

SECTION 07 13 26 – SELF ADHERING SHEET WATERPROOFING

Part 1 - General

1.1 Related Documents

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

1.2 Summary

- A. This Section includes the following:
 - 1. Modified Bituminous Sheet Waterproofing system at Podium ceiling slabs which have a built-in slope of less than 1/8":12.
 - 2. Adhesive-coated HDPE sheet waterproofing beneath below grade concrete slabs.
 - 3. Molded-sheet drainage panels.
- B. Related Sections include the following:
 - 1. Division 03 – Section "Cast-In-Place Concrete" for concrete mixes, forming, form release agents; curing and curing compounds.
 - 2. Division 07 - Section "Joint Sealants" for joint-sealant materials and installation.

1.3 Submittals

- A. Product Data: Include manufacturer's written instructions for evaluating, preparing, and treating substrate, technical data, and tested physical and performance properties of waterproofing.
- B. Shop Drawings: Show locations and extent of waterproofing. Include details for substrate joints and cracks, sheet flashings, penetrations, inside and outside corners, tie-ins with adjoining waterproofing, and other termination conditions.
 - 1. Include setting drawings showing layout, sizes, sections and profiles.
- C. Samples: For the following products:
 - 1. 12-by-12-inch square of waterproofing and flashing sheet.
 - 2. 4-by-4-inch square of drainage panel.
- D. Installer Certificates: Signed by manufacturers certifying that installers comply with requirements.
- E. Qualification Data: For Installer
- F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for waterproofing.
- G. Warranties: Special warranties specified in this Section.

1.4 Quality Assurance

- A. Installer Qualifications:
 - 1. Installer shall submit evidence that it is a company specializing in the Work of this Section having not less than five (5) years uninterrupted experience as an approved applicator of the approved waterproofing system(s).

2. Installer shall submit a letter from the approved Waterproofing materials Manufacturer that it is an approved applicator of the specified waterproofing systems and capable of securing the specified manufacturer's Watertightness Warranty.
3. Installer shall submit evidence of having performed not less than two prior projects of similar size and complexity within the past five years utilizing the specified products.
- B. Source Limitations: Obtain waterproofing materials through one source from a single manufacturer.
- C. Mockups: Before beginning installation, install waterproofing to 100 sq. ft. of deck and of wall to demonstrate surface preparation, crack and joint treatment, corner treatment, and execution quality.
 1. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- D. Preinstallation Conference: Conduct conference at Project site.
 1. Review waterproofing requirements including surface preparation, substrate condition and pretreatment, minimum curing period, forecasted weather conditions, special details and sheet flashings, installation procedures, testing and inspection procedures, and protection and repairs.

1.5 Delivery, Storage, And Handling

- A. Deliver liquid materials to Project site in original packages with seals unbroken, labeled with manufacturer's name, product brand name and type, date of manufacture, and directions for storing and mixing with other components.
- B. Store liquid materials in their original undamaged packages in a clean, dry, protected location and within temperature range required by waterproofing manufacturer.
- C. Remove and replace liquid materials that cannot be applied within their stated shelf life.
- D. Store rolls according to manufacturer's written instructions.
- E. Protect stored materials from direct sunlight.

1.6 Project Conditions

- A. Environmental Limitations: Apply waterproofing within the range of ambient and substrate temperatures recommended in writing by waterproofing manufacturer. Do not apply waterproofing to a damp or wet substrate.
 1. Do not apply waterproofing in snow, rain, fog, or mist.
- B. Maintain adequate ventilation during preparation and application of waterproofing materials.

1.7 Warranty

- A. Special Manufacturer's Warranty: Manufacturer's standard form in which manufacturer agrees to replace waterproofing material that does not comply with requirements or that fails to remain watertight within specified warranty period.
 1. Warranty does not include failure of waterproofing due to failure of substrate prepared and treated according to requirements or formation of new joints and cracks in substrate exceeding 1/16 inch (1.6 mm) in width.
 2. Warranty Period: Fifteen (15) years from date of Substantial Completion.

- B. Installer's Warranty: Installer's standard form, signed by Installer, covering Work of this Section, for warranty period of two(2) years.
 - 1. Warranty includes removing and reinstalling protection board, drainage panels, and/or insulation.

Part 2 - Products

2.1 Modified Bituminous Sheet Waterproofing – Above Slab Application

- A. Modified Bituminous Sheet: Not less than 60-mil- thick, self-adhering sheet consisting of 56 mils of rubberized asphalt laminated to a 4-mil- thick, polyethylene film with release liner on adhesive side and formulated for application with primer or surface conditioner that complies with VOC limits of authorities having jurisdiction.
 - 1. Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Grace, W. R. & Co.; Bituthene 4000 Membrane system.
 - 2. Physical Properties:
 - a. Tensile Strength: 325 psi minimum; ASTM D 412, Die C, modified.
 - b. Ultimate Elongation: 300 percent minimum; ASTM D 412, Die C, modified.
 - c. Low-Temperature Flexibility: Pass at minus 20 deg F; ASTM D 1970.
 - d. Crack Cycling: Unaffected after 100 cycles of 1/8-inch (movement; ASTM C 836.
 - e. Puncture Resistance: 50 lbf minimum; ASTM E 154.
 - f. Hydrostatic-Head Resistance: 150 feet minimum; ASTM D 5385.
 - g. Water Absorption: 0.1 percent weight-gain maximum after 48-hour immersion at 70 deg F ; ASTM D 570.
 - h. Vapor Permeance: 0.05 perms; ASTM E 96, Water Method.

2.2 Adhesive-Coated Hdpe Sheet Waterproofing – Below Slab Application

- A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
- B. Products: Subject to compliance with requirements, provide one of the following:
 - 1. Grace, W. R. & Co.; Preprufe 300R.
- C. Adhesive-Coated HDPE Sheet for Horizontal Applications: 46-mil - thick, uniform, flexible sheets consisting of 30-mil- thick, HDPE sheet coated with a pressure-sensitive rubber adhesive, a protective adhesive coating, a detackifying surface treatment, an uncoated self-adhering side lap strip, and a release liner with the following physical properties:
 - 1. Tensile Strength, Film: 4000 psi minimum; ASTM D 412.
 - 2. Low-Temperature Flexibility: Pass at minus 10 deg F ; ASTM D 1970.
 - 3. Peel Adhesion to Concrete: 5 lbf/in. ; ASTM D 903, modified.
 - 4. Lap Adhesion: 2.5 lbf/in. ; ASTM D 1876, modified.
 - 5. Puncture Resistance: 221 pounds; ASTM E154.

6. Hydrostatic-Head Resistance: 231 feet ; ASTM D 5385, modified.
7. Vapor Permeance: 0.01 perms ; ASTM E 96, Water Method.
8. Water Absorption: 0.5 percent; ASTM D 570.

2.3 Auxiliary Materials

- A. General: Furnish auxiliary materials recommended by waterproofing manufacturer for intended use and compatible with sheet waterproofing.
 1. Furnish liquid-type auxiliary materials that comply with VOC limits of authorities having jurisdiction.
- B. Primer: Liquid waterborne primer recommended for substrate by manufacturer of sheet waterproofing material.
 1. Bituthene Primer B2
- C. Surface Conditioner: Liquid, waterborne surface conditioner recommended for substrate by manufacturer of sheet waterproofing material.
 1. Bituthene System 4000 Surface Conditioner.
- D. Liquid Membrane: Elastomeric, two-component liquid, cold fluid applied, trowel grade or low viscosity.
 1. Bituthene Liquid Membrane.
- E. Sheet Strips: Self-adhering, rubberized-asphalt sheet strips of same material and thickness as sheet waterproofing.
- F. Mastic, Adhesives, and Tape: Liquid mastic and adhesives, and adhesive tapes recommended by waterproofing manufacturer.
 1. Detail Tape: Two-sided, pressure-sensitive, self-adhering reinforced tape, 4-1/2 inches wide, with a tack-free protective adhesive coating on one side and release film on self-adhering side.
- G. Metal Termination Bars: Aluminum bars, approximately 1 by 1/8 inch thick, predrilled at 9-inch (229-mm) centers.

2.4 Molded-Sheet Drainage Panels

- A. Nonwoven-Geotextile-Faced, Molded-Sheet Drainage/Protection Panel: Manufactured composite subsurface drainage/protection panels consisting of a nonwoven, needle-punched geotextile facing with an apparent opening size not exceeding No. 70 (0.21-mm) sieve laminated to one side with a polymeric film bonded to the other side of a studded, nonbiodegradable, molded-plastic-sheet drainage core, with a vertical flow rate of 9 to 15 gpm per ft.
 1. Grace, W. R. & Co., HydroDuct 660 – Heavy duty drainage/protection panel for use at horizontal applications.
 2. Grace, W. R. & Co., HydroDuct 220 – Drainage/protection panel for use at vertical foundation wall applications.

Part 3 - Execution

3.1 Examination

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance.
 - 1. Verify that concrete has cured and aged for minimum of three (3) days, or as otherwise recommended in writing by waterproofing manufacturer.
 - 2. Verify that concrete is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D 4263.
 - 3. Verify that substrate is dry, smooth, and sound; and ready to receive the approved waterproofing system.
 - 4. Begin installation only after unsatisfactory conditions have been corrected.

3.2 Surface Preparation – For Above Slab Applications.

- A. Clean, prepare, and treat substrates according to manufacturer's written instructions. Provide clean, dust-free, and dry substrates for waterproofing application.
- B. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete substrates.
- C. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids.
- D. Prepare, fill, prime, and treat joints and cracks in substrates. Remove dust and dirt from joints and cracks according to ASTM D 4258.
 - 1. Install sheet strips and center over treated construction and contraction joints and cracks exceeding a width of 1/16 inch.
- E. Bridge and cover isolation joints, expansion joints and discontinuous deck-to-wall and deck-to-deck joints with overlapping sheet strips.
 - 1. Invert and loosely lay first sheet strip over center of joint. Firmly adhere second sheet strip to first and overlap to substrate.
- F. Corners: Prepare, prime, and treat inside and outside corners according to Manufacturer's written instruction and the detail drawings provided.
 - 1. Install membrane strips centered over vertical inside corners. Install 3/4-inch fillets of liquid membrane on horizontal inside corners and as follows:
 - a. At footing-to-wall intersections, extend liquid membrane each direction from corner or install membrane strip centered over corner.
 - b. At plaza deck-to-wall intersections, extend liquid membrane or sheet strips onto deck waterproofing and to finished height of sheet flashing.
- G. Prepare, treat, and seal vertical and horizontal surfaces at terminations and penetrations through waterproofing and at drains and protrusions according to ASTM D 6135.

3.3 Surface Preparation – For Below Slab Applications.

- A. Verify the substrate to receive sub-slab membrane waterproofing is well-compacted and free of loose aggregate and sharp projections.
- B. Verify that all slab penetrations are in place and rigidly secured.
- C. Substrate must be free of standing water.

- D. To properly prepared substrate install drainage/protection panel to receive waterproofing membrane in accordance with the approved manufacturers written instructions.
 - 1. Place drainage/protection panel with edges tightly butted and with excess geotextile lapped in shingle fashion over adjoining panel edge.
 - 2. Neatly cut panels around penetrating elements and seal to penetrating elements with manufacturers' approved tape.
- E. Do not install drainage/protection panels at slabs being poured onto void boxes or carton forms.

