashing pieces.

B. Types Required:

1. Surface-mounted type: Provide with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.

## 2.05 GUTTERS, DOWNSPOUTS AND CONDUCTOR HEADS

A. Fabricate from same material and finish used for adjacent exposed flashings.

B. Form sheet metal to profile dimensions indicated, free from distortions and defects detrimental to water-tight system.

C. Provide precast concrete splash blocks at downspout discharge.

D. Provide formed metal splash pans fabricated from same type of sheet metal used for downspouts. Locate where downspout discharges onto lower roof.

E. Downspout Supports: Brackets.

F. Back-paint concealed metal surfaces with bituminous coating to a minimum of 15 mils dry film thickness.

G. Shop Finish, Rain Drainage: Provide manufacturer's standard baked-on acrylic shop finish on sheet metal rain drainage units (gutters, downspouts, and similar exposed units); 1.0-mil dry film thickness.

H. Splash Pads: Precast concrete type, of size and profiles indicated; minimum 3000 psi at 28 days, with minimum 5 percent air entrainment.

1. Downspout Boots: Steel.
2. Seal metal joints.

I. Splash Pads: Precast concrete type, of size and profiles indicated; minimum 3000 psi at 28 days, with minimum 5 percent air entrainment.

## PART 3 - EXECUTION

### 3.01 INSPECTION

A. Verification of Conditions:

1. Verify locations of all roof openings and penetrations are in accord with reviewed shop drawings.
2. Examine conditions and substrates under which products of this section are to be installed; submit written notification of unacceptable conditions or substrates.
3. Submit copy of installer's report to the Engineer within 72 hours of report receipt.
4. Proceeding with construction activity of this section:
   a. Prior to correction of unacceptable conditions or substrates are prohibited.
   b. Indicates installer's acceptance of conditions and substrates.

### 3.02 PREPARATION

A. Deliver the following items to entities performing work, for incorporation into their work:

1. Masonry through-wall flashings: Division 4.

B. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.

C. Isolate dissimilar metals by means of a heavy bituminous coating, approved paint coating, adhered polyethylene sheet, or other means approved by the Engineer.

## 3.03 INSTALLATION

A. Sheet Metal:

1. Install work in accord with reviewed shop drawings and industry standards. Provide sheet metal items true to line, without buckling, creasing, warp or wind in finished surfaces.
2. Coordinate flashing at roof surfaces with roofing work to provide weathertight condition at roof terminations.
3. Perform field joining of lengths specified for shop fabrication, but in lengths no shorter than 10'-0" except at closure pieces.
4. Isolate dissimilar materials to prevent electrolysis. Separate using bituminous paint or roofing felt.
5. Seaming:
   a. Comply with SMACNA Plates #99, #100 and other applicable plates.
   b. Flat-lock seams: Finish not less than 3/4" wide.
   c. Soldered lap seams: Finish not less than 1" wide.
   d. Other lap seams: Overlap not less than 4" unless otherwise indicated.
   e. Seams: Orient properly for direction of water flow.
   f. Flatlock seams with cleats soldered.
   g. Lap seams occurring in members sloping 45" or more, 4" minimum; bed in with butyl sealant.
   h. Perform soldering in same manner indicated in FABRICATION Article.
6. Secure sheet metal items using continuous cleats, clips and blind fasteners as indicated; exposed face fastening is prohibited.
7. Fastening:
   a. Nails: Confine to one edge only of flashing 1'-0" or less in width. Space nails at 4" O.C. Maximum. Provide neoprene washers for nails.
   b. Cleats: Continuous; form to profile of item being secured.
   c. Clips: Minimum 2" wide and continuous; form to profile of item being secured. The clips are continuous and the cap flashing replacement.
8. Form joints in linear sheet metal to allow for 1/2" minimum expansion at 20'-0" OP.C. Maximum and 8'-0" from corners. Provide 1'-0" wide back-up plate at intersections. Form plates to profile of sheet metal items. Apply linear sheet metal items in full bed of butyl or urethane caulk over back-up plate.
9. Gutters and downspouts:
   a. Construct with riveted and soldered joints, lapped 1" minimum in direction of flow, provide 3/4" minimum expansion joints at 60`-0" O.C. maximum. Form expansion joints in accord with SMACNA Manual, Plate #7 for gutters up to 20 gauge; Plate #11, 20 gauge and heavier.
   b. Hang gutters with high points equidistant from downspouts, evenly sloped toward downspouts. Support gutters in accord with SMACNA Manual, Plate #14A.
   c. Secure downspouts to exterior walls at 6'-0" O.C. maximum using straps and expansion type fasteners. Lap downspout joints, 1-1/2" minimum and solder.
   d. Finish gutters, downspouts and hangers; required, copper material to match existing.

## 3.04 CLEANING AND PROTECTION

A. Remove protective film from prefinished sheet metal immediately after installation.

B. Repair or replace work, which is damaged or defaced, as directed by the Engineer.

1. Refinish marred and abraded areas of prefinished sheet using finish manufacturer's recommended methods and materials. Replace units, which, in the opinion of the Engineer, cannot satisfactorily be refinished in place.

C. Remove from sheet metal surfaces any debris or substances, which will inhibit uniform weathering.

D. Protect sheet metal work as recommended by the installer so that completed work will be clean, secured, and without damage at substantial completion.

END OF SECTION 07081

# SECTION 07160
# BITUMINOUS DAMPROOFING

## PART 1 - GENERAL

### 1.01 SUMMARY

A. Section Includes:

1. Substrate preparation.
2. Bituminous dampproofing.
3. Edge and penetration detailing material.

B. Related Sections:

1. Roofing: Elsewhere in Division 7.
2. Water repellents: Elsewhere in Division 7.
3. Special coatings: Division 9.

### 1.02 SUBMITTALS

A. Product Data: Technical product information and installation instructions which demonstrate that products comply with project requirements.

### 1.03 REFERENCES

A. Reference Standards: In addition to requirements shown or specified, comply with applicable provisions of following for design, materials, fabrication, and installation of component parts:

1. NRCA Roofing and Waterproofing Manual, National Roofing Contractors Association - NRCA Waterproofing and Dampproofing Manual.

### 1.04 DELIVERY, STORAGE, AND HANDLING

A. Deliver dampproofing materials to project site in factory-sealed containers.

B. Store materials in dry, well-ventilated space.

### 1.05 SITE CONDITIONS

A. Install dampproofing only when site weather conditions are acceptable per manufacturer's recommendations.

B. Ventilation: Provide sufficient ventilation during application and curing of dampproofing to prevent buildup of toxic or flammable fumes.

## PART 2 - PRODUCTS

### 2.01 BITUMINOUS DAMPPROOFING MATERIALS

A. Cold-Applied Asphalt Emulsion Semimastic: Fibrated dampproofing mastic of spraying/brushing (medium) consistency, meeting the requirements of ASTM D 1227, Type II; asbestos free.

1. Emulsion Based Semi-Mastic Dampproofing: Non-asbestos short fiber reinforced emulsion asphaltic compound, ASTM D1 227, Type 2, Class 1 or 2.
   a. Application: Brush or spray.
   b. Thickness: Primer and two coats for 1.6 mm 1/16 inch minimum.
   c. Acceptable Products and Manufacturers:
      i) A-H Semi-Mastic Emulsion, Anti-Hydro, Co. Newark, NJ.
      ii) Emulsified Asphalt Semi-Mastic, Euclid Chemical Co., Cleveland, OH.
      iii) Karnak 220AF, Karnak Chemical Corporation, Clark, NJ.
      iv) Sealmastic Type II, W. R. Meadows, Inc., Elgin, NJ.
      v) Hydrocide 700B, Sonneborn Building Products/ChemRex, Inc. Minneapolis, MN.
      vi) Or equal.

### 2.02 INSTALLATION ACCESSORIES

A. Reinforcing Fabric: Woven or nonwoven glass fiber, treated with organic binders and coated for compatibility with dampproofing bitumen.

B. Detailing Mastic: Asphalt-based plastic roof cement, trowel consistency, meeting the requirements of ASTM D 4586.

## PART 3 - EXECUTION

### 3.01 EXAMINATION

A. Verify that surfaces are smooth, sound, clean, and dry, and that elements which will penetrate dampproofing have been completed and are rigidly installed.

### 3.02 PREPARATION

A. Remove honeycomb, aggregate pockets, fins, ridges, and projecting rough areas.

B. Fill cracks, holes, depressions, and irregularities with latex patching mortar or detailing mastic as recommended by membrane manufacturer.