3.4 Modified Bituminous Sheet Waterproofing Application – Above Slab

- A. Install modified bituminous sheets according to waterproofing manufacturer's written instructions and according to the applicable provisions of ASTM D 6135.
- B. Apply primer to substrates at required rate and allow to dry. Limit priming to areas that will be covered by sheet waterproofing in same day. Re-prime areas exposed for more than 24 hours.
- C. Apply and firmly adhere sheets over area to receive waterproofing. Accurately align sheets and maintain uniform 2-1/2-inch- minimum lap widths and end laps. Overlap and seal seams and stagger end laps to ensure watertight installation.
 - 1. When ambient and substrate temperatures range between 25 and 40 deg F, install self-adhering, modified bituminous sheets produced for low-temperature application. Do not use low-temperature sheets if ambient or substrate temperature is higher than 60 deg F.
- D. Horizontal Application: Apply sheets from low point to high point of decks to ensure that side laps shed water.
- E. Apply continuous sheets over sheet strips bridging substrate cracks, construction, and contraction joints.
- F. Seal exposed edges of sheets at terminations not concealed by metal counterflashings or ending in reglets with mastic.
- G. Install sheet waterproofing and auxiliary materials to tie into adjacent waterproofing.
- H. Repair tears, voids, and lapped seams in waterproofing not complying with requirements. Slit and flatten fishmouths and blisters. Patch with sheet waterproofing extending 6 inches beyond repaired areas in all directions.
- I. Install protection course with butted joints over waterproofing membrane immediately.
- J. Correct deficiencies in or remove sheet waterproofing that does not comply with requirements; repair substrates, reapply waterproofing, and repair sheet flashings.

3.5 Adhesive-Coated Hdpe Sheet Waterproofing Application – Below Slab

- A. Horizontal Applications: Install adhesive-coated HDPE sheet with HDPE face against substrate (drainage/protection panel or carton forms). Accurately align sheets and maintain uniform 3 inch minimum lap widths and end laps. Overlap and seal seams. Overlap, stagger, and seal end laps with detail tape to ensure watertight installation.
- B. Corners: Seal lapped terminations and cut edges of sheet waterproofing at inside and outside corners with detail tape.
- C. Seal penetrations through sheet waterproofing to provide watertight seal with detail tape patches or wraps and a liquid-membrane troweling in accord with detail drawings provided.

- D. Install sheet waterproofing and auxiliary materials to produce a continuous watertight tie into adjacent waterproofing.
- E. Repair tears, voids, and lapped seams in waterproofing not complying with requirements. Tape perimeter of damaged or nonconforming area extending 6 inches beyond repaired areas in all directions. Apply a patch of sheet waterproofing and firmly secure with detail tape.
- F. Correct deficiencies in or remove waterproofing that does not comply with requirements; repair substrates, reapply waterproofing, and repair sheet flashings.

3.6 Molded-Sheet Drainage/Protection Panel Installation – Above Slab

- A. Place and secure molded-sheet drainage/protection panels, with geotextile facing away from deck substrate, according to manufacturer's written instructions. Use adhesives that do not penetrate waterproofing, and which are approved by the waterproofing membrane manufacturer. Lap edges and ends of geotextile to maintain continuity. Protect installed molded-sheet drainage/protection panels during subsequent construction.

3.7 Field Quality Control

- A. Begin waterproofing installation in the presence of the approved Manufacturers' technical representative.
- B. Manufacturer of waterproofing products shall arrange for its technical representative to make periodic site visits during the applications of waterproofing, to confirm the quality of the installation as required for issuance of the specified Watertightness Warranty.
 - 1. Manufacturers Observations Frequency: shall be not less than once per week – weather permitting.
- C. Flood Testing: Flood test each deck (above slab) area for leaks, according to the approved manufacturers written instruction, and with the applicable provisions of ASTM D 5957, after completing waterproofing but before overlying construction is placed. Install temporary containment assemblies, plug or dam drains, and flood with potable water.
 - 1. Flood to an average depth of 2-1/2 inches with a minimum depth of 1 inch and not exceeding a depth of 4 inches. Maintain 2 inches of clearance from top of sheet flashings.
 - 2. Flood each area for 48 hours.
 - 3. After flood testing, repair leaks, repeat flood tests, and make further repairs until waterproofing installation is watertight.
- D. Owner reserves the right to engage an independent testing agency to observe water testing and examine underside of decks and terminations for evidence of leaks during testing.

3.8 Protection and Cleaning

- A. Protect waterproofing from damage and wear during remainder of construction period.
- B. Protect installed drainage/protection panels from damage due to UV light, harmful weather exposures, physical abuse, and other causes. Provide temporary coverings where installation will be subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.
- C. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

*****End of Section 07 13 26*****

SECTION 07 20 00 – THERMAL INSULATION

PART 1: GENERAL

1.01: General Requirements

- A. Conform to the general provisions of the Contract, General and Supplementary Conditions to the contract, Division One of this Specification, the Drawings and this Specification Section.
- B. Should conflict arise between the Drawings and the provisions of the Specifications, the Specifications shall govern.

1.02: Scope of Work (includes but is not necessarily limited to the following):

- A. General:
 - 1. Refer to the drawings for the extent of work.
 - 2. Inspect existing conditions and the work of other trades for proper conditions before beginning the work of this section.
 - 3. Coordinate the work of this section with the work of other trades.
 - 4. Protect people, property, and the work of this section and other trades.
 - 5. Clean up work site and dispose of waste and debris on a daily basis.
- B. Scope:
 - 1. Products, Materials and work included: Provide all materials and accessories, labor, tools, and equipment for the installation of insulation as shown and described in this section including, but not limited to:
 - a. Insulation for exterior walls, roofs, and foundation walls.
 - b. Acoustical insulation for sound insulated walls and above ceilings.

1.03: Related Work Specified Elsewhere

- A. Section 07 26 00, Plastic Vapor Retarder
- A. Section 07 52 16, SBS Mod Bit Membrane Roofing – 14
- B. Section 09 22 16, Non-Structural Metal Framing
- C. Section 09 53 23, Suspended Acoustical Ceiling System.

1.04: Regulatory Codes and Agencies

- A. Refer to Division 1

1.05: Definitions

- A. Thermal resistivity, or “r-value,” represents rate of heat flow through homogenous material exactly one inch thick. R-value is expressed by temperature difference in degrees Fahrenheit between two exposed faces required to cause one BTU to flow through one square foot per hour at standard mean temperature.
- B. Thermal resistance or r-value represents rate of heat flow through homogenous material of given thickness calculated by the resistivity (r-value) of the unit thickness (1 inch) times the actual thickness of the material.

1.06: System Description

- A. Performance Requirements: Systems to provide continuity of thermal insulation and vapor retarder at scheduled locations.
- B. Thermal Resistance: As scheduled or as required by these specifications. Comply with local and/or state energy code.
- C. Fire Performance Characteristics: Provide insulation with fire performance characteristics indicated per ASTM 136 and ASTM E 84, as applicable, and which correspond to products listed in UL Fire Resistance Directory or UL Building Materials Directory.

1.07: Submittals

- A. Comply with all requirements of Division 1
- B. Product Data:
 - 1. Submit manufacturer's published literature for specified products and accessories as applicable, including manufacturer's specifications, physical characteristics and performance data.
 - 2. Submit, as a supplement, manufacturer's instructions and directions for application if not included in manufacturer's published literature.
 - 3. Proof of Compliance: Upon completion of this portion of the work, and as a condition of its acceptance, deliver to the Architect/Engineer a letter signed by an official of the insulation manufacturer and installing firm or firms certifying that all insulation and accessories were furnished and installed in complete accordance with this Specification section.

1.08: Quality Control

- A. Materials: Furnish only materials of tested and certified thermal resistance and performance characteristics, of the thermal resistance indicated on the drawing.
- B. Obtain all materials of each type from a single source unless prior approval is received from the Architect.

1.09: Delivery, Storage, and Handling

- A. Delivery

1. Deliver insulation materials in original sealed cartons or containers with manufacturer's original labels intact and legible. Do not remove labels.
 2. Do not deliver to the site more than one week prior to installation. Coordinate with the General Contractor for proper delivery time.
 3. Do not deliver to the building until the building is enclosed and dry.
- B. Handling
1. Verify that each label is intact and clearly states thermal resistance and conductance and manufacturer's name. Do not remove labels or open cartons and containers until the construction manager's representative has observed and approved the material.
 2. Protect insulation from physical damage and from becoming wet, soiled, or covered with ice or snow. Comply with manufacturer's recommendations for handling, storage and protection during installation.
 3. Take all precautions to handle all materials to prevent damage.
 4. Do not apply any damaged insulation or accessories.
 5. Until final acceptance is received, replace any and all damaged insulation and accessories at no cost to the owner.
- C. Storage
1. Store all insulation materials as necessary to protect from sunlight, moisture, dirt, mud, temperature change, open flames and contaminants which may damage the insulation's thermal and moisture resistance qualities.
 2. Store all insulation and accessories a minimum of twelve inches (12") above the floor.
 3. Keep all materials dry by storing inside the building under roof.
 4. Where products and/or materials have been approved for storage outside, store off the ground, properly supported on a level platform, and protected from direct exposure to rain, snow, sunlight, and other extreme weather conditions. Provide adequate ventilation to prevent condensation.
 5. Do not store in or near patient, staff, pedestrian or vehicular traffic areas.

1.10: Protection

- A. Protect people from injury and adjacent property, structures and the work of other trades from damage.
- B. The Contractor or Subcontractor shall repair or replace, as directed by the Architect, all work or property damaged by the Contractor or Subcontractor at no additional cost to the owner.
- C. Take all precautions to protect the insulation from damage, deterioration and defects until final acceptance is given by the Architect.

PART 2: PRODUCTS

2.01: Manufacturers

- A. Subject to compliance with requirements, manufacturers offering insulation products that may be incorporated in the work include the following:

1. Glass Fiber Insulation (Types 1, 2, and 3)
 - a. CertainTeed Corporation
 - b. Johns Manville
 - c. Knauf Fiber Glass
2. Extruded Polystyrene Board Insulation (Type 4)
 - a. Amoco Foam Products Co.
 - b. DiviersiFoam Products
 - c. Dow Chemical Company
 - d. Owens Corning
 - e. UC Industries

2.02: Materials

- A. General: Provide preformed units in sizes to fit applications indicated, selected from manufacturer's standard thicknesses, widths, and lengths.
- B. Type 1 – Mineral Fiber Blanket/Batt Insulation: ASTM C665, Type III, Class B (blankets with reflective vapor retarded membrane on one face)
 1. Mineral Fiber Type: Fibers manufactured from glass
 2. Combustion Characteristics: Unfaced materials pass ASTM E 136
 3. Surface Burning Characteristics: Maximum flame spread and smoke developed values of 25 and 50, respectively.
 4. Facing: foil faced
 5. Thickness: As required to provide r-value as scheduled
 6. Vapor Permeance: 0.05 Perms maximum
- C. Type 2 – Mineral Fiber Blanket/Batt Insulation: ASTM C665, Type II, Class C (blankets with nonreflective vapor retarder membrane on one face)
 1. Mineral fiber type: fibers manufactured from glass
 2. Combustion characteristics: Unfaced materials pass ASTM E 136.
 3. Surface Burning Characteristics: Maximum flame spread and smoke developed values of 25 and 50, respectively.
 4. Facing: Kraft faced (KF)
 5. Thickness: As required to provide r-value as scheduled.
 6. Vapor Permeance: 0.10 Perms maximum
- D. Type 3 – Flexible Glass Fiber Insulation Board: ASTM C612, type IA and type IB, unfaced; thermal insulation combining glass fibers with thermosetting resin binders.
 1. Nominal Density: Not less than 1.5 lb/cu. ft. nor more than 1.65 lb/cu. ft.
 2. Thermal Resistivity: 4.13 deg. F x h x sq. ft/BTU x inch at 75 deg. F.

3. Surface Burning Characteristics: Maximum flame spread and smoke developed values of 25 and 50, respectively.
 4. Thickness: As required to provide r-value as scheduled.
- E. Type 4 – Composite Roof Insulation: ASTM C 1289, Type IV, composite polyisocyanurate foam core integrally bonded to a 1/2" high-density fiberboard roof insulation on one side and an organic/inorganic face sheet on the other.
1. Basis of Design: Dow Styrofoam Hy-Therm Composite Roof Insulation.
 2. Compliant with
 - a. ASTM C1289 Type IV, including Annex method
 - b. ASTM D1622, Standard Test Method for Apparent Density of Rigid Cellular Plastics
 - c. ASTM D1621, Standard Test Method for Compressive Properties of Rigid Cellular Plastics
 - d. ASTM E84, Standard Test Method for Surface Burning Characteristics of Building Materials
 2. Physical Characteristics
 - a. Nominal foam core density, ASTM D1622, pcf: 2
 - b. Compressive strength, core foam, ASTM D1621psi, min: 16
 - c. Flame spread, core foam, ASTM E84, max:55
 - d. Dimensional stability, 158 degrees F (70 deg C)/97% RH, % linear change: Less than 2
 - e. Flexural strength, ASTM C203, psi, min. 40
 - f. Water absorption, ASTM C209, % by volume, max: 2.0
 - g. Linear coefficient of thermal expansion in/in degrees F.0.000014
 - h. Maximum use temp, (foam) degrees F 190
 3. Layer with Type 5 per drawings to achieve required R-value
- F. Type 5: Rigid Polyisocyanurate Board
1. Typical Location: roof
 2. Product: Dow Tuff-R 1.5 inch board
 3. Layer with Type 4 per drawings to achieve required R-value
- G. Type 6 – Acoustical Batts
1. Unfaced fiberglass batts
 2. Location: **All** interior walls and above **all** ceilings as shown on drawings
 3. R11 unless otherwise noted.
- H. Accessories
1. Adhesive: Product with demonstrated capability to bond insulation or mechanical anchors securely to substrates indicated without damaging or corroding either insulation, anchors, or substrates.

2. Adhesive-Attached Pin Anchors: Perforated plate, 2 inches square, welded to projecting pin, with self-locking washer.
 - a. Plate: Zinc-plated steel, 0.106 inch thick.
 - b. Pin: Copper-coated low carbon steel, fully annealed, 0.106 inch diameter, length to suit depth of insulation with washer in place to hold insulation tight to substrate.
 - c. Washer: Mild steel, 0.016 inch thick, size as required to hold insulation securely.
3. Tape: Bright aluminum or polyester self-adhering type, mesh reinforced, of type recommended by insulation or vapor retarder manufacturer.
4. Caulking Compound: material approved by manufacturer of safing insulation for sealing joint between foil backing of safing insulation and edge of concrete floor slab against penetration of smoke.
5. Sealant: Single component, gunnable, synthetic rubber acoustical sealant.

PART 3: EXECUTION

3.01: Examination and Preparation

- A. Examine substrates and conditions, with installer present, to determine if conditions affecting performance of insulation are satisfactory.
- B. Do not proceed with installation of insulation until unsatisfactory conditions have been corrected. Proceeding with work indicates acceptance of underlying conditions.
- C. Clean substrates of substances harmful to insulation or vapor retarder.

3.02: Installation

- A. Install insulation in accordance with insulation manufacturer's instructions.
- B. Extend insulation full thickness to envelop entire area to be insulated.
 1. Cut and fit tightly around obstructions. Fill voids with insulation.
 2. Apply a single layer of insulation of required thickness unless otherwise indicated or required.
- C. Perimeter and Underslab Insulation
 1. Install continuous rigid insulation board at foundation and subslab as indicated, with minimum combined width of 36 inches, using insulation mastic on vertical surfaces.
 2. On vertical surfaces, set units in adhesive applied in accordance with manufacturer's instructions.
- D. Install Type 1 or Type 2 insulation in exterior wall studs.
 1. Fit insulation tight in spaces, leaving no gaps or voids.
 2. Install friction fit insulation tight to framing members.
- E. Under metal roofing, install Type 2 insulation on top of metal deck. Install continuous from edge of adjoining roof insulation, fitting snugly around framing and penetrations

1. Position long edges continuous and perpendicular to metal deck ribs.
 2. Form joints parallel to ribs on solid bearing surfaces.
- F. Flexible board insulation: Install pin anchors to face of substrate at spacings as recommended by insulation and fastening manufacturers, but not to exceed spacing required to provide full, uniform support of insulation material.
- G. Vapor Retarders: See Section 07190. Where vapor barrier is specified (either independent or part of the insulation), install vapor barrier on room side.
- H. Do not crush or compress batts.
- I. Friction-fit insulation between studs after cover material has been installed on one side of the cavity.
- J. When unfaced insulation is used, and in applications without a cover material or where the stud depth is larger than the insulation thickness, use wire or metal straps to hold insulation in place. When faced insulation is used, the attachment flanges may be taped to the face of metal stud prior to applying the interior finish.
- K. Provide supplementary support to hold the product in place until finish surface is applied when insulation is installed in heights over 8 feet.
- L. Caulk perimeter joints of door and window frames to ensure a complete seal.

3.03: Schedule

- A. Provide sufficient thicknesses of each type of insulation to achieve R-values as compliant with the drawings.
- B. Provide sufficient thicknesses of specified materials to achieve thermal resistance ratings of not less than those indicated, and of greater thickness where required by local/state energy code.

3.04: Clean Up

- A. At the end of each day's work and at final completion, the site shall be free of all waste materials and equipment used by the Contractor. Remove all waste materials and debris and dispose of in a legal and safe manner.
- B. The Contractor shall be responsible for maintaining a clean work place and shall pay for all costs, at no additional expense to the Owner, should outside labor and equipment be used to clean up the work site.
- C. Prevent waste materials from entering and accumulating in the storm drainage system and on adjacent property.

*****End of Section 07 20 00*****

SECTION 07 21 29 – SPRAYED INSULATION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Water-blown closed-cell spray polyurethane foam insulation.

1.3 RELATED SECTIONS

- A. Section 03 30 00 - Cast-In-Place Concrete.
- B. Section 06 10 00 - Rough Carpentry.
- C. Section 07 92 00 - Joint Sealants.
- D. Section 07 21 00 – Thermal Insulation
- E. Section 07 27 19 - Plastic Sheet Air Barriers

1.4 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. Transmission Properties by Means of the Heat Flow Meter Apparatus
 - 2. ASTM C 1338: Standard Test method for Determining Fungi Resistance of Insulation Materials and Facings
 - 3. ASTM E 84: Test Method for Surface Burning Characteristics of Building
 - 4. ASTM E 96: Standard Test Methods for Water Vapor Transmission of
 - 5. ASTM E119: Standard Test Methods for Fire Tests of Building
 - 6. ASTM E 2178: Standard Test Method for Air Permeance of Building
 - 7. NFPA 285: Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non Load-Bearing Wall Assemblies Containing Combustible Components

1.5 SUBMITTALS

- A. Product Data for type of insulation product specified.
- B. Product test reports performed by a qualified third-party testing agency evidencing compliance of insulation products with specified requirements including those for thermal resistance, fire-test-response characteristics, water vapor transmission, and other properties, based on comprehensive testing of current products.
- C. Evaluation Report: Evidence of compliance of foam-plastic insulations with

International Building Code (IBC), International Residential Code (IRC),
International Energy Conservation Code (IECC).

- D. Manufacturer's certificate certifying insulation provided meets or exceeds specified requirements.
- E. Installer's certificate showing the Icynene installation certification.
- F. Provide standard manufacturer's warranty

1.6 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Product produced in an ISO 9001 registered factory.
- B. Single Source Responsibility: Single source product from one manufacturer.
- C. Installer Qualifications: Engage an Icynene Licensed Contractor (installer) who has been trained and certified by Icynene.
- D. Fire-Test-Response Characteristics: Provide materials specified as determined by testing identical products per test method indicated below by a testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.
 - 1. Surface-Burning Characteristics: ASTM E 84
 - 2. Rated Wall Assembly Testing: ASTM E119 and ASTM 285
- E. Toxicity/Hazardous Materials
 - 1. Provide products that contain no chemical blowing agents.
 - 2. Provide products that are "Low-emitting".
 - 3. Provide products that contain no PBDE's .
 - 4. Provide products that contain no urea-formaldehyde.

1.7 REGULATORY REQUIREMENTS

- A. Conform to applicable code requirements for flame and smoke ratings and non-combustibility as applicable.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store products in protected area not exposed to weather and at temperature conditions recommended by manufacturer.
- C. Components should be a matched set (system) as supplied by the manufacturer.
- D. Use components within their labeled shelf-life.
- E. Use components as supplied with no site alterations or additions.

1.9 WARRANTY

- A. Refer to manufacturer's standard warranty terms

1.10 PROJECT CONDITIONS

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

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Polyurethane Spray Foam Insulation: ICYNENE ProSeal Eco™ (MD-R-210) by Icynene Inc.

2.2 MATERIALS

- A. General: Provide insulating materials that comply with requirements and with referenced standards.
- B. ICYNENE ProSeal Eco™ (MD-R-210) Spray Foam Insulation: Medium-density, water-blown, conforming to the following:
 - 1. Thermal Resistance (for 1 inch of material) (R-Value/inch @75 deg F): ASTM C 518; 4.86 hr.sq ft.degree F/BTU
 - 2. Air Permeance (for 1.3 inch of material): ASTM E 2178: <0.00049 L/s.m2 @75 Pa
 - 3. Water Vapor Transmission (for 2.5 inches of material): ASTM E 96; less than 1 perm
 - 4. Resistance to Fungal Growth: ASTM C 1338: no growth
 - 5. Flame Spread and Smoke Developed Rating: ASTM E 84
 - a. Flame Spread: Less than 20
 - b. Smoke Development: Less than 450
- C. Product Description:
 - 1. Collaborative for High-Performance Schools (CHPS) "Low-emitting material" per CA 01350 Criteria

2.3 SOURCE QUALITY CONTROL

- A. Product produced in an ISO 9001 registered factory.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, under which work is to be performed. Do not proceed until unsatisfactory conditions have been corrected.
 - 1. Review placement area to determine final location will not be within 3 inches of any heat source where the temperature will exceed 180 deg F per ASTM C 411 or in accordance with authorities having jurisdiction.

3.2 PREPARATION

- A. Clean substrates and cavities of loose materials capable of interfering with insulation placement.

3.3 APPLICATION

- A. Site mix liquid components supplied by Icynene and installed by Independent Icynene Licensed Dealer.
- B. Apply insulation to substrates in compliance with manufacturer's written instructions.
- C. Apply insulation to produce thickness required for indicated R Value. D. Extend insulation in thickness indicated to envelop entire area to be insulated. E. Water-Piping Coordination: If water piping is located within insulated exterior walls, coordinate location of piping to ensure that it is placed on warm side of insulation and insulation encapsulates piping.

3.4 REPAIRS

- A. Any repairs must be effected by an Icynene Licensed Contractor.

3.5 PROTECTION

- A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings where insulation is subject to abuse.

*****End of Section 07 21 29*****

SECTION 07 26 00 – PLASTIC VAPOR RETARDER

PART 1: GENERAL

1.01: General

- A. Conform to the general provisions of the Contract, General and Supplementary Conditions to the contract, Division One of this Specification, the Drawings and this Specification Section.
- B. Should conflict arise between the Drawings and the provisions of the Specifications, the Specifications shall govern.
- C. The contractor shall furnish all labor, materials, tools, equipment, and perform all work necessary for, or incidental to, the furnishing and installation, complete, of all plastic vapor retarders as shown on the drawings and as specified. All work shall be in accordance with the Contract Documents and completely coordinated with work of all other trades.
- D. Although such work is not specifically shown or specified, furnish and install all supplementary or miscellaneous items, appurtenances, and devices incidental to, or necessary for, a sound, secure, and complete installation.