C. Form fillets (cants) at inside corners and around projecting elements using latex patching mortar or detailing mastic.

### 3.03 INSTALLATION - GENERAL

A. Comply with dampproofing manufacturer's instructions for handling, preparation, application, and protection of dampproofing materials.

## 3.04 ABOVE-GRADE DAMPPROOFING

A. Cavity Wall Dampproofing: Damp proof air-space side of inner wythe.

1. Form flashings at outside corners, changes in plane, and penetrations larger than 1/2 inch diameter. Apply coating of dampproofing or detailing mastic, embed layer of fiberglass reinforcing extending at least 12 inches onto dampproofing surface, and topcoat with another layer of damp proofing or detailing mastic.
2. Form 3/8-inch fillet of detailing mastic around penetrations 1/2 inch in diameter or smaller.
3. Apply 2 coats of cold-applied fibrated semimastic asphalt emulsion dampproofing at the rate of 20 square feet per gallon per coat.

## 3.05 PROTECTION AND CLEANING

A. Take measures required to protect completed dampproofing after installation.

B. Clean spillage and soiling from adjacent surfaces using cleaning agents and procedures recommended by the manufacturer of the surface.

END OF SECTION 07160

# SECTION 07190
# WATER REPELLENTS

## PART 1 - GENERAL

### 1.01 SCOPE

A. Water repellents applied to exterior masonry surfaces.

B. Pressure washing.

### 1.02 RELATED REQUIREMENTS

A. Section 04200 - Unit Masonry.

B. Section 07900 - Joint Sealers.

### 1.03 REFERENCE STANDARDS

A. ASTM D3960 - Standard Practice for Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings; 2005.

B. ASTM D5095 - Standard Test Method for Determination of the Nonvolatile Content in Silanes, Siloxanes, and Silane-Siloxane Blends Used in Masonry Water Repellent Treatments; 1991 (Reapproved 2007).

C. MPI (APL) - Master Painters Institute Approved Products List; Master Painters and Decorators Association; current edition, www.paintinfo.com.

### 1.04 SUBMITTALS

A. Product Data: Provide product description.

B. Manufacturer's Installation Instructions: Indicate special procedures and conditions requiring special attention; cautionary procedures required during application.

C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

D. Manufacturer's Field Reports: Report whether manufacturer's "best practices" are being followed; if not, state corrective recommendations. Email report to the Architect/Engineer the same day as inspection occurs; mail report on manufacturer's letterhead to the Architect/Engineer within 2 days after inspection.

### 1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

B. Installer Qualifications: Company specializing in performing the work of this section with minimum 5 years experience.

## 1.06 MOCK-UP

A. Prepare a representative surface 36 by 36 inch in size using specified materials and preparation and application methods on surfaces identical to those to be coated; approved mock-up constitutes standard for workmanship.

B. For proposed substitutions, prepare side-by-side mock-ups of specified and substitute products.

C. Locate where directed.

D. Mockup may remain as part of the Work.

## 1.07 PRE-INSTALLATION MEETING

A. Convene a meeting at least one week prior to starting work; require attendance of affected installers; invite the Architect/Engineer and Cobb County .

## 1.08 FIELD CONDITIONS

A. Protect liquid materials from freezing.

B. Do not apply water repellent when ambient temperature is lower than 50 degrees F or higher than 100 degrees F.

C. Do not apply water repellents when wind velocity is higher than 20 mph.

## 1.09 EXTRA MATERIALS

A. See Section 01600 - Product Requirements, for additional provisions.

B. Provide two gallons of water repellent.

# PART 2 - PRODUCTS

## 2.01 MANUFACTURERS

A. Silane/Siloxane Water Repellents:

1. Tnemec Company, Inc: www.tnemec.com.
2. BASF Construction Chemicals: www.buildingsystems.basf.com.
3. Textured Coatings of America, Inc: www.texcote.com.

## 2.02 MATERIALS

A. Exact product to be used will be determined by side-by-side mock-up testing of at least 3 products meeting specified requirements; prepare mock ups as specified above; submit cost breakdown for each product used in mock-up, including both unit and total costs.

B. Water Repellent: Non-glossy, colorless, penetrating, water-vapor-permeable, non-yellowing sealer, that dries invisibly leaving appearance of substrate unchanged.

1. Applications: Vertical surfaces and non-traffic horizontal surfaces.

C. Water Repellent: Silicone resin based; colorless.

1. VOC Content: Less than 800 g/L, when tested in accordance with ASTM D 3690 or D 5095.
2. Solids by Volume: 5 percent, minimum.

## PART 3 - EXECUTION

### 3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify joint sealants are installed and cured.

C. Verify surfaces to be coated are dry, clean, and free of efflorescence, oil, or other matter detrimental to application of water repellent.

### 3.02 PREPARATION

A. Prepare surfaces to be coated as recommended by water repellent manufacturer for best results.

B. Do not start work until masonry mortar substrate is cured a minimum of 60 days.

C. Remove oil and foreign substances with a chemical solvent that will not affect water repellent.

D. Pressure wash surfaces to be coated:

1. Concrete: High pressure wash at 1500 to 4000 psi, at 6 to 12 inches from surface.
2. Firm Masonry (Concrete Masonry Units, Brick, and Dense Stone): High pressure wash at 1500 to 4000 psi, at 6 to 12 inches from surface.

E. Allow surfaces to dry completely to degree recommended by water repellent manufacturer before starting coating work.

### 3.03 APPLICATION

A. Apply water repellent in accordance with manufacturer's instructions, using procedures and application methods recommended as producing the best results.

B. Apply at rate recommended by manufacturer, continuously over entire surface.

C. Apply two coats, minimum.

D. Remove water repellent from unintended surfaces immediately by a method instructed by water repellent manufacturer.

E. Provide manufacturer's field service representative to inspect preparation and application work continuously during entire application period to ensure that manufacturer's "best practices" for preparation and application are being followed.

## 3.04 PROTECTION OF ADJACENT WORK

A. Protect adjacent landscaping, property, and vehicles from drips and overspray.

B. Protect adjacent surfaces not intended to receive water repellent.

C. Remove water repellent from unintended surfaces immediately by a method instructed by water repellent manufacturer.

END OF SECTION 07190

# SECTION 07210
# BUILDING INSULATION

## PART 1 - GENERAL

### 1.01 SCOPE

A. The work specified in this section includes furnishing all labor, materials, equipment, and incidentals necessary to install all building insulation complete as shown on the Drawings and as specified herein.

### 1.02 RELATED WORK

A. Section 03300: Cast-in-Place Concrete.

B. Section 07080: Roof Insulation.

### 1.03 REFERENCES

A. Standards of the following as referenced:

1. American Society for Testing and Materials (ASTM).
2. Federal Specifications (Fed. Spec.).
3. The Society of the Plastics Industry, Inc. (SPI).
4. Underwriters Laboratories, Inc. (UL).

### 1.04 DEFINITIONS

A. Terms:

1. Bead board: EPS.
2. EPS: Expanded polystyrene.
3. RCPS: Rigid cellular polystyrene.
4. XEPS: Extruded-expanded polystyrene.

### 1.05 SUBMITTALS

A. Submittals shall be made in accordance with the requirements of the General Conditions of the Contract Documents. In addition, the following specific information shall be provided:

1. Product data and installation instructions for each type insulation and installation.
2. Certificates indicating materials supplied or installed are asbestos free.

### 1.06 DELIVERY, STORAGE, AND HANDLING

A. Storage and handling:

1. Store materials under cover, off ground: protect from moisture.

2. Remove wet, damaged, or deteriorated materials.

## PART 2 - PRODUCTS

### 2.01 MATERIALS

A. Rigid extruded polystyrene insulation (XEPS):

1. Acceptable products:
   a. Amoco Foam Products, Inc.; Amofoam CM.
   b. Dow Chemical U.S.A.; Styrofoam SM.
   c. UC Industries, Inc.; FormulaR 250 SE.
2. Characteristics:
   a. Material: Extruded, closed cell polystyrene boards; meet ASTM C578-87a, Type IV.
   b. Thickness: 2" OR 1.5" as shown on the drawings and schedules.
   c. Density: 2.0 PCF, minimum.
   d. Compressive strength: 20 minimum, tested in accord with ASTM D1621-73.
   e. Water vapor transmission: Maximum 1.1 perm-in., tested in accord with ASTM E96-80, Procedure B.
   f. Size: 1'-4" by 8'-0" and 2'-0" by 8'-0".
   g. Edges: square.
   h. Mark each board indicating code compliance.
3. Mastic: Specified in Air/Vapor Barrier Membrane section.