1.02: Scope of Work (includes but is not necessarily limited to the following):

- A. General:
 - 1. Refer to the drawings for the extent of work.
 - 2. Inspect existing conditions and the work of other trades for suitable conditions before beginning the work of this section.
 - 3. Coordinate the work of this section with the work of other trades.
 - 4. Protect people, property, and the work of this section and other trades.
 - 5. Clean up work site and dispose of waste and debris on a daily basis.
- B. Scope:
 - 1. Products, Materials, and work included: Provide all material, tools, labor and equipment necessary for the installation of vapor retarder sheeting membrane overlaying prepared subgrade material or gravel fill, under interior concrete slabs on grade, and on the inside surfaces of insulated exterior walls.
 - 2. Although such work is not specifically shown or specified, furnish and install all supplementary or miscellaneous items, appurtenances, and devices incidental to, or necessary for, a sound, secure, and complete installation.

1.03: Related Work Specified Elsewhere

- A. Section 03 30 00, Cast-in-Place Concrete
- B. Section 07 20 00, Thermal Insulation
- C. Section 09 22 16, Non-Structural Metal Framing
- D. Section 09 29 00, Gypsum Wallboard and Sheathing

1.04: Regulatory Codes and Agencies

- A. Refer to Division 1

1.05: Standard Industry Specifications

- A. American Society for Testing and Materials (ASTM):
 - 1. D 882-91: Tensile Properties of Thin Plastic Sheeting, Test Methods
 - 2. D 96-94: Water Vapor Transmission of Materials, Test Methods
 - 3. E154-88 (R1993): Water Vapor Retarders Used in Contact with Earth under Concrete Slabs, on Walls, or as Ground Cover, Test Methods

1.06: Submittals

- A. Make all submittals in accordance with Division 1.
- B. Product Data:
 - 1. Submit manufacturer's published literature for specified products and accessories as applicable, including manufacturer's specifications, physical characteristics and performance data.
 - 2. Submit manufacturer's installation instructions

1.07: Quality Control

- A. Obtain all materials of each type from a single manufacturer, unless otherwise approved by the Architect in writing.

1.08: Product Delivery, Storage, and Handling

- A. Deliver materials in original packages bearing manufacturer's labels identifying material and storage and handling recommendations.
- B. Store and handle sheeting material to prevent puncturing or tearing.

1.09: Project Conditions

- A. Begin placing vapor retarder only after substrate construction has been completed satisfactorily and drains and other projections are installed.
- B. For underslab installations, level and compact subgrade and gravel base immediately before placing sheeting.

PART 2: PRODUCTS

2.01: Materials

- A. Vapor Retarder Sheeting for use under concrete slabs
 - 1. 8 mil polyethylene vapor barrier
 - 2. Abrasion and puncture resistant and is resistant to deterioration;
 - 3. Meets or exceeds requirements of ASTM E 1745-96, Class C, Standard Specification for Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs
 - 4. Sandwich composition of non-woven geotextile laminated with polyethylene to polymer film.
 - 5. Perm Rating: 0.10 per ASTM F 1249.
 - 6. Tensile Strength: Not less than 29 lbf/inch, 22lbf/inch CD, per ASTM E 154, Section 9.
 - 7. Approved manufacturer/product: Fortifiber Moistop Plus Underslab Vapor Retarder or equal compliant with the requirements of this specification.
- B. Pressure sensitive tape for use with underslab sheets:
 - 1. Special pressure-sensitive plastic tape furnished by manufacturer of vapor retarder sheeting to be compatible with polyethylene surfaces.
 - 2. Approved product/manufacturer: Fortifiber #495 Moistop Vapor Barrier Tape.
- C. Plastic Vapor Retarder for use on walls where concealed by interior finish
 - 1. 6 mil polyethylene sheeting
 - 2. Approved product/manufacturer: Visqueen or equal.
- D. Vapor Barrier Tape
 - 1. Heavy duty, 3-inch wide laminate consisting of 0.00035-inch aluminum foil-glass fiber reinforced two- or three- directional patterned Kraft paper with pressure-sensitive adhesive protected by strippable liner.
 - 2. U.L. listed
 - 3. Approved products/manufacturers:
 - a. Two-directional: FasTape 0820 FR-FSK (10.0 mils thick) by Fasson, or equal.
 - b. Three-directional: FasTape 0821 FR-FSK (11.8 mils thick) by Fasson, or equal.
 - 4. Product used to be compatible with vapor barrier material where applied.
 - 5. Adhesion failure of tape to any surface to be augmented by additional application of "Spray Trim Adhesive" No. 82130-1, as manufactured by Norton, or equal, to surfaces to be attached.
- E. Plastic vapor retarder for use in plenums or where exposed
 - 1. Flamespread 25 or less
 - 2. Griffolyn Type 55 FR or equal

PART 3: EXECUTION

3.01: Inspection

- A. Verify that project conditions are satisfactory to receive the vapor retarder sheeting.
- B. Do not commence installation until underlying conditions are satisfactory for work to proceed. Proceeding with work indicates acceptance of underlying conditions as satisfactory.

3.02: Coordination

- A. Coordinate all work involving material, labor and equipment of other trades penetrating, underlying, or overlaying the work of this section so that each trade's work can be installed, erected or fabricated as designed and required in the drawings and so that the work space be maintained and left clean and safe.

3.03: Installation

- A. Underslab Applications
 - 1. Install vapor retarder over compacted subgrade and compacted gravel base in accordance with manufacturer's directions and recommendations. Vapor barrier to be located immediately below floor slabs and above gravel base.
 - 2. Place sheeting in position with longest dimension parallel with the direction of the pour. Lay with minimum number of joints.
 - a. Lap joints 6 inches.
 - b. Seal lapped joints and patches with manufacturer's recommended pressure-sensitive tape.
 - c. Turn up edges at vertical surfaces, not less than 4 inches.
 - 3. Exercise extreme care to avoid puncturing or tearing sheeting during installation. Patch punctures and tears.
 - 4. Ensure there is no standing water on membrane at time of concrete placement.
- B. Wall applications
 - 1. Fasten to walls on conditioned side of insulation
 - 2. Lap edges min. 6 inches
 - 3. Seal all seams and openings with manufacturer's recommended tape

3.04: Cleaning and Adjustment

- A. Remove any foreign matter from surface of sheet.
- B. Ensure that seams are tightly sealed and that no punctures or tears exist in sheet. Repair any punctures or tears.

3.05: Clean Up

- A. At the end of each day's work and at final completion, the site shall be free of all waste materials and equipment used by the Contractor. Remove all waste materials and debris and dispose of in a legal and safe manner.

- B. The Contractor shall be responsible for maintaining a clean work place and shall pay for all costs, at no additional expense to the Owner, should outside labor and equipment be used to clean up the work site.
- C. Prevent waste materials from entering and accumulating in the storm drainage system and on adjacent property.

*****End of Section 07 26 00*****

SECTION 07 27 19 – PLASTIC SHEET AIR BARRIERS

PART 1: GENERAL

1.01: General

- A. Conform to the general provisions of the Contract, General and Supplementary Conditions to the contract, Division One of this Specification, the Drawings and this Specification Section.
- B. Should conflict arise between the Drawings and the provisions of the Specifications, the Specifications shall govern.
- C. The contractor shall furnish all labor, materials, tools, equipment, and perform all work necessary for, or incidental to, the furnishing and installation, complete, of all weather resistive barriers as shown on the drawings and as specified. All work shall be in accordance with the Contract Documents and completely coordinated with work of all other trades.
- D. Although such work is not specifically shown or specified, furnish and install all supplementary or miscellaneous items, appurtenances, and devices incidental to, or necessary for, a sound, secure, and complete installation.

1.02: Scope of Work (includes but is not necessarily limited to the following):

- A. General:
 - 1. Refer to the drawings for the extent of work to be done.
 - 2. Inspect existing conditions and the work of other trades for proper conditions before the work of this section begins.
 - 3. Coordinate the work of this section with the work of other trades.
 - 4. Protect people, property, and the work of this section and other trades.
 - 5. Clean up work site and dispose of waste and debris on a daily basis.
- B. Scope:
 - 1. Products, Materials, and work included: Provide all material, tools, labor and equipment necessary for the installation of air infiltration barriers on the exterior side of exterior wall sheathing beneath stucco, simulated stone, and other siding.
 - 2. Although such work is not specifically shown or specified, furnish and install all supplementary or miscellaneous items, appurtenances, and devices incidental to, or necessary for, a sound, secure, and complete installation.

1.03: Related Work Specified Elsewhere

- A. Section 07 26 00, Plastic Vapor Barrier
- B. Section 07 20 00, Thermal Insulation
- C. Section 09 22 16, Non-Structural Metal Framing
- D. Section 09 29 00, Gypsum Wallboard and Sheathing

1.04: Regulatory Codes and Agencies

- A. Refer to Division 1

1.05: Standard Industry Specifications

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM E-96-90 "Standard Test Methods for Water Transmission of Materials"
 - 2. ASTM E-1677-95 "Standard Specification for an Air Retarder (AR) Material or System for Low-Rise Framed Building Walls."
- B. AATCC-127 "Hydrostatic Head Test"

1.06: Submittals

- A. Make all submittals in accordance with Division 1.
- B. Product Data:
 - 1. Submit manufacturer's published literature for specified products and accessories as applicable, including manufacturer's specifications, physical characteristics, test results, and performance data.
 - 2. Submit manufacturer's installation instructions

1.07: Quality Control

- A. Obtain all materials of each type from a single manufacturer, unless otherwise approved by the Architect in writing.

1.08: Product Delivery, Storage, and Handling

- A. Deliver materials in original packages bearing manufacturer's labels identifying material and storage and handling recommendations.
- B. Store and handle sheeting material to prevent puncturing or tearing.
- C. Store undercover. Protect from excessive exposure to sunlight according to manufacturer's directions.

1.09: Project Conditions

- A. Begin placing vapor retarder only after substrate construction has been completed satisfactorily.
- B. Proceeding with installation indicates acceptance of conditions as satisfactory.

PART 2: PRODUCTS

2.01: Air and Water Resistant Barrier

- A. Spunbonded olefin, Non-woven, non-perforated
- B. Performance characteristics:

1. ASTM E1677 Type 1 Air Retarder. Air leakage at 25 mph (75 Pa) wind pressure of less than 0.6 cfm/ft².
 2. Water Vapor Transmission of greater than 20 perms in accordance with ASTM E-96-90, Method B.
 3. Water penetration resistance of 200 cm on hydrostatic head in accordance with AATCC-127.
- C. Approved Manufacturer/Product
1. Tyvek StuccoWrap by DuPont Company, Wilmington, DE or equal as approved by Architect

2.2: Sealing Tape/Fasteners

- A. Approved Tape Manufacturers
1. DuPont Contractor Tape, by DuPont Company, Wilmington, DE
- B. Recommended Fasteners for steel frame construction
1. Rust resistant screws with washers.

PART 3: EXECUTION

3.01: Inspection

- A. Verify that project conditions are satisfactory to receive the vapor retarder sheeting.
- B. Do not commence installation until underlying conditions are satisfactory for work to proceed. Proceeding with work indicates acceptance of underlying conditions as satisfactory.

3.02: Coordination

- A. Coordinate all work involving material, labor and equipment of other trades penetrating, underlying, or overlaying the work of this section so that each trade's work can be installed, erected or fabricated as designed and required in the drawings and so that the work space is maintained and left clean and safe.

3.03: Installation

- A. Install in accordance with manufacturer's instructions over exterior sheathing and under foam board. Seal joints and penetrations through air infiltration barrier with specified tape and fasteners prior to installation of finish material. Air infiltration barrier shall be air tight and free from holes, tears, and punctures. All window and door penetrations are to be flashed and sealed per manufacturer instructions.

3.05: Clean Up

- A. At the end of each day's work and at final completion, the site shall be free of all waste materials and equipment used by the Contractor. Remove all waste materials and debris and dispose of in a legal and safe manner.

- B. The Contractor shall be responsible for maintaining a clean work place and shall pay for all costs, at no additional expense to the Owner, should outside labor and equipment be used to clean up the work site.
- C. Prevent waste materials from entering and accumulating in the storm drainage system and on adjacent property.

*****End of Section 07 27 19*****

SECTION 07 30 00 – ICE AND WATER SHIELD

PART 1: GENERAL

1.01: Description

- A. The Contractor shall furnish all labor, materials, tools, equipment and perform all Work and services necessary for, or incidental to, the furnishing and installation, complete, of all work of this section, as shown on Drawings and as specified, in accordance with the Provisions of the Contract Documents, and completely coordinated with the Work of all other trades.
- B. 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.
- C. Roofing and Sheet Metal Contractor shall be one and the same.
- D. Verify suitability of roof structure system and roof deck support prior to installation.

1.02: Related Work Specified Elsewhere

- A. Section 07 20 00: Thermal Insulation
- B. Section 07 21 29: Sprayed Insulation
- C. Section 07530: TOP Roofing

1.03: Reference Standards

- A. ASTM D412 Standard Test Methods for Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers in Tension
- B. ASTM D461 Standard Test Methods for Felt
- C. ASTM D903 Standard Test Method for Peel or Stripping of Adhesive Bonds
- D. ASTM D1970 Standard Specification for Self-Adhering Polymer-modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection
- E. ASTM D3767 Standard Practice for Rubber-Measurement of Dimensions
- F. ASTM E96 Standard Test Methods for Water Vapor Transmission of Materials
- G. ASTM E108 Standard Test Methods for Fire Tests of Roof Coverings

1.02: Quality Assurance

- A. Provide materials and roofing system which are labeled by UL for Class “A” Rating.

1.03: Submittals

- A. Installation instructions and recommendations from manufacturer.
- B. Certification substantiating that materials comply with requirements.

1.04: Product Delivery, Storage, and Handling

- A. Stage delivery to avoid long on-site storage or delays.
- B. Store materials off ground, protected from weather.
- C. Handle materials in accordance with manufacturer's recommendations.

1.05: Job Conditions

- A. Do not overload structure with stored materials or by use of heavy equipment on deck.
- B. Examine substrate and conditions. If unsatisfactory conditions are found, do not proceed until those conditions have been corrected. Proceeding with work indicates acceptance of underlying conditions.
- C. Proceed with Work only when weather conditions are within Manufacturer's recommended limitations, and when conditions will permit Work to proceed in accordance with Specification Requirements and Manufacturer's recommendations.

1.06: Scope

- A. Install underlayment in the following locations
 - 1. Along all sloped roof edges.
 - 2. Valleys.
 - 3. Ridges.
 - 4. Junction of roof deck and walls extending above roof.
 - 5. Other areas vulnerable to wind-driven rain.
 - 6. As shown on drawings.

PART 2: PRODUCTS

2.01: Approved Manufacturers

- A. Grace Construction Products
- B. Other manufacturers desiring approval shall comply with requirements of Division 1.

2.02: Products

- A. Grace Ice and Water Shield

PART 3: EXECUTION

3.01: Examination

- A. Inspect installation area prior to beginning work to verify suitability of conditions and underlying work.

3.02: Surface Preparation

- A. Install directly on substrate as shown on drawings.
- B. Remove dust, dirt, loose nails, and debris.
- C. Remove protrusions from roof deck.
- D. Repair any voids, damaged, or supported areas prior to installing underlayment.

3.03: Job Conditions

- A. Apply only in fair weather with air, roof deck, and membrane temperatures above 40 degrees.
- B. Install roof covering material at temperatures of 40 degrees or higher.

3.04: Membrane Installation

- A. Roof edge installation:
 - 1. Cut membrane into 10-foot to 15-foot lengths and reroll loosely.
 - 2. Peel back one to two feet of release liner, align the membrane, and continue to peel the release liner from the membrane.
 - 3. Press membrane in place with heavy hand pressure.
 - 4. Side laps must be a minimum of 3 ½" and end laps must be a minimum of 6".
- B. Valley and Ridge Application
 - 1. Peel release liner.
 - 2. Center sheet of the valley or ridge, drape, and press in place.
 - 3. Work from the center of the valley or ridge outward in each direction.
 - 4. Start at the low point and work up the roof.
- C. Alternative Method
 - 1. Unroll a 3-foot to 6-foot starter strip, leaving the release liner in place.
 - 2. Align the membrane and roll in the intended direction of membrane application.
 - 3. Carefully cut the release liner on top of the full roll in the cross direction being careful not to cut the membrane.
 - 4. Peel back about 6" of the release liner in the opposite direction of the intended membrane application exposing the black adhesive.
 - 5. Hold the release liner with one hand and pull the roll along the deck with the release liner, leaving the starter strip behind. Use the other hand to apply pressure on the top of the roll.
 - 6. Press the membrane in place with heavy hand pressure frequently.
 - 7. When finished with the roll, go back to the beginning, reroll it, and pull the remaining release paper from the material, finishing with the installation.
- D. Install membrane so that all laps shed water.
- E. Work from the low point to the high point of the roof.
- F. Apply membrane in valleys before applying to eaves.
- G. Membrane may be installed either horizontally or vertically.

- H. If nailing of membrane is necessary on steep slopes during hot weather, back-nail and cover the nails by overlapping with the next sheet.
- I. Install one width of membrane along eaves and elsewhere unless otherwise indicated.
- J. Place metal drip edges over the membrane.

3.05: Clean Up

- A. At the end of each day's work and at final completion, the site shall be free of all waste materials and equipment used by the Contractor. Remove all waste materials and debris and dispose of in a legal and safe manner.
- B. Clean up release liner as expeditiously as possible. Release liner is slippery and may be hazardous in steep roof working conditions.
- C. The Contractor shall be responsible for maintaining a clean work place and shall pay for all costs, at no additional expense to the Owner, should outside labor and equipment be used to clean up the work site.
- D. Prevent waste materials from entering and accumulating in the storm drainage system and on adjacent property.

*****End of Section 07 30 00*****

SECTION 07 31 13 - ASPHALT SHINGLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Asphalt shingles.
 - 2. Underlayment.
 - 3. Ridge vents.
 - 4. Associated metal flashings.
- B. Related Sections:
 - 1. Division 06 Section "Roofing Carpentry" for wood framing.
 - 2. Division 06 Section "Sheathing" for roof-deck wood structural panels and roof sheathing.
 - 3. Division 07 Section "Preparation for Roof Replacement".
 - 4. Division 07 Section "Sheet Metal Flashing and Trim" for metal roof penetration flashings and counterflashings.
 - 5. Division 07 Section "Roof Accessories" for ridge vents.

1.3 DEFINITION

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

1.4 UNIT PRICES - MEASUREMENT AND PAYMENT

- A. Installation of Asphalt Shingle Roofing:
 - 1. Basis of Measurement: By Square (100 square feet).
 - 2. Basis of Payment: Includes sheet materials, bituminous materials, roof shingles, and accessories.

1.5 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. A 361 - Sheet Steel, Zinc-Coated (Galvanized) by the Hot-Dip Process for Roofing and Siding.
 - 2. D 228 - Testing Asphalt Roll Roofing, Cap Sheets and Shingles.
 - 3. D 2178 - Asphalt Impregnated Glass (Felt) Mat Used in Roofing and Waterproofing.
 - 4. D 2822 - Asphalt Roof Cement.
 - 5. D 3018 - Class A Asphalt Shingles Surfaced with Mineral Granules
 - 6. D 3161 - Test for Wind-Resistance of Asphalt Shingles (Fan-Induced Method).
 - 7. D 3462 - Asphalt Shingles Made from Glass Felt and Surfaced with Mineral Granules.
 - 8. D 4586 - Asphalt Roof Cement, Asbestos-Free.
 - 9. D 4869 - E 108 - Test Methods for Fire Tests of Roof Coverings.
- B. Factory Mutual (FM):
 - 1. Roof Assembly Classifications

2. Construction Bulletins.

- C. Sheet Metal and Air Conditioning Contractor's National Association (SMACNA): Architectural Sheet Metal Manual.
- D. National Roofing Contractors Association (NRCA):
1. Manual of Roof Maintenance and Roof Repair.
 2. Steep Roofing Manual.
- E. Underwriters Laboratories (UL):
1. Fire Hazard Classifications.
 2. UL 580 - Tests for Wind Uplift Resistance of Roof Assemblies.
 3. UL 790 - Tests for Fire Resistance of Roof Covering Materials.

1.6 SUBMITTALS

- A. Product List: Submit list of proposed Products and manufacturers, including all items specified in Part 2 – Products or otherwise required by the Work.
- B. Shop Drawings: Indicate specially configured metal flashings, joint locations, fastening locations, and installation details.
- C. Product Data: For each type of product indicated.
- D. Samples for Initial Selection: For each type of asphalt shingle ridge and hip cap shingles and ridge vent.
1. Include similar Samples of trim and accessories involving color selection.
- E. Samples for Verification: For the following products, of sizes indicated, to verify color selected:
1. Asphalt Shingle: Full size.
 2. Ridge and Hip Cap Shingles: Full size.
 3. Ridge Vent: 12-inch- long Sample.
 4. Exposed Valley Lining: 12 inches square.
 5. Self-Adhering Underlayment: 12 inches square.
- F. Qualification Data: For qualified Installer.
- G. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for asphalt shingles.
- H. Research/Evaluation Reports: For each type of asphalt shingle required, from the ICC.
- I. Windstorm Inspection Forms: Copies of Texas Department of Insurance (TDI) Inspection Verification (WPI-2-BC-5) and Application for Certification of Compliance (WPI-1) Forms indicating completed roofing installation meets TDI requirements for the Texas Windstorm Insurance Association.
- J. Maintenance Data: For each type of asphalt shingle to include in maintenance manuals.
- K. Warranties: Sample of special warranties.

1.7 QUALITY ASSURANCE

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

- B. Source Limitations: Obtain ridge and hip cap shingles and **ridge vents** from single source from single manufacturer.
- C. Fire-Resistance Characteristics: Where indicated, provide asphalt shingles and related roofing materials identical to those of assemblies tested for fire resistance per test method below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify products with appropriate markings of applicable testing agency.
 - 1. Exterior Fire-Test Exposure: Class A ; ASTM E 108 or UL 790, for application and roof slopes indicated.
- D. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Build mockups for asphalt shingles including related roofing materials.
 - a. Size: 15 feet long by 15 feet wide.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- E. Preinstallation Conference: Conduct conference at Project site.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Store roofing materials in a dry, well-ventilated, weathertight location according to asphalt shingle manufacturer's written instructions. Store underlayment rolls on end on pallets or other raised surfaces. Do not double stack rolls.
 - 1. Handle, store, and place roofing materials in a manner to avoid significant or permanent damage to roof deck or structural supporting members.
- B. Protect unused underlayment from weather, sunlight, and moisture when left overnight or when roofing work is not in progress.