## PART 3 - EXECUTION

### 3.01 INSTALLATION

A. General: Comply with manufacturer's product data for each type installation. Cut insulation around obstructions and protrusions. Remove projections interfering with installation.

B. Thermal insulation installation:

1. General: Comply with manufacturer's installation instructions for conditions encountered.
2. Rigid extruded polystyrene insulation (XEPS): Secure to masonry by embedding in tacky dampproofing material. Install between rows of masonry reinforcement with end joints butted.
3. Rigid perimeter slab insulation (XEPS): Install over vapor retarder; extend 4' -0" minimum inside building; and down to top of footing butt adjacent boards. Install in locations indicated or required by local energy code.

END OF SECTION 07210

# SECTION 07216
# UNDER SLAB VAPOR RETARDER

## PART 1 - GENERAL

### 1.01 SECTION INCLUDES

A. Surface preparation.

B. Application of an underslab vapor retarder.

### 1.02 RELATED SECTIONS

A. Section 03 30 00 - Concrete.

B. Section 07 10 00 – Dampproofing and Waterproofing.

### 1.03 REFERENCES

A. American Society for Testing and Materials (ASTM)

1. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs.
2. ASTM E154 - Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs.
3. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials.
4. ASTM E1643 - Standard Practice for Installation of Water Vapor Retarders Usedin Contact with Earth or Granular Fill Under Concrete Slabs.
5. ASTM F1249-01 Standard Test Method for Water Vapor Transmission Rate Through Plastic Film and Sheeting Using a Modulated Infrared Sensor.

B. American Concrete Institute (ACI)

1. ACI 302.1R-96 Vapor Barrier Component (plastic membrane) is not less than 10 mils thick.

### 1.04 SUBMITTALS

A. Comply with Section 01 33 00 - Submittal Procedures.

B. Submit manufacturer's product data and application instructions.

### 1.05 DELIVERY, STORAGE, AND HANDLING

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

B. Store materials in a clean, dry area in accordance with manufacturer's instructions.

C. Stack membrane on smooth ground or wood platform to eliminate warping.

D. Protect materials during handling and application to prevent damage or contamination.

E. Ensure membrane is stamped with manufacturer's name, product name, and membrane thickness at intervals of no more than 85" (220 cm).

## 1.06 ENVIRONMENTAL REQUIREMENTS

A. Product not intended for uses subject to abuse or permanent exposure to the elements.

B. Do not apply on frozen ground.

# PART 2 - PRODUCTS

## 2.01 MANUFACTURER

A. W. R. MEADOWS, INC., PO Box 338, Hampshire, Illinois 60140-0338. (800) 342-5976. (847) 683-4500. Fax (847) 683-4544. Web Site www.wrmeadows.com.

## 2.02 MATERIALS

A. Plastic Vapor Retarder

1. Performance-Based Specification: Vapor barrier membrane must meet or exceed all requirements of ASTM E 1745, Classes A, B, & C.
   a. Maximum Permeance ASTM E96: 0.0043 Perms
   b. Water Vapor Transmission Rate ASTM F1249 calibrated to ASTM E96 (water method): 0.0016 grains/ft.2/hr
   c. Tensile Strength ASTM E154, Section 9: 52 Lb. Force/Inch
   d. Puncture Resistance ASTM D1709, Method B: 2,655 Grams
   e. Water Vapor Retarder ASTM E1745: Meets or exceeds Class A, B & C
   f. Thickness of Retarder (plastic) ACI 302.1R-96: Not less than 10 mils

## 2.03 ACCESSORIES

A. Seam Tape

1. High Density Polyethylene Tape with pressure sensitive adhesive. Minimum width 4".

B. Pipe Boots

1. Construct pipe boots from vapor barrier material and pressure sensitive tape per manufacturer's instructions.

# PART 3 - EXECUTION

## 3.01 EXAMINATION

A. Examine surfaces to receive membrane. Notify architect if surfaces are not acceptable. Do not begin surface preparation or application until unacceptable conditions have been corrected.

## 3.02 SURFACE PREPARATION

A. Prepare surfaces in accordance with manufacturer's instructions.

## 3.03 APPLICATION

A. Installation shall be in accordance with manufacturer's instructions and ASTM E 1643–98.

B. Unroll vapor barrier with the longest dimension parallel with the direction of the pour.

C. Lap vapor barrier over footings and seal to foundation walls.

D. Overlap joints 6" and seal with manufacturer's tape.

E. Seal all penetrations (including pipes) with manufacturer's pipe boot.

F. No penetration of the vapor barrier is allowed except for reinforcing steel and permanent utilities.

G. Repair damaged areas by cutting patches of vapor barrier, overlapping damaged area 6", and taping all four sides with tape.

END OF SECTION 07216

# SECTION 07280
# AIR/VAPOR BARRIER MEMBRANE

## PART 1 - GENERAL

### 1.01 SCOPE

A. Provide air barrier membrane and accessories as indicated and specified.

### 1.02 RELATED WORK

A. Section 04400: Masonry

B. Section 07900: Caulking and Joint Sealants for joint sealant materials and installation

### 1.03 REFERENCES

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

1. ASTM D 412: Test Methods for Vulcanized Rubber and Thermoplastic Elastomers – Tension.
2. ASTM E 96: Test Methods for Water Vapor Transmission of Materials.
3. ASTM E 283: Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
4. ASTM E 330: Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.
5. ASTM E 699: Criteria for Evaluation of Agencies Involved in Testing Quality Assurance, and Evaluating Building Components in Accordance with Test Methods Promulgated by ASTM Committee E-6.

### 1.04 SUBMITTALS

A. Submittals shall be made in accordance with the requirements of the General Conditions. In addition, the following specific information shall be provided:

1. Product Data: Submit manufacturer's product data for each material. Include standard details, certified test results, installation instructions, and recommendations for sealing penetrations and perimeter.
2. Samples: Submit two labeled samples of each product, not less than 6 by 12 inches in size.
3. Shop Drawings for Air/Vapor Barrier Membrane Mockup: Submit shop drawings for mockup indicating size of mockup, details of construction, and expansion and control joints. Include relationship with adjacent materials, sequence of installation and materials and methods for sealing penetrations. Address shop drawing review comments prior to construction of mockup. Revise to show changes necessary to mockup.
4. Shop Drawings: Submit shop drawings indicating details of construction, including expansion and control joints. Include relationship with adjacent materials, sequence of

installation and materials and methods for sealing penetrations. Shop drawings shall include details of the following connections, as applicable to the project:

a. Foundation and walls.
b. Walls and windows or doors.
c. Different wall systems.
d. Wall and roof.
e. Wall and roof over unconditioned space.
f. Walls, floor and roof across construction, control and expansion joints.
g. Walls, floors and roof to utility, pipe and duct penetrations.

## 1.05 QUALITY ASSURANCE

A. Installer Qualifications:

1. Each worker who is installing air barriers must be either a Certified Applicator as defined in Paragraph 1.05.B below or an installer who is registered with ABAA.

B. Air/vapor barrier installers must be trained and certified by NECA (National Energy Conservation Association) and PSDI (Professional Skills Development Institute) for energy conservation.

C. Single-Source Responsibility: Obtain air/vapor barrier materials from a single manufacturer.

D. Provide products which comply with all state and local regulations controlling use of volatile organic compounds (VOCs).

E. Mockups of Air Vapor Barrier Membrane Installation: Prior to installation on the building, construct a mockup of a typical exterior wall assembly to indicate relationship of materials with air barrier and quality of workmanship. Mockup shall use actual air barrier membrane and wall materials as indicated in Section 04400. Remove mockup assemblies from site at completion of project. Mockup is subject to acceptance by Engineer, rebuild mockups which are rejected at no additional cost to the Owner.

F. Project Meetings:

1. Pre-Construction Meeting: After completion of mockup shop drawings, but prior to construction of mock-up, convene a meeting with representatives of materials to be incorporated in the mockup and installers of mockup. Agenda shall include sequence and details of construction to ensure continuity of air barrier.

2. Pre-Installation Meeting: Convene a pre-installation meeting a minimum of one week prior to commencing work of this section. Attendees shall include representatives of air barrier manufacturer, exterior wall installers and all other associated trades involved in air/vapor barrier installation including project superintendent. Agenda shall include the following:
   a. Review of submittals.
   b. Review of mock-ups.
   c. Coordination with sequence of installation with adjacent materials.
   d. Schedule for subsequent work covering air barrier.
   e. Procedures for quality assurance.

## 1.06 DELIVERY, STORAGE AND HANDLING

A. Provide in accordance with Section 01610 and 01611.

## PART 2 - PRODUCTS

## 2.01 LIQUID AIR/VAPOR BARRIER MEMBRANE

A. Liquid Air Barrier Membrane: Water-based asphalt emulsion modified with a blend of synthetic rubbers and special additives, compatible with sheet membranes.

B. Transition Materials: To provide an air barrier between the membrane and adjacent materials, provide transition materials consisting of extruded low-modulus silicone sheet and silicone sealant intended to adhere to polyethylene side of membrane and adjacent material. Provide the following materials as recommended by the manufacturer of the air barrier membrane:

1. Cleaning Agent: Toluene.
2. Silicone Sheet: Provide preformed corners.
3. Silicone Sealant.

C. Performance Criteria:

1. Air permeability no greater than 0.004 CFM/Ft2 under pressure differential of 0.3 in. of water.
2. Moisture Control: Maximum permeability no greater than 0.1 perms.

D. Manufacturers: Subject to compliance with requirements, provide one of the following products:

1. Grace Construction Products.
2. Carlisle Coatings & Waterproofing Inc.
3. Or equal.

## PART 3 - EXECUTION

## 3.01 PREPARATION

A. Clean substrate surfaces to receive air vapor barrier membrane in accordance with manufacturer's instructions. Apply primer if recommended by manufacturer.

B. Installation:

1. Strictly comply with air barrier membrane manufacturer's printed instructions, reviewed submittals and the following:
   a. Apply materials within manufacturer's requirements for temperature and weather conditions.
   b. Do not apply to wet or frozen substrates.
   c. Do not allow contamination with dust or dirt.
   d. Seal completely at edges, perimeter and penetrations.

2. Protect installed work from damage due to harmful weather exposures, physical abuse, and other causes.
3. Provide temporary protection over air barrier membrane if materials covering air barrier membrane will not be installed within manufacturer's recommended time limit for exposure.
4. Repair damage to air barrier membrane caused by construction activities or subsequent work prior to covering.

END OF SECTION 07280

# SECTION 07411
# PREFORMED METAL ROOF PANELS

## PART 1 - GENERAL

### 1.01 SECTION INCLUDES

A. Furnish all labor, materials, tools equipment and services for all preformed roofing as indicated, in accord with provisions of the Contract Documents.

B. Completely coordinate with work of all other trades.

C. Removal of existing metal roofing, flashing, gutters, downspouts, sealants, insulation and accessories complete.

D. Although such work is not specifically indicated, furnish and install all supplementary or miscellaneous items, appurtenances and devices incidental to or necessary for a sound, secure and complete installation.

E. Architectural roofing system of preformed steel panels.

F. Thermal roof insulation.

G. Fastening system.

H. Factory finishing.

I. Accessories and miscellaneous components.

### 1.02 REFERENCE STANDARDS

A. SMACNA: "Architectural Sheet Metal Manual"

B. ASTM A792/A792M - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.

C. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

E. ASTM E1592 - Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference.

F. ASTM E1646 - Standard Test Method for Water Penetration of Exterior Metal Roof Panel Systems by Uniform Static Air Pressure Difference.

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

## 1.03 SUBMITTALS

A. Product Data: Manufacturer's data sheets on each product to be used, including:

1. Storage and handling requirements and recommendations.
2. Installation methods.
3. Specimen warranty.

B. Shop Drawings: Include layouts of roof panels, details of edge and penetration conditions, spacing and type of connections, flashings, underlayment, and special conditions.

1. Show work to be field-fabricated or field-assembled.
2. Include structural analysis signed and sealed by qualified structural engineer, indicating conformance of roofing system to specified loading conditions.

C. Submit thermal calculations and details of floating clip, flashing attachments, and accessorizes certifying the free movement in response to the expansion/contraction forces resulting from a total temperature differential of 110 degrees F.

D. Selection Samples: For each roofing system specified, submit color chips representing manufacturer's full range of available colors and patterns.

E. Verification Samples: For each roofing system specified, submit samples of minimum size 12 inches square, representing actual roofing metal, thickness, profile, color, and texture.

1. Include typical panel joint in sample.
2. Include typical fastening detail.

F. Warranty: Submit specified manufacturer's warranty and ensure that forms have been completed in Cobb County School District's name and are registered with manufacturer.

## 1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in the manufacture of roofing systems similar to those required for this project, with not less than 5 years of documented experience.

B. Installer Qualifications: Company trained and authorized by roofing system manufacturer.

C. Installer must meet the following minimum standards should be meet:

1. Maintain $250,000 general liability coverage for each loss
2. Maintain sufficient worker's compensation coverage as mandated by law.
3. Have no viable claims pending regarding negligent acts or defective workmanship on previously performed or current projects.
4. Has not filed for protection from creditors under any state or federal insolvency or debtor relief statutes or codes.
5. Project foreman is the person having received specific training in the proper installation of the specified system and will be present to supervise whenever material is being installed.

D. Prior to installation of roofing system, conduct a pre-installation conference at the project site.

## 1.05 DELIVERY, STORAGE, AND HANDLING

A. Provide strippable plastic protection on prefinished roofing panels for removal after installation.

B. Store roofing panels on project site as recommended by manufacturer to minimize damage to panels prior to installation.

## 1.06 WARRANTY

A. Finish Warranty: Provide manufacturer's special warranty covering failure of factory-applied exterior finish on metal roof panels and agreeing to repair or replace panels that show evidence of finish degradation, including significant fading, chalking, cracking, or peeling within specified warranty period of 5 year period from date of Substantial Completion.

B. Waterproofing Warranty: Provide manufacturer's warranty for weather tightness of roofing system, including agreement to repair or replace roofing that fails to keep out water within specified warranty period of 10 years from date of Substantial Completion.

C. Special Weather tightness Warranty: On manufacturer's standard form, in which manufacturer agrees to repair or replace metal panel assemblies that fail to remain weather tight, including leaks, without monetary limitation within [5] years from date of Substantial Completion.

# PART 2 - PRODUCTS

## 2.01 MANUFACTURERS

A. Design is based on LokSeam, manufactured by MBCI, or equal.

B. Acceptable manufacturers are:

1. ATAS International, Inc: www.atas.com.
2. Berridge Manufacturing Company
3. Petersen Aluminum Corporation: www.pac-clad.com.

## 2.02 STRUCTURAL METAL ROOF PANELS

A. Mechanically-seamed, Concealed Fastener, Metal Roof Panels: Structural metal roof panel consisting of formed metal sheet with vertical ribs at panel edges, installed by lapping and mechanically interlocking edges of adjacent panels, and attaching panels to supports using concealed clips and fasteners in a weather tight installation.

1. Basis of Design: MBCI, LokSeam, <http://www.mbci.com/lokseam.html>
2. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, structural quality, Grade 50, Coating Class AZ55 (Grade 340, Coating Class AZM165) unpainted Galvalume Plus coating.
   a. Nominal Coated Thickness: 0.022 inch/26 gage.
   b. Panel Surface: Smooth with striations in pan.
   c. Exterior Finish: Exposed Galvalume Plus coating.

d. Panel Width: 16 inches.

e. Panel Seam Height: 1.75 inch.

f. Joint Type: Snap joint-seamed.

## 2.03 ATTACHMENT SYSTEM

A. Concealed System: Provide manufacturer's standard stainless steel concealed anchor clips designed for specific roofing system and engineered to meet performance requirements, including anticipated thermal movement.

B. All self-tapping/self drilling fasteners, bolts, nuts, self locking rivets and other suitable fasteners shall be designed to withstand specified design loads.

C. Provide fasteners with a factory applied coating in a color to match metal roof system application.

D. Provide neoprene washers under heads of exposed fasteners

## 2.04 PANEL FINISH

A. Strippable film shall be applied to the top side of the painted coil to protect the finish during fabrication, shipping and field handling. This strippable film must be removed before installation.

B. Siliconized Polyester Coating: Epoxy primer and silicone-modified polyester enamel topcoat with minimum dry film thickness of 0.8 mil; color and gloss as selected from manufacturer's standards.

## 2.05 ACCESSORIES AND MISCELLANEOUS ITEMS

A. Miscellaneous Sheet Metal Items: Provide flashings, gutters, downspouts, trim, moldings, closure strips, preformed crickets, and similar sheet metal items of the same material, thickness, and finish as used for the roofing panels. Items completely concealed after installation may optionally be made of stainless steel.