1.9 WARRANTY

- A. Special Warranty: Standard form in which manufacturer agrees to repair or replace asphalt shingles that fail in materials[**or workmanship**] within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Manufacturing defects.
 - b. Structural failures including failure of asphalt shingles to self-seal after a reasonable time.
 - 2. Material Warranty Period: 30 years from date of Substantial Completion, prorated, with first five years non-prorated.
 - 3. Wind-Speed Warranty Period: Asphalt shingles will resist blow-off or damage caused by wind speeds up to 75 mph for five years from date of Substantial Completion.
 - 4. Algae-Discoloration Warranty Period: Asphalt shingles will not discolor for 10 years from date of Substantial Completion.
 - 5. Workmanship Warranty Period: 10 years from date of Substantial Completion.

- B. Special Project Warranty: Roofing Installer's Warranty, signed by roofing Installer, covering the Work of this Section, in which roofing Installer agrees to repair or replace components of asphalt shingle roofing that fail in materials or workmanship within specified warranty period.

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

1.10 EXTRA MATERIALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Asphalt Shingles: 300 sq. ft of each type, in unbroken bundles.

PART 2 - PRODUCTS

2.1 GLASS-FIBER-REINFORCED ASPHALT SHINGLES

- A. Laminated-Strip Asphalt Shingles: ASTM D 3462, laminated, multi-ply overlay construction, glass-fiber reinforced, mineral-granule surfaced, and self-sealing.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:

2. Basis-of-Design Product: Subject to compliance with requirements, provide GAF Timberline Ultra HD shingles to match existing, or comparable product by one of the following:

- a. Atlas Roofing Corporation.
- b. IKO.
- c. Owens Corning.
- d. TAMKO Roofing Products, Inc.

3. Butt Edge: Straight cut.

4. Strip Size: Manufacturer's standard.

5. Algae Resistance: Granules treated to resist algae discoloration.

6. Color and Blends: As selected by Architect from manufacturer's full range.

- B. Hip and Ridge Shingles: Manufacturer's standard units to match asphalt shingles. Trim each side of lapped portion of unit to taper approximately 1 inch.

2.2 UNDERLAYMENT MATERIALS

- A. Felt: ASTM D 4869, Type II, fiberglass reinforced, non-perforated, asphalt-saturated felts.

- B. Self-Adhering Sheet Underlayment, High Temperature: Minimum of 30- to 40-mil- thick, slip- resisting, polyethylene-film-reinforced top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release paper backing; cold applied. Provide primer for adjoining concrete or masonry surfaces to receive underlayment.

1. Thermal Stability: Stable after testing at 240 deg F; ASTM D 1970.

2. Low-Temperature Flexibility: Passes after testing at minus 20 deg F; ASTM D 1970.

3. Basis-of-Design Product: Subject to compliance with requirements, provide one of the following:

- a. Grace, W. R. & Co. Grace Ultra
- b. Henry Company.- Blue PF200HT

- C. Granular-Surfaced Valley Lining: ASTM D 3909, mineral-granular-surfaced, glass-felt-based, asphalt

2.3 RIDGE VENTS

- A. Rigid Ridge Vent: Manufacturer's standard, rigid section high-density polypropylene or other UV-stabilized plastic ridge vent with nonwoven geotextile filter strips and external deflector baffles; for use under ridge shingles.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Air Vent, Inc.; a Gibraltar Industries company.
 - b. Cor-A-Vent, Inc.
 - c. GAF Materials Corporation.
 - d. Lomanco, Inc.
 - e. Owens Corning.
 - f. Trimline Building Products.

2.4 ACCESSORIES

- A. Asphalt Roofing Cement: ASTM D 4586, Type II, asbestos free.
- B. Roofing Nails: ASTM F 1667; aluminum, stainless-steel, or hot-dip galvanized-steel wire shingle nails, minimum 0.120-inch- diameter, barbed shank, sharp-pointed, with a minimum 3/8-inch- diameter flat head and of sufficient length to penetrate 3/4 inch into solid wood decking or extend at least 1/8 inch through OSB or plywood sheathing.
 1. Where nails are in contact with metal flashing, use nails made from same metal as flashing.
- C. Felt Underlayment Nails: Aluminum, stainless-steel, or hot-dip galvanized-steel wire with low- profile capped heads or disc caps, 1-inch minimum diameter.

2.5 METAL FLASHING AND TRIM

- A. General: Comply with requirements in Division 07 Section "Sheet Metal Flashing and Trim."
 1. Sheet Metal: Zinc-tin alloy-coated steel; Aluminum, mill finished.
- B. Fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item.
 1. Apron Flashings: Fabricate with lower flange a minimum of 4 inches over and 4 inches beyond each side of downslope asphalt shingles and 6 inches up the vertical surface.
 2. Step Flashings: Fabricate with a headlap of 2 inches and a minimum extension of 5 inches over the underlying asphalt shingle and up the vertical surface.
 3. Cricket Flashings: Fabricate with concealed flange extending a minimum of 18 inches 24 inches beneath upslope asphalt shingles and 6 inches beyond each side of chimney, skylight, etc., and 6 inches above the roof plane.
 4. Drip Edges: Fabricate in lengths not exceeding 10 feet with 2-inch roof-deck flange and 1-1/2-inch fascia flange with 3/8-inch drip at lower edge.
- C. Vent Pipe Flashings: ASTM B 749, Type L51121, at least 1/16 inch thick. Provide lead sleeve sized to slip over and turn down into pipe, soldered to skirt at slope of roof, and extending at least 4 inches from pipe onto roof.

PART 3 - EXECUTION**3.1 EXAMINATION**

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

3.2 UNDERLAYMENT INSTALLATION

- A. General: Comply with underlayment manufacturer's written installation instructions applicable to products and applications indicated unless more stringent requirements apply.
- B. Single-Layer Felt Underlayment: Install on roof deck parallel with and starting at the eaves. Lap sides a minimum of 2 inches over underlying course. Lap ends a minimum of 4 inches. Stagger end laps between succeeding courses at least 72 inches. Fasten with **roofing** nails.
 - 1. Install felt underlayment on roof deck not covered by self-adhering sheet underlayment. Lap sides of felt over self-adhering sheet underlayment not less than 3 inches in direction to shed water. Lap ends of felt not less than 6 inches over self-adhering sheet underlayment.
 - 2. Install fasteners at no more than 36 inch o.c.
 - 3. Terminate felt underlayment extended up not less than 4 inches against sidewalls, curbs, chimneys, and other roof projections.
 - 4. Install fasteners at no more than 36 inch o.c.
- C. Self-Adhering Sheet Underlayment: Install, wrinkle free, on roof deck. Comply with low-temperature installation restrictions of underlayment manufacturer if applicable. Install **at locations indicated below** lapped in direction to shed water. Lap sides not less than 3-1/2 inches. Lap ends not less than 6 inches staggered 24 inches between courses. Roll laps with roller. Cover underlayment within seven days.
 - 1. Prime concrete and masonry surfaces to receive self-adhering sheet underlayment.
 - 2. Eaves: Extend from edges of eaves 24 inches beyond interior face of exterior wall.
 - 3. Rakes: Extend from edges of rake 24 inches beyond interior face of exterior wall.
 - 4. Valleys: Extend from lowest to highest point 18 inches on each side.
 - 5. Hips: Extend 18 inches on each side.
 - 6. Ridges: Extend 36 inches on each side without obstructing continuous ridge vent slot.
 - 7. Sidewalls: Extend beyond sidewall **18 inches**, and return vertically against sidewall not less than **4 inches**.
 - 8. Dormers, Chimneys, Skylights, and Other Roof-Penetrating Elements: Extend beyond penetrating element 18 inches and return vertically against penetrating element not less than 4 inches.
 - 9. Roof Slope Transitions: Extend 18 inches on each roof slope.
- D. Closed-Cut Valley Lining: Comply with NRCA's recommendations. Install a 36-inch- wide felt underlayment centered in valley. Fasten to roof deck with roofing nails.

1. Lap roof-deck felt underlayment over valley felt underlayment at least 6 inches.
2. Install a 36-inch- wide strip of granular-surfaced valley lining centered in valley, with granular-surface face up. Lap ends of strips at least 12 inches in direction to shed water, and seal with asphalt roofing cement. Fasten to roof deck with roofing nails.

3.3 METAL FLASHING INSTALLATION

- A. General: Install metal flashings and other sheet metal to comply with requirements in Division 07 Section "Sheet Metal Flashing and Trim."
 1. Install metal flashings according to recommendations in ARMA's "Residential Asphalt Roofing Manual" and asphalt shingle recommendations in NRCA's "The NRCA Roofing and Waterproofing Manual."
- B. Apron Flashings: Extend lower flange over and beyond each side of downslope asphalt shingles and up the vertical surface.
- C. Step Flashings: Install with a headlap of 2 inches and extend over the underlying asphalt shingle and up the vertical surface. Fasten to roof deck only.
- D. Cricket Flashings: Install against the roof-penetrating element extending concealed flange beneath upslope asphalt shingles and beyond each side.
- E. Rake Drip Edges: Install rake drip edge flashings over underlayment and fasten to roof deck.
- F. Eave Drip Edges: Install eave drip edge flashings below underlayment and fasten to roof sheathing.
- G. Pipe Flashings: Form flashing around pipe penetrations and asphalt shingles. Fasten and seal to asphalt shingles as recommended by manufacturer.

3.4 ASPHALT SHINGLE INSTALLATION

- A. General: Install asphalt shingles according to manufacturer's written instructions, recommendations in ARMA's "Residential Asphalt Roofing Manual," and asphalt shingle recommendations in NRCA's "The NRCA Roofing and Waterproofing Manual."
- B. Install starter strip along lowest roof edge, consisting of an asphalt shingle strip at least 7 inches wide with self-sealing strip face up at roof edge.
 1. Extend asphalt shingles 3/4 inch over fascia at eaves and rakes.
 2. Install starter strip along rake edge.
- C. Install first and remaining courses of asphalt shingles stair-stepping diagonally across roof deck with manufacturer's recommended offset pattern at succeeding courses, maintaining uniform exposure.
- D. Fasten asphalt shingle strips with a minimum of **four** roofing nails located according to manufacturer's written instructions.
 1. Where roof slope is less than 4:12, seal asphalt shingles with asphalt roofing cement spots.
 2. When ambient temperature during installation is below 40 deg F, seal asphalt shingles with asphalt roofing cement spots.
- E. Closed-Cut Valleys: Extend asphalt shingle strips from one side of valley 12 inches beyond center of valley. Use one-piece shingle strips without joints in valley. Fasten with extra nail in upper end of shingle. Install asphalt shingle courses from other side of valley and cut back to a

straight line 2 inches short of valley centerline. Trim upper concealed corners of cut-back shingle strips.

1. Do not nail asphalt shingles within 6 inches of valley center.
2. Set trimmed, concealed-corner asphalt shingles in a 3-inch- wide bed of asphalt roofing cement.

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

G. Ridge and Hip Cap Shingles: Maintain same exposure of cap shingles as roofing shingle exposure. Lap cap shingles at ridges to shed water away from direction of prevailing winds. Fasten with roofing nails of sufficient length to penetrate sheathing.

1. Fasten ridge cap asphalt shingles to cover ridge vent without obstructing airflow.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Owner retains the option to engage a qualified testing agency to perform tests and inspections and to prepare test reports.

B. Field inspection and testing will be performed under provisions of Division 01 Section "Quality Requirements".

C. Upon substantial completion, Owner may have Work inspected using appropriate means to establish conditions of completed Project.

D. Correct identified defects or irregularities. Remove and repair defects before end of each day.

E. Do not perform demolition during roofing operations.

F. Repair or remove and replace components of roofing system where inspections indicate that they do not comply with specified requirements.

G. Repair or remove and replace components of membrane roofing system where inspections indicate that they do not comply with specified requirements.

H. Roofing system will be considered defective if it does not pass tests and inspections.

1. Perform additional testing and inspecting, at Contractor's expense, to determine if replaced or additional work complies with specified requirements.