1. Downspouts: Open face, rectangular profile.

B. Rib and Ridge Closures: Provide prefabricated, close-fitting components of steel with corrosion resistant finish, closed-cell synthetic rubber, neoprene, or PVC, or combination steel and closed-cell foam.

C. Sealants: As specified in Section 07900.

1. Exposed sealant must cure to rubber-like consistency.
2. Concealed sealant must be non-hardening type.
3. Seam sealant must be factory-applied, non-skinning, non-drying type.

D. Thermal Insulation: Provide flexible blanket, rigid, or semi-rigid type, faced with white, flexible, non-dusting vapor retarder tested for maximum flame-spread rating of 50, per ASTM E84; for installation using spacer blocks.

1. Thickness: As required to meet required thermal resistance.

## 2.06 FABRICATION

A. Panels: Fabricate panels and accessory items at factory, using manufacturer's standard processes as required to achieve specified appearance and performance requirements.

B. Joints: Factory-install captive gaskets, sealants, or separator strips at panel joints to provide weather tight seals, eliminate metal-to-metal contact, and minimize noise from panel movements.

# PART 3 - EXECUTION

## 3.01 EXAMINATION

A. Contractor to remove existing roofing, flashing, insulation, etc necessary to allow inspection of deck and installation of new roofing panels.

B. Do not begin installation of preformed metal roof panels until substrates have been properly prepared.

C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

D. Inspect roof deck to verify deck is clean and smooth, free of depressions, waves or projections, level to +/- 1/4" in 20', and properly sloped.

## 3.02 PREPARATION

A. Coordinate roofing work with provisions for roof drainage, flashing, trim, penetrations, and other adjoining work to assure that the completed roof will be free of leaks.

B. Remove protective film from surface of roof panels immediately prior to installation. Strip film carefully, to avoid damage to prefinished surfaces.

C. Separate dissimilar metals by applying a bituminous coating, self-adhering rubberized asphalt sheet, or other permanent method approved by roof panel manufacturer.

D. Where metal will be in contact with wood or other absorbent material subject to wetting, seal joints with sealing compound and apply one coat of heavy-bodied bituminous paint.

## 3.03 INSTALLATION

A. Roofing Contractor to coordinate installation of roof with Owner. Protect existing construction to remain and building contents at all times. Provide temporary roofing if necessary to protect building's contents.

B. Overall: Install roofing system in accordance with approved shop drawings and panel manufacturer's instructions and recommendations, as applicable to specific project conditions. Anchor all components of roofing system securely in place while allowing for thermal and structural movement.

1. Install roofing system with concealed clips and fasteners, except as otherwise recommended by manufacturer for specific circumstances.

2. Minimize field cutting of panels. Where field cutting is absolutely required, use methods that will not distort panel profiles. Use of torches for field cutting is absolutely prohibited.

C. Accessories: Install all components required for a complete roofing assembly, including flashings, gutters, downspouts, trim, moldings, closure strips, preformed crickets, caps, equipment curbs, rib closures, ridge closures, and similar roof accessory items.

D. Install peal and stick membrane and slip sheet on roof substrate before installing preformed metal roof panels. Secure by methods acceptable to roof panel manufacturer, minimizing use of metal fasteners. Apply from eaves to ridge in shingle fashion, overlapping horizontal joints a minimum of 6 inches and side and end laps a minimum of 18 inches. Offset seams in building paper and seams in roofing felt.

E. Grace Ice & Water Shield underlayment to be used on all applications and on low (less than 1:12) slope or complex roofs per manufacturer's recommendation.

F. Roof Panels: Install panels in strict accordance with manufacturer's instructions, minimizing transverse joints except at junction with penetrations.

1. Provide sealant tape or other approved joint sealer at lapped panel joints.
2. Install sealant or sealant tape, as recommended by panel manufacturer, at end laps and side joints.

G. Insulation: Install insulation between roof covering and supporting members to present a neat appearance. Fold, staple, and tape seams unless otherwise approved by Architect.

1. Follow insulation manufacturer's requirements for installation of product.

H. Do not allow panels or trim to come into contact with dissimilar materials.

## 3.04 CLEANING

A. Clean exposed sheet metal work at completion of installation. Remove grease and oil films, excess joint sealer, handling marks, and debris from installation, leaving the work clean and unmarked, free from dents, creases, waves, scratch marks, or other damage to the finish.

## 3.05 PROTECTION

A. Do not permit storage of materials or roof traffic on installed roof panels. Provide temporary walkways or planks as necessary to avoid damage to completed work. Protect roofing until completion of project.

B. Touch-up, repair, or replace damaged roof panels or accessories before date of Substantial Completion.

END OF SECTION 07411

# SECTION 07550
# MODIFIED BITUMINOUS MEMBRANE ROOFING

## PART 1 - GENERAL

### 1.01 SCOPE

A. Modified bituminous roofing membrane, conventional application.

B. Insulation, flat and tapered.

C. Deck sheathing.

D. Base flashings.

E. Roofing cant strips, accessories, roofing expansion joints, and walkway pads.

### 1.02 RELATED REQUIREMENTS

A. Section 07081 - Flashing and Sheet metal.

### 1.03 REFERENCE STANDARDS

A. ASTM C726 - Standard Specification for Mineral Fiber Roof Insulation Board; 2005e1.

B. ASTM C728 - Standard Specification for Perlite Thermal Insulation Board; 2005 (Reapproved 2010).

C. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board; 2010.

D. ASTM D41 - Standard Specification for Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing; 2011.

E. ASTM D312 - Standard Specification for Asphalt Used in Roofing; 2000 (Reapproved 2006).

F. ASTM D1863 - Standard Specification for Mineral Aggregate Used on Built-Up Roofs; 2005.

G. ASTM D2822 - Standard Specification for Asphalt Roof Cement, Asbestos-Containing; 2005.

H. ASTM D4586 - Standard Specification for Asphalt Roof Cement, Asbestos-Free; 2007.

I. ASTM D4897 - Standard Specification for Asphalt-Coated Glass-Fiber Venting Base Sheet Used in Roofing; 2001 (Reapproved 2009).

J. ASTM D6162 - Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fiber Reinforcements; 2000a (Reapproved 2008).

K. ASTM D6163 - Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Glass Fiber Reinforcements; 2000 (Reapproved 2008).

L. ASTM D6164 - Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Polyester Reinforcements; 2011.

M. ASTM D6298 - Standard Specification for Fiberglass Reinforced Styrene Butadiene Styrene (SBS) Modified Bituminous Sheets with a Factory Applied Metal Surface; 2005.

N. FM P7825 - Approval Guide; Factory Mutual Research Corporation; current edition.

O. FM DS 1-28 - Wind Design; Factory Mutual Research Corporation; 2007.

P. NRCA ML104 - The NRCA Roofing and Waterproofing Manual; National Roofing Contractors Association; Fifth Edition, with interim updates.

Q. UL (FRD) - Fire Resistance Directory; Underwriters Laboratories Inc.; current edition.

## 1.04 SUBMITTALS

A. See Section 01340 - Shop Drawings, Product Data and Samples.

B. Product Data: Provide manufacturer's catalog data for membrane and bitumen materials, base flashing materials.

C. Shop Drawings: Indicate joint or termination detail conditions.

D. Samples of Aggregate: Submit two one lb containers of roofing aggregate.

E. Manufacturer's qualification data.

F. Installer's qualification data.

G. Manufacturer's Installation Instructions: Indicate special procedures.

H. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

I. Manufacturer's Field Reports: Indicate procedures followed.

J. Warranty: Submit manufacturer warranty and ensure forms have been completed and registered with manufacturer.

## 1.05 QUALITY ASSURANCE

A. SUBMITTALS PRIOR TO CONTRACT AWARD:

1. Letter from the proposed primary roofing manufacturer confirming that the bidder is an acceptable Contractor authorized to install the proposed system.
2. Letter from the primary roofing manufacturer stating that the proposed application will comply with the Manufacturer's requirements in order to qualify the project for the specified guarantee.

B. ACCEPTABLE PRODUCTS: Provide primary roofing products, including each type of sheet, all manufactured in the United States, supplied by a single manufacturer which has been

successfully producing the specified types of primary products for not less than 10 years. Provide secondary or accessory products which are acceptable to the manufacturer of the primary roofing products.

C. PROJECT ACCEPTANCE: Submit a completed manufacturer"s application for roof guarantee form along with shop drawings of the roofs showing all dimensions, penetrations, and details. The form shall contain all the technical information applicable to the project including deck types, roof slopes, base sheet and/or insulation assemblies (with method of attachment, and fastener type), and manufacturer"s membrane assembly proposed for installation. The form shall also contain accurate and complete information requested including proper names, addresses, zip codes and telephone numbers. The project must receive approval, through this process, prior to shipment of materials to the project site.

D. SCOPE OF WORK: The work to be performed under this specification shall include but is not limited to the following: Attend necessary job meetings and furnish competent and full time supervision, experienced roof mechanics, all materials, tools, and equipment necessary to complete, in an acceptable manner, the roof installation in accordance with this specification. Comply with the latest written application instructions of the manufacturer of the primary roofing products. In addition, application practice shall comply with requirements and recommendations contained in the latest edition of the Handbook of Accepted Roofing Knowledge (HARK) as published by the National Roofing Contractor"s Association, amended to include the acceptance of a phased roof system installation.

E. LOCAL REGULATIONS: Conform to regulations of public agencies, including any specific requirements of the city and/or state of jurisdiction.

F. MANUFACTURER REQUIREMENTS: The primary roofing materials manufacturer shall provide direct trained company personnel to attend necessary job meetings, perform periodic inspections as necessary, and conduct a final inspection upon successful completion of the project.

G. RECOMMENDED MAINTENANCE: In addition to the guarantee, furnish to the Owner the manufacturer's printed recommendations for proper maintenance of the specified roof system including inspection frequencies, penetration addition policies, temporary repairs, and leak call procedures.

H. Perform work in accordance with NRCA Roofing and Waterproofing Manual.

1. Maintain one copy on site.

I. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

J. Installer Qualifications: Company specializing in performing the work of this section with minimum 5 years experience and approved by manufacturer.

## 1.06 PRE-INSTALLATION MEETING

A. Convene one week before starting work of this section.

B. Review preparation and installation procedures and coordinating and scheduling required with related work.

## 1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver products in manufacturer's original containers, dry, undamaged, with seals and labels intact.

B. Store products in weather protected environment, clear of ground and moisture; ballast materials may be stored outdoors.

1. STORAGE: Store materials out of direct exposure to the elements. Store roll goods on a clean, flat and dry surface. All material stored on the roof overnight shall be stored on pallets. Rolls of roofing must be stored on ends. Store materials on the roof in a manner so as to preclude overloading of deck and building structure. Store materials such as solvents, adhesives and asphalt cutback products away from open flames, sparks or excessive heat. Cover all material using a breathable cover such as a canvas. Polyethylene or other non-breathable plastic coverings are not acceptable.
2. HANDLING: Handle all materials in such a manner as to preclude damage and contamination with moisture or foreign matter. Handle rolled goods to prevent damage to edges or ends.

C. DAMAGED MATERIAL: Any materials that are found to be damaged or stored in any manner other than stated above will be automatically rejected, removed and replaced at the Contractor's expense.

D. Protect foam insulation from direct exposure to sunlight.

## 1.08 FIELD CONDITIONS

A. Coordinate the work with installation of associated flashings and counterflashings installed by other sections as the work of this section proceeds.

B. REQUIREMENTS PRIOR TO JOB START

1. NOTIFICATION: Give a minimum of 5 days notice to the Owner and manufacturer prior to commencing any work and notify both parties on a daily basis of any change in work schedule.
2. PERMITS: Obtain all permits required by local agencies and pay all fees which may be required for the performance of the work.
3. SAFETY: Familiarize every member of the application crew with all fire and safety regulations recommended by OSHA, NRCA and other industry or local governmental groups.

C. ENVIRONMENTAL REQUIREMENTS

1. PRECIPITATION: Do not apply roofing materials during precipitation or in the event there is a probability of precipitation during application. Take adequate precautions to ensure that materials, applied roofing, and building interiors are protected from possible moisture damage or contamination.

D. PROTECTION REQUIREMENTS

1. MEMBRANE PROTECTION: Provide protection against staining and mechanical damage for newly applied roofing and adjacent surfaces throughout this project.
2. TORCH SAFETY: Designate one person on each crew to perform a daily fire watch. The designated crew member shall watch for fires or smoldering materials on all areas of roof construction Continue the fire watch for one hour after roofing material application has been suspended for the day.
3. LIMITED ACCESS: Prevent access by the public to materials, tools and equipment during the course of the project.
4. DEBRIS REMOVAL: Remove all debris daily from the project site and take to a legal dumping area authorized to receive such materials.
5. SITE CONDITION: Complete, to the owner's satisfaction, all job site clean-up including building interior, exterior and landscaping where affected by the construction.

E. Do not apply roofing membrane when environmental conditions are outside the ranges recommended by manufacturer.

F. Do not apply roofing membrane during unsuitable weather.

G. Do not apply roofing membrane when ambient temperature is below 40 degrees F.

H. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed the same day.

## 1.09 WARRANTY

A. See Section 01780 - Closeout Submittals, for additional warranty requirements.

B. ROOF MEMBRANE GUARANTEE: Upon successful completion of the project, and after all post installation procedures have been completed, furnish the Owner with the manufacturer"s 20 year labor and materials membrane guarantee. The guarantee shall be a term type, without deductibles or limitations on coverage amount, and shall be issued at no additional cost to the Owner. This guarantee shall not exclude random areas of ponding from coverage.

C. Correct defective Work within a two year period after Date of Substantial Completion.

D. Provide 20 year manufacturer's material and labor warranty to cover failure to prevent penetration of water.

# PART 2 - PRODUCTS

## 2.01 MANUFACTURERS

A. Membrane Materials:

1. Siplast: www.siplast.com.
2. GAF Materials Corporation.
3. Schuller International, Inc.

4. Firestone Building Products.
5. Substitutions: See Section 01600 - Product Requirements.

B. BASE SHEET

1. MODIFIED BASE SHEET: A fiberglass reinforced, Styrene-Butadiene-Styrene (SBS) modified asphalt coated sheet, having an minimum weight of 28 lb./square.
   a. Siplast Parabase or equal.

C. VENTING BASE SHEET: A fiberglass reinforced, asphalt coated sheet, having a minimum 1 1/2 inch perforations with a minimum weight of 24 lb./square.

1. Paravent

D. Insulation:

1. Dow Chemical Co: www.dow.com.
2. Owens Corning Corp: www.owenscorning.com.
3. GAF Materials Corporation.
4. The Celotex Corporation.
5. Johns Manville Roofing Products Division.
6. Schuller Internatrional
7. Substitutions: See Section 01600 - Product Requirements.

## 2.02 ROOFING ACCESSORIES

A. BITUMINOUS CUTBACK MATERIALS

1. PRIMER: A high flash, quick drying, asphalt solvent blend which meets or exceeds ASTM D 41-85 requirements.
   a. Siplast PA-1125 Asphalt Primer
2. MASTICS: An asphalt cutback mastic, reinforced with non-asbestos fibers, used as a base for setting metal flanges and conforming to ASTM D 4586-86 Type II requirements.
   a. Siplast PA-1021 Plastic Cement

B. CAULKING/SEALANTS: A single component, high performance, elastomeric sealant conforming to ASTM D 232 or ASTM C 920 requirements.. Acceptable types are as follows:

1. Sonolastic NP 1 by Sonneborn Building Products; Minneapolis, MN (612) 835-3434
2. Black Jack No. 1010 by Gibson-Homans; Twinsburg, OH (216) 425-3255

C. CERAMIC GRANULES: No. 11 Grade Specification Ceramic granules of color scheme matching the granule surfacing of the finish ply.

1. Siplast No. 11 Granules

D. WALKTREAD: A prefabricated, puncture resistant polyester core reinforced, polymer modified bitumen sheet material topped with a ceramic-coated granule wearing surface.

1. Thickness: 0.217 in - (5.5 mm)
2. Weight: 1.8 lbs/ft$^2$ - (8.8 Kg/m$^2$)
3. Width: 30 in (76.2 cm)
   a. Paratread Roof Protection Material

E. BASE SHEET FASTENERS

## 2.03 PREPARATION

A. ROOFING - CONVENTIONAL APPLICATION

1. Modified Bituminous Roofing: System to serve as design guideline: GAF System I-3-1 MGPFR, with insulation.
   a. Other Acceptable Products and systems as manufactured by:
      i) The Celotex Corporation.
      ii) GS Roofing Products Company.
      iii) Schuller International, Inc..
      iv) Firestone Buidling Products
2. Roofing Assembly Requirements:
   a. Roof-Ceiling Fire Resistance Rating: Conform to UL Assembly Design No. P732 and D925.
   b. Insulation Thermal Value (R), minimum: 14; provide insulation of thickness required.
3. Acceptable Insulation Types - Constant Thickness Application: Any of the types specified.
   a. Single layer of polyisocyanurate or composite board.
4. Acceptable Insulation Types - Tapered Application: Any of the types specified.
   a. Tapered perlite board.
5. Surfacing: Aggregate where indicated.