3.6 PROTECTING AND CLEANING

A. Protect installed roofing system from damage and wear during remainder of construction period. When remaining construction will not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.

B. Correct deficiencies in or remove roofing system that does not comply with requirements; repair substrates; and repair or reinstall roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.

C. In areas where finished surfaces are soiled by adhesives, asphalt, or any other source of soiling caused by work of this Section, consult manufacturer of surfaces for cleaning advice and conform to their documented instructions.

- D. Repair or replace defaced or disfigured finishes caused by Work of this Section.

3.7 ROOFING INSTALLER'S WARRANTY

- A. WHEREAS the roofing sub-contractor herein called the "Roofing Installer," has performed roofing and associated work ("work") on the following project:
1. Owner:
 2. Address:
 3. Building Name/Type:
 4. Address:
 5. Area of Work:
 6. Acceptance Date:
 7. Warranty Period:
 8. Expiration Date:
- B. AND WHEREAS Roofing Installer has contracted (either directly with Owner or indirectly as a subcontractor) to warrant said work against leaks and faulty or defective materials and workmanship for designated Warranty Period,
- C. NOW THEREFORE Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period he will, at his own cost and expense, make or cause to be made such repairs to or replacements of said work as are necessary to correct faulty and defective work and as are necessary to maintain said work in a watertight condition.
- D. This Warranty is made subject to the following terms and conditions:
1. Specifically excluded from this Warranty are damages to work and other parts of the building, and to building contents, caused by:
 - a. Lightning;
 - b. Peak gust wind speed exceeding 75 mph;
 - c. Fire;
 - d. Failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;
 - e. Faulty construction of parapet walls, copings, chimneys, skylights, vents, equipment supports, and other conditions and penetrations of the work;
 - f. Vapor condensation on bottom of roofing; and
 - g. Activity on roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner.
 2. When work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Roofing Installer and until cost and expense thereof have been paid by Owner or by another responsible party so designated.
 3. Roofing Installer is responsible for damage to work covered by this Warranty but is not liable for consequential damages to building or building contents resulting from leaks or faults or defects of work.
 4. During Warranty Period, if Owner allows alteration of work by anyone other than Roofing Installer, including cutting, patching, and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty shall become null and void on date of said alterations, but only to the extent said alterations affect work covered by this Warranty. If Owner engages Roofing Installer to perform said alterations, Warranty shall not become null and void unless Roofing Installer, before starting said work, shall have notified Owner in writing, showing reasonable cause for claim, that said alterations would likely damage or deteriorate work, thereby reasonably justifying a limitation or termination of this Warranty.
 5. During Warranty Period, if original use of roof is changed and it becomes used for, but was not originally specified for, a promenade, work deck, spray-cooled surface, flooded basin, or

other use or service more severe than originally specified, this Warranty shall become null and void on date of said change, but only to the extent said change affects work covered by this Warranty.

6. Owner shall promptly notify Roofing Installer of observed, known, or suspected leaks, defects, or deterioration and shall afford reasonable opportunity for Roofing Installer to inspect work and to examine evidence of such leaks, defects, or deterioration.
7. This Warranty is recognized to be the only warranty of Roofing Installer on said work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Installer of responsibility for performance of original work according to requirements of the Contract Documents, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's General Contractor.

END OF SECTION 07 31 13

SECTION 07 46 46 – FIBER CEMENT SIDING AND TRIM

PART 1 GENERAL

1.0 SCOPE

- A. Furnish and install fiber-cement siding, panels, soffit, trim and accessories where shown on drawings or as specified herein.
- B. Coordinate this section with interfacing and adjoining work for proper sequence of installation.
- C. Work in other sections affecting this work:
 - 1. Section 06 10 00 – Rough Carpentry: Framing and Sheathing
 - 2. Section 07 27 19 – Plastic Sheet Air Barriers.
 - 3. Section 09 90 00 - Painting. Painting trim.
 - 4. Section 09 29 00 - Gypsum Wallboard and Sheathing

1.1 REFERENCES

- A. ASTM D3359 - Standard Test Method for Measuring Adhesion by Tape Test, Tool and Tape.
- B. ASTM E136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 degrees C.

1.2 SUBMITTALS

- A. Submit under provisions of Section 01 33 23.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
- C. Shop Drawings: Provide detailed drawings of applications for cementitious siding.
- D. Selection Samples: For each finish product specified, three complete sets of color chips representing manufacturer's full range of available colors and patterns.
- E. Verification Samples: For each finish product specified, three samples, minimum size 4 by 6 inches, representing actual product, color, and patterns.

1.3 QUALITY ASSURANCE

- A. Installer Qualifications: Minimum of 2 years of experience with installation of similar products.
- B. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.

1. Finish areas designated by Architect.
2. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.
3. Refinish mock-up area as required to produce acceptable work.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store siding on edge or lay flat on a smooth level surface. Protect edges and corners from chipping. Store sheets under cover and keep dry prior to installing.
- C. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.5 PROJECT CONDITIONS

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

1.6 WARRANTY

- A. Product Warranty: Limited product warranties.
 1. Lap siding for 30 years.
 2. Vertical siding for 30 years.
 3. Soffit panels for 30 years.
 4. Trim boards for 15 years.
- B. Finish Warranty: Limited product warranty against manufacturing finish defects.
 1. Color finish 15 years.
 2. Finish warranty includes the coverage for labor and material.
- C. Workmanship Warranty: Application limited warranty for 2 years.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: James Hardie Building Products, Inc., 26300 La Alameda Suite 400 Mission Viejo, CA 92691; Toll Free Tel: 866-274-3464; Web: www.jameshardiecommercial.com
- B. Requests for approval of equal substitutions will be considered in accordance with provisions of Section 00 43 25.

2.2 SIDING

- A. HardiPanel HZ5 vertical siding and HardieSoffit HZ5 panels requirement for Materials:
 1. Fiber-cement Siding - complies with ASTM C 1186 Type A Grade II.

2. Fiber-cement Siding - complies with ASTM E 136 as a noncombustible material.
3. Fiber-cement Siding - complies with ASTM E 84 Flame Spread Index = 0, Smoke Developed Index = 5.
- B. Shingle Siding:
 1. HZ5 siding as manufactured by James Hardie Building Products, Inc.
 - a. Type: HardieShingle Staggered-Edge Notched Panel 48 inches wide by 16 inches high with 7 inches exposure.
- C. Lap Siding:
 1. HardiePlank HZ5 Lap as manuf. by James Hardie Building Products, Inc.
 - a. Type: Cedarmill - board size per drawings.
- D. Vertical Siding:
 1. HardiePanel HZ5 siding as manuf. by James Hardie Building Products, Inc.
 - a. Type: Cedarmill - board size per drawings.
- E. Soffit Panels:
 1. HardieSoffit HZ5 soffit panel, by James Hardie Building Products, Inc.
 - a. Type: Textured Cedarmill non-vented - board size per drawings.
 - b. Type: Textured Cedarmill vented - board size per drawings.
- F. Trim:
 1. HardiePlank HZ5 Trim as manuf. by James Hardie Building Products, Inc.
 - a. Product: Batten Boards, 2-1/2 inch width.
 - b. Product: 4/4 Boards, width varies, ref. drawings.
 - c. Texture: Smooth, ref. drawings for location.
 - d. Texture: Rustic, ref. drawings for location
 - e. Length: 12 feet (3658 mm).
 - f. Thickness: Ref. drawings.
 2. HardieTrim HZ5 Fascia boards as manufactured by James Hardie Building Products, Inc.

2.3 FASTENERS

- A. Wood Framing Fasteners per manufacturer requirements:
 1. Panel: Minimum 6d common nail, hot-dipped galvanized or stainless steel. The use of electro- galvanized nails is not permitted.
 2. Trim: Minimum 6d common nail, hot-dipped galvanized or stainless steel. The use of electro- galvanized nails is not permitted.

- 3 Soffit: Minimum 4d common nail, hot-dipped galvanized or stainless steel. The use of electro-galvanized nails is not permitted.

2.4 FINISHES

- A. Factory Primer: Provide factory applied universal primer.
 1. Primer: Factory primed by James Hardie.
 2. Topcoat: Refer to Section 09900 and Exterior Finish Schedule.
- B. Factory Finish: Refer to Exterior Finish Schedule.
 1. Product: ColorPlus Technology by James Hardie.
 2. PrimePlus system
 3. Definition: Factory applied finish; defined as a finish applied in the same facility and company that manufactures the siding substrate.
 4. Process:
 - a. Factory applied finish by fiber cement manufacturer in a controlled environment within the fiber cement manufacturer's own facility utilizing a multi-coat, heat cured finish within one manufacturing process.
 - b. Each finish color must have documented color match to delta E of 0.5 or better between product lines, manufacturing lots or production runs as measured by photospectrometer and verified by third party.
 5. Protection: Factory applied finish protection such as plastic laminate that is removed once siding is installed
 6. Accessories: Complete finishing system includes pre-packaged touch-up kit provided by fiber cement manufacturer. Provide quantities as recommended by manufacturer.
- C. Factory Finish Color for Trim, Soffit and Siding Colors:
 1. Selected by Architect from Manuf. full range of colors

2.05 SEALANT

- A. Sealant shall conform to ASTM C 920, Type S, Grade NS, Use NT.
- B. Provide Pro Series Quad Advanced Formula Sealant as manufactured by OSI Sealants. Substitutions shall be approved by the trim/panel manufacturer for use with their products.

2.06 ACCESSORIES

- A. Flashing: Provide Z flashing along all horizontal siding joints.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If framing preparation is the responsibility of another installer, notify Architect of unsatisfactory

preparation before proceeding.

- C. Nominal 2 inch by 4 inch (51 mm by 102 mm) wood framing selected for minimal shrinkage and complying with local building codes, including the use of water-resistive barriers or vapor barriers where required. Minimum 1-1/2 inches (38 mm) face and straight, true, of uniform dimensions and properly aligned.
 - 1. Install water-resistive barriers and claddings to dry surfaces.
 - 2. Repair any punctures or tears in the water-resistive barrier prior to the installation of the siding.
 - 3. Protect siding from other trades.
- D. Minimum 20 gauge 3-5/8 inch (92 mm) C-Stud 16 inches maximum on center or 16 gauge 3-5/8 inches (92 mm) C-Stud 24 inches (610 mm) maximum on center metal framing complying with local building codes, including the use of water-resistive barriers and/or vapor barriers where required. Minimum 1-1/2 inches (38 mm) face and straight, true, of uniform dimensions and properly aligned.
 - 1. Install water-resistive barriers and claddings to dry surfaces.
 - 2. Repair any punctures or tears in the water-resistive barrier prior to the installation of the siding.
 - 3. Protect siding from other trades.

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Install a water-resistive barrier as required in accordance with local building code requirements.
- D. The water-resistive barrier must be appropriately installed with penetration and junction flashing in accordance with local building code requirements.

3.3 INSTALLATION - HARDIEPANEL HZ5 VERTICAL SIDING

- A. Install materials in strict accordance with manufacturer's installation instructions.
- B. Block framing between studs where HardiePanel siding horizontal joints occur.
- C. Install metal Z flashing and provide a 1/4 inch (6 mm) gap at horizontal panel joints.
- D. Place fasteners no closer than 3/8 inch (9.5 mm) from panel edges and 2 inches (51 mm) from panel corners.
- E. Allow minimum vertical clearance between the edge of siding and any other material in strict accordance with the manufacturer's installation instructions.
- F. Maintain clearance between siding and adjacent finished grade.
- G. Specific framing and fastener requirements refer to Tables 2 and 3 in National Evaluation Service Report No. NER-405.