B. BITUMINOUS MATERIALS

1. Bitumen: Asphalt, ASTM D312 Type III; for adhering insulation, use Type III.
2. Primer: ASTM D41, asphalt type.
3. Roof Cement: ASTM D4586, Type II.

C. INSULATION

1. Perlite Board Insulation: Expanded perlite mineral aggregate, ASTM C728, with the following characteristics:
   a. Tapered Board: Slope as indicated; minimum thickness 1 inch; fabricate of fewest layers possible.

2. Polyisocyanurate Board Insulation: Rigid cellular foam, complying with ASTM C1289, Type I, aluminum foil both faces; Class 1, non-reinforced foam core, and with the following characteristics:
   a. Facing: Asphalt felt or mat both faces.
   b. Board Size: 48 x 96 inch.
   c. Board Thickness: 1-1/2 inch.
   d. Board Edges: Square.
3. Composite Board Insulation: Top layer perlite, bottom layer polyisocyanurate, complying with ASTM C1289, and with the following characteristics:
   a. Polyisocyanurate surfaces faced with aluminum foil.
   b. Polyisocyanurate surfaces faced with aluminum foil.

D. ACCESSORIES

1. Prefabricated Roofing Expansion Joint Flashing: As specified elsewhere in Division 07000..
2. Wood Cants: Wood blocking, pressure preservative treated.
3. Sheathing Adhesive: Non-combustible type, for adhering gypsum sheathing to metal deck.
4. Sheathing Joint Tape: Heat resistant type, min. 2 inch wide, self adhering.
5. Insulation Joint Tape: Glass fiber reinforced type as recommended by insulation manufacturer, compatible with roofing materials; 6 inches wide; self adhering.
6. Insulation Fasteners: Appropriate for purpose intended and approved by roofing manufacturer.
   a. Length as required for thickness of insulation material and penetration of deck substrate, with metal washers.
7. Roofing Nails: Galvanized, hot dipped type, size and configuration as required to suit application.
8. Strip Reglet Devices: Galvanized steel, maximum possible lengths per location, with attachment flanges.
9. Insulation Perimeter Restraint: Stainless steel edge device configured to restrain insulation boards in position and provide top flashing over ballast.
10. Sealants: As recommended by membrane manufacturer.

## PART 3 - EXECUTION

### 3.01 EXAMINATION

A. Verify that surfaces and site conditions are ready to receive work.

B. Verify deck is supported and secure.

C. Verify deck is clean and smooth, flat, free of depressions, waves, or projections, properly sloped and suitable for installation of roof system.

D. Verify deck surfaces are dry and free of snow or ice.

E. Verify that roof openings, curbs, and penetrations through roof are solidly set, and cant strips are in place.

## 3.02 METAL DECK PREPARATION

A. Install deck sheathing on metal deck:

1. Lay with long side at right angle to flutes; stagger end joints; provide support at ends.
2. Cut sheathing cleanly and accurately at roof breaks and protrusions to provide smooth surface.
3. Tape joints.
4. Mechanically fasten sheathing to roof deck, in accordance with Factory Mutual recommendations and roofing manufacturer's instructions.
   a. Over entire roof area, fasten sheathing using 6 fasteners with washers per sheathing board.
   b. At roof perimeter to a distance of 4 ft in from edges, fasten sheathing using 6 fasteners with washers per board.

B. Protected Membrane Application: Mop cant strips in place with hot bitumen.

## 3.03 ROOF MEMBRANE INSTALLATION

A. ROOF MEMBRANE APPLICATION: Apply roofing in accordance with roofing system manufacturer's instructions and the following requirements. Application of roofing membrane base ply shall immediately follow application of base sheet and/or insulation as a continuous operation.

B. AESTHETIC CONSIDERATIONS: An aesthetically pleasing overall appearance of the finished roof application is a standard requirement for this project. Make necessary preparations, utilize recommended application techniques, apply the specified materials (i.e. granules, metallic powder), and exercise care in ensuring that the finished application is acceptable to the Owner.

C. PRIMING: Prime metal flanges and concrete and masonry surfaces with a uniform coating of ASTM D 41 asphalt primer.

D. BITUMEN CONSISTENCY: Cutting or alterations of bitumen, primer, and sealants will not be permitted.

E. ROOF MEMBRANE APPLICATION: Apply all layers of roofing free of wrinkles, creases or fishmouths. Exert sufficient pressure on the roll during application to ensure prevention of air pockets. Stagger the lap seams between the base ply layer and the finish ply layer. Stagger the courses to ensure this.

1. Apply all layers of roofing perpendicular to the slope of the deck.
2. Fully bond the base ply to the prepared substrate, utilizing minimum 3 inch side and end laps. Apply each sheet directly behind the torch applicator. Cut a dog ear angle at the end laps on overlapping selvage edges. Using a clean trowel, apply top pressure to top seal T-laps immediately following sheet application. Stagger end laps a minimum of 3 feet.

3. Fully bond the finish ply to the base ply, utilizing minimum 3 inch side and end laps. Apply each sheet directly behind the torch applicator. Stagger end laps of the finish ply a minimum 3 feet. Cut a dog ear angle at the end laps on overlapping selvage edges. Using a clean trowel, apply top pressure to top seal T-laps immediately following sheet application. Stagger side laps of the finish ply a minimum 12 inches from side laps in the underlying base ply. Stagger end laps of the finish ply a minimum 3 feet from end laps in the underlying base ply.

4. Apply all layers of roofing parallel to the slope of the deck.

5. Fully bond the base ply to the prepared substrate, utilizing minimum 3 inch side and end laps. Apply each sheet directly behind the torch applicator. Cut dog ear angles on underlying end laps at the finish edge and the overlapping selvage edges. Using a clean trowel, apply top pressure to top seal T-laps immediately following sheet application. Stagger end laps a minimum of 3 feet.

6. Fully bond the finish ply to the base ply, utilizing minimum 3 inch side and end laps. Apply each sheet directly behind the torch applicator. Stagger end laps of the finish ply a minimum 3 feet. Cut dog ear angles on underlying end laps at the finish edge and the overlapping selvage edges. Using a clean trowel, apply top pressure to top seal T-laps immediately following sheet application. Stagger side laps of the finish ply a minimum 12 inches from side laps in the underlying base ply. Stagger end laps of the finish ply a minimum 3 feet from end laps in the underlying base ply.

7. Maximum sheet lengths and special fastening of the specified roof membrane system may be required at various slope increments where the roof deck slope exceeds 1/2 inch per foot. The manufacturer shall provide acceptable sheet lengths and the required fastening schedule for all roofing sheet applications to applicable roof slopes.

F. GRANULE EMBEDMENT: Broadcast mineral granules over all bitumen overruns on the finish ply surface, while the bitumen is still hot, to ensure a monolithic surface color.

G. WATER CUT-OFF: At end of day's work, or when precipitation is imminent, construct a water cut-off at all open edges. Cut-offs can be built using asphalt or plastic cement and roofing felts, constructed to withstand protracted periods of service. Cut-offs must be completely removed prior to the resumption of roofing.

## 3.04 FIELD QUALITY CONTROL AND INSPECTIONS

A. SITE CONDITION: Leave all areas around job site free of debris, roofing materials, equipment and related items after completion of job.

B. NOTIFICATION OF COMPLETION: Notify the manufacturer by means of manufacturer's printed Notification of Completion form of job completion in order to schedule a final inspection date.

C. FINAL INSPECTION - POST-INSTALLATION MEETING: Hold a meeting at the completion of the project, attended by all parties that were present at the pre-job conference. A punch list of items required for completion shall be compiled by the Contractor and the manufacturer's representative. Complete, sign, and mail the punch list form to the manufacturer's headquarters.

D. ISSUANCE OF THE GUARANTEE: Complete all post installation procedures and meet the manufacturer's final endorsement for issuance of the specified guarantee.

## 3.05 GENERAL INSULATION INSTALLATION

A. Ensure vapor retarder is clean and dry, continuous, and ready for application of roofing system.

B. Attachment of Insulation:

1. Mechanically fasten first layer of insulation to deck in accordance with roofing manufacturer's instructions and Factory Mutual requirements.
2. Embed second layer of insulation into flood coat mopping of hot bitumen in accordance with roofing and insulation manufacturers' instructions.

C. Lay subsequent layers of insulation with joints staggered minimum 6 inch from joints of preceding layer.

D. Place tapered insulation to the required slope pattern in accordance with manufacturer's instructions.

E. Lay boards with edges in moderate contact without forcing. Cut insulation to fit neatly to perimeter blocking and around penetrations through roof.

F. Tape joints of insulation in accordance with roofing and insulation manufacturers' instructions.

G. Do not apply more insulation than can be covered with membrane in same day.

## 3.06 GENERAL MEMBRANE APPLICATION

A. Apply membrane in accordance with manufacturer's instructions.

B. Apply membrane; lap and seal edges and ends permanently waterproof.

C. Apply smooth, free from air pockets, wrinkles, fish-mouths, or tears. Ensure full bond of membrane to substrate.

D. At end of day's operation, install waterproof cut-off. Remove cut-off before resuming roofing.

E. At intersections with vertical surfaces:

1. Extend membrane over cant strips and up a minimum of 8 inches onto vertical surfaces.
2. Apply flexible flashing over membrane.
3. Secure flashing to nailing strips at 4 inches on center.
4. Insert base flashing into reglets and secure.

F. Around roof penetrations, mop in and seal flanges and flashings with flexible flashing.

G. Install roofing expansion joints where indicated. Make joints watertight.

1. Install prefabricated joint components in accordance with manufacturer's instructions.

H. Coordinate installation of roof drains and sumps and related flashings.

## 3.07 FIELD QUALITY CONTROL

A. See Section 01400 - Quality Requirements, for general requirements for field quality control and inspection.

B. Require site attendance of roofing and insulation material manufacturers daily during installation of the Work.

## 3.08 CLEANING

A. Remove bituminous markings from finished surfaces.

B. In areas where finished surfaces are soiled by bitumen or other source of soiling caused by work of this section, consult manufacturer of surfaces for cleaning advice and conform to their documented instructions.

C. Repair or replace defaced or damaged finishes caused by work of this section.

## 3.09 PROTECTION

A. Protect installed roofing and flashings from construction operations.

B. Where traffic must continue over finished roof membrane, protect surfaces using durable materials.

END OF SECTION 07550

# SECTION 07900
# CAULKING AND SEALANTS

## PART 1 - GENERAL

### 1.01 SCOPE OF WORK

A. The work in this section includes furnishing all materials, labor, equipment, and incidentals required to perform all caulking, and related work necessary for the proper completion of the project as required by the Drawings and as specified herein.

B. Contract drawings show only functional features and some of the required external connections. They do not show all components required for a complete installation nor exact dimensions particular to any manufacturer's equipment. Contractor shall supply all parts, devices and equipment necessary to meet the requirements of the Contract Documents and shall make all dimensional adjustments particular to the equipment being furnished. All costs associated with such changes and adjustments shall be considered as being included in the price bid for the Work shown and specified.

### 1.02 APPLICATION SCHEDULE

A. Caulk all exterior wall joints between frames in openings and adjacent materials, between masonry and cast in place concrete, expansion and control joints and all other joints shown on the Drawings or required for the completion of the work.

B. Caulk all interior joints between frames and masonry, at tops of masonry walls, between masonry and structural concrete and control joints, exterior window and door frames and all other joints shown on the drawings or required for the completion of the work.

C. Joints of similar nature to those indicated shall be sealed with same sealer, whether indicated on Drawings to be sealed or not.

### 1.03 SUBMITTALS

A. Submittals shall be made in accordance with the requirements of the General Conditions of the Contract Documents. In addition, the following specific information shall be provided:

1. Manufacturer's technical data for each joint sealer product required, including instructions for joint preparation and joint sealer application.
2. Manufacturer's standard bead samples consisting of strips of actual products showing full range of colors available, for each product exposed to view.
3. Samples 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 in the Work.

### 1.04 QUALITY ASSURANCE

A. Applicable standards: Standards of the following, as referenced herein:

1. ASTM C 920-87 Standard Specification for Elastomeric Joint Sealants, 1987.

2. ASTM C 962-86 Standard Guide for Use of Elastomeric Joint Sealants, 1986.

B. Preinstallation Meeting: The contractor shall arrange a meeting with installer, sealer manufacturers' representatives, and other trades whose work affects installation of sealers at project site to review procedures and time schedule proposed for installation of sealers which is coordinated with other related work.

## 1.05 WARRANTY

A. Provide a warranty against defective equipment and workmanship in accordance with the requirements of the General Conditions of the Contract Documents.

## 1.06 DELIVERY, STORAGE, AND HANDLING

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

B. Store and handle materials to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

## 1.07 PROJECT CONDITIONS

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

B. When ambient and substrate temperature conditions are outside the limits permitted by sealer manufacturer or below 40 degrees F (4.4 degrees C).

C. When substrates are wet due to rain, frost, condensation, or other causes.

D. Joint Dimension Conditions: Do not proceed with installation of sealers when joint dimensions are less than recommended by joint sealer manufacturer for application indicated.

# PART 2 - PRODUCTS

## 2.01 MANUFACTURERS

A. Provide joint sealers manufactured by Polymeric Systems, Inc., 723 Wheatland Street, Phoenixville, PA 19460-3394. Telephone outside PA: 800-CAULK-IT; inside PA: 610-935-1170; FAX: 610-935-7123.

B. Other manufacturers considered equal shall include:

1. Pecora Corp
2. Protective Treatments, Inc.
3. Tremco, Inc.
4. Sonneborn Inc.

## 2.02 CAULKING

A. Silicone Sealant: PSI-631 Non Corrosive Silicone Sealant.

B. One-Part Urethane:

1. Gun-grade, oxygen-cured: PSI-901 One-Part Urethane Sealant.

C. Provide the following colors:

1. Sealant joints in masonry: Match mortar color.
2. Joints around doors, windows, louvers and other openings: Match color of adjacent wall material.
3. Joints in paving: Manufacturer's standard gray.

D. Primer: As recommended by caulking compound manufacturer.

E. Back-up Material: Closed cell foam polyethylene, or similar non-bituminous material as recommended by manufacturer of caulking compound and completely compatible with selected compound.

# PART 3 - EXECUTION

## 3.01 SURFACE PREPARATION AND INSTALLATION

A. Remove dirt, grease, mortar droppings and other foreign matter from substrate.

B. Require installer to inspect joints indicated to receive joint sealers for compliance with requirements for joint configuration, installation tolerances and other conditions affecting joint sealer performance. Do not allow joint sealer work to proceed until unsatisfactory conditions have been corrected.

## 3.02 CAULKING

A. Surface Preparation: Clean metal surfaces free of grease, oil, wax lacquer, and other foreign residue by wiping with a clean cloth moistened with a suitable solvent. Scrape or brush masonry surfaces clean. Apply appropriate primer to contact surfaces.

B. Joint Preparation: Joints to be caulked having a depth in excess of 3/8-inch shall be packed with back-up material. Round back-up material shall be sized to require 20 percent to 50 percent compression upon insertion. In joints not of sufficient depth to allow packing, install polyethylene bond-breaking tape at back of joint. Avoid lengthwise stretching of back-up material. Cut all corners, avoid wrapping around corners.

C. Application: Apply compound with pressure flow gun with nozzle of proper size and shape to suit width of joint, promptly after mixing and with sufficient pressure to fill joint. Apply as a continuous operation horizontally in one direction, and vertically from bottom to top, except joints having excessive widths where compound might sag, the joints shall be built up with successive beads. Finish joints smooth and slightly coved.

## 3.03 PROTECTION AND CLEANING

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 and remove damaged or deteriorated joint sealers immediately and reseal joints with new materials to produce joint sealer installations with repaired areas indistinguishable from original work.

B. 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.

## 3.04 SCHEDULE OF JOINT SEALERS

A. General-Purpose Interior and Exterior Applications:

1. Sealer:
   a. One-part, gun-grade polyurethane.
2. Applications:
   a. Joints and recesses between adjacent constructions and, etc.
   b. Masonry control joints.
   c. Around penetrations in exterior walls.
   d. Under door thresholds, and at bottom of door frames.
   e. Wherever necessary to prevent infiltration of water or air into or through exterior

B. Other Exterior Applications:

1. Sealer:
   a. Neutral cure silicone.
2. Applications:
   a. Top edge of surface mounted counterflashing.

END OF SECTION 07900