- H. Factory Finish Touch Up: Apply touch up paint to cut edges in accordance with manufacturer's printed instructions.
 - 1. Touch-up nicks, scrapes, and nail heads in pre-finished siding using the manufacturer's touch-up kit pen.
 - 2. Touch-up of nails shall be performed after application, but before plastic protection wrap is removed to prevent spotting of touch-up finish.
 - 3. Use touch-up paint sparingly. If large areas require touch-up, replace the damaged area with new pre-finished siding. Match touch up color to siding color through use of manufacturer's branded touch-up kits.

3.4 INSTALLATION - HARDIETRIM HZ10 BOARDS

- A. Install materials in strict accordance with manufacturer's installation instructions. Install flashing around all wall openings.
- B. Fasten through trim into structural framing or code complying sheathing. Fasteners must penetrate minimum 3/4 inch (19 mm) or full thickness of sheathing. Additional fasteners may be required to ensure adequate security.
- C. Place fasteners no closer than 3/4 inch (19 mm) and no further than 2 inches (51 mm) from side edge of trim board and no closer than 1 inch (25 mm) from end. Fasten maximum 16 inches (406 mm) on center.
- D. Maintain clearance between trim and adjacent finished grade.
- E. Trim inside corner with a single board trim both side of corner.
- F. Outside Corner Board Attach Trim on both sides of corner with 16 gage corrosion resistant finish nail 1/2 inch (13 mm) from edge spaced 16 inches (406 mm) apart, weather cut each end spaced minimum 12 inches (305 mm) apart.
- G. Allow 1/8 inch gap between trim and siding.
- H. Seal gap with high quality, paint-able caulk.
- I. Shim frieze board as required to align with corner trim..
- J. Fasten through overlapping boards. Do not nail between lap joints.
- K. Overlay siding with single board of outside corner board then align second corner board to outside edge of first corner board. Do not fasten HardieTrim boards to HardieTrim boards.
- L. Shim frieze board as required to align with corner trim.
- M. Install HardieTrim Fascia boards to rafter tails or to sub fascia.

3.5 FINISHING

- A. Finish unprimed siding with a minimum one coat high quality, alkali resistant primer and one coat of either, 100 percent acrylic or latex or oil based, exterior grade topcoats or two coats high quality alkali resistant 100 percent acrylic or latex, exterior grade topcoat within 90 days of installation. Follow paint manufacturer's written product recommendation and written application instructions.

- B. Finish factory primed siding with a minimum of one coat of high quality 100 percent acrylic or latex or oil based exterior grade paint within 180 days of installation. Follow paint manufacturer's written product recommendation and written application instructions.
- C. Finish panels and moulding coated by the PrimePlus system in accordance with Section 09 90 00.

3.6 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

*****End of Section 07 46 46*****

SECTION 07 61 13 – STANDING SEAM SHEET METAL ROOFING

PART 1: GENERAL

1.01 Section Includes

- A. Preformed, prefinished metal roofing and flashings.
- B. Miscellaneous trim, flashing, closures, drip flashing, and accessories.
- C. Sealant.
- D. Fastening devices.

1.02 Related Sections

- A. Section: 06 11 00 Wood Framing and Sheathing
- B. Section: 06 17 53 Shop-Fabricated Wood Trusses
- C. Section: 07 71 23 Manufactured Gutters and Downspouts
- D. Section: 07 92 00 Joint Sealants.
- E. Section: 01 25 13 Product Options and Substitutions.
- F. Section: 01 45 23 Testing and Inspection Services

1.03 References

- A. American Iron & Steel Institute (AISI) Specification for the Design of Cold formed Steel Structural Members.
- B. ASTM A-653-09 Steel Sheet, Zinc-Coated (Galvanized)
- C. ASTM 792-86 AZ-50 Aluminum Zinc Alloy Coated Steel (Galvalume Sheet Metal
- D. ASTM E-1680
- E. ASTM E-1646
- F. ASTM E-1592
- G. Spec Data Sheet - Aluminum Zinc Alloy Coated Steel (Galvalume) Sheet Metal by Bethlehem Corp.
- H. SMACNA - Architectural Sheet Metal Manual.
- I. Building Materials Directory - Underwriter's Laboratories, Test Procedure 580 - UL-90.

1.04 Assembly Description

- A. The roofing assembly includes preformed sheet metal panels, related accessories, valleys, hips, ridges, eaves, corners, rakes, miscellaneous flashing and attaching devices.

1.05 Submittals

- A. Submit detailed shop drawings showing layout of panels, anchoring details, joint details, trim, flashing, and accessories. Show details of weatherproofing, terminations, and penetrations of metal work at 0'-3"= 1'-0" scale.
- B. Submit a sample of each type of roof panel, complete with factory finish.
- C. Submit results indicating compliance with minimum requirements of the following performance tests:
 - 1. Air Infiltration - ASTM E 1680
 - 2. Water Infiltration - ASTM E 1646
 - 3. Wind Uplift - UL 90
- D. Submit calculations with registered engineer seal, verifying roof panel and attachment method resist wind pressures imposed on it pursuant to applicable building codes.
- E. Substitutions shall be per, Section: 01 25 13 Product Options and Substitutions.

1.06 Quality Assurance

- A. Manufacturer: Company specializing in Architectural Sheet Metal Products with ten (10) years minimum experience.
- B. Applicator Qualifications
 - 1. Three years minimum experience in application of high performance standing seam roofs
 - 2. Minimum of five satisfactory projects on similar types of roofs.
- F. Regulatory requirements
 - 1. Comply with requirements of applicable building codes and other agencies having jurisdiction for wind uplift rating of standing seam roofs.

1.07 Delivery, Storage and Handling

- A. Upon receipt of panels and other materials, installer shall examine the shipment for damage and completeness.
- B. Panels should be stored in a clean, dry place. One end should be elevated allowing moisture to run off.
- C. Panels with strippable film must not be stored in the open, exposed to the sun.
- D. Stack all materials to prevent damage and to allow adequate ventilation.

1.08 Warranty

- A. Paint finish shall have a twenty-year warranty against cracking, peeling and fading (not to exceed 5 N.B.S. units).
- B. Galvalume material shall have a twenty-year warranty against failure due to corrosion, rupture or perforation.
- C. Roofing Installer shall furnish guarantee covering watertightness of the roofing system for the period of two (2) years from the date of substantial completion.
- D. When required, Roofing Installer to furnish, Manufacturer's standard watertightness warranty; Roofing Installer to comply with Manufacturer's watertightness warranty program and submit to

manufacture all required documents. Watertightness warranty program to include roofing installation inspections which Roofing Installer shall participate.

Part 2 Product

2.01 Acceptable Manufacturers

- A. Berridge Manufacturing Company, San Antonio, Texas.

6515 Fratt Road
San Antonio, Texas 78218
Phone: (800) 669-0009 Toll Free
(210) 650-3050 Local
Fax: (210) 650-0379
- B. Substitutions shall fully comply with specified requirements.

2.02 Sheet Materials

- A. Prefinished metal shall be Aluminum-Zinc Alloy Coated (AZ-50 Galvalume®) Steel Sheet, 24-Gauge or 22-Gauge*, ASTM 792-08, Grade 40, yield strength 40 ksi min.
- B. Finish shall be full strength Kynar 500® or Hylar 5000™ fluoropolymer coating applied by the manufacturer on a continuous coil coating line, with a top side dry film thickness of 0.75 ± 0.05 mil over 0.20 ± 0.05 mil prime coat, to provide a total top side dry film thickness of 0.95 ± 0.10 mil. Bottom side shall be coated with a primer (non-metallics only) and beige urethane coating with a total dry film thickness of 0.35 ± 0.05 mil. Finish shall conform to all tests for adhesion, flexibility, and longevity as specified by the Kynar 500® or Hylar 5000™ finish supplier.
- C. Strippable film shall be applied to the top side of all prefinished metal to protect the finish during fabrication, shipping and field handling. This strippable film MUST be removed immediately before installation.
- D. Unpainted metal shall be Aluminum-Zinc Alloy Coated (AZ-55 Acrylic Coated Galvalume®) Steel Sheet, 24-Gauge or 22-Gauge*, ASTM 792-08, Grade 40, yield strength 40 ksi min., with clear acrylic coating on both sides of material.
- E. Field protection must be provided by the contractor at the job site so stacked or coiled material is not exposed to weather and moisture.
- F. Flashing maybe factory fabricated or field fabricated. Unless otherwise specified all exposed qadjacent flashing shall be of the same material and finish as panel system.

2.03 Accessory Materials

- A. Fasteners: [Galvanized Steel] or [Stainless Steel] with washers at exposed fasteners where approved by architect.
- B. Sealant: Sealant shall be an ultra low modulus, high performance, one-part, moisture curing silicone joint sealant. [Tremco Spectrum One] or [Dow 790] or [Pecora 890NST] or [Duralink] or [Titebond Metal Roof Sealant] (Do not use a clear sealant or sealants which release a solvent or acid during curing).
- C. Sealant must be resistant to environmental conditions such as wind loading, wind driven rain, snow, sleet, acid rain, ozone, ultraviolet light and extreme temperature variations.

- D. Features must include joint movement capabilities of +100% & -50% ASTM C-719, capable of taking expansion, compression, transverse and longitudinal movement, service temperature range - 65°F to 300°F (-54°C to 149°C), Flow, sag or slump: ASTM C-639; Nil, Hardness (Shore A): ASTM C-661; 15, Tensile strength at maximum elongation: ASTM D-412; 200 psi, Tensile strength at 100% elongation: ASTM D-412; 35 psi, Tear strength, (die "C"); ASTM D-624; 40 pli, Peel strength (Aluminum, Glass, Concrete): ASTM C-794; 30 pli
- E. Vinyl Weatherseal Insert.

2.04 Fabrication

- A. All exposed adjacent flashing shall be of the same material and finish as the roof panels.
- B. Hem all exposed edges of flashing on underside, ½ inch.

2.05 Berridge Zee-Lock Standing Seam Panel

- A. 2" high vertical legs shall be spaced at 16" on-center and shall have no exposed fasteners.
- B. Panels shall be [site-formed with the Berridge Model SP-21-X Portable Roll Former in continuous lengths from ridge to eave] or [factory-formed to 40' max].
- C. [Continuous Zee Rib shall be 1 3/8" wide and 2 1/8" in height. Rib shall be connected to purlin with two #12-14 x 1" self-drilling/tapping fasteners] or [Zee Clips spaced at 3'-0"].
- D. Optional Vinyl Weatherseal (U.S. Patent 5134825) shall be factory-installed over Continuous Zee Rib.
- E. Sidelap shall be mechanically seamed with a powered seamer.
- F. When required, panel assembly to bear Underwriters Laboratories Label UL90, pursuant to [Construction No. 312 for open framing conditions, either uninsulated or with blanket insulation] or [Const. No. 335 or 335 (mod.) with rigid board insulation] or [Const. No. 403 over solid substrate] and applicable Fire Ratings.
- G. Certification shall be submitted, based on independent testing laboratory, indicating no measurable water penetration or air leakage through the system when tested in accordance with ASTM E-1680 and E-1646.

Part 3 Execution

3.01 Inspection

- A. Substrate
 - 1. Examine plywood or metal deck to ensure proper attachment to framing.
 - 2. Inspect roof deck to verify deck is clean and smooth, free of depressions, waves or projections, level to ¼" in 20' and properly sloped to [valleys] (or) [eaves].
 - 3. Verify roof openings, curbs, pipes, sleeves, ducts or vents through roof are solidly set, cant strips and reglets in place, and nailing strips located.
 - 4. Verify deck is dry and free of snow or ice. [Flutes in steel deck to be clean and dry] or [joints in wood deck to be solidly supported and nailed].
- B. Underlayment:

1. Verify [#30 unperforated asphalt saturated roofing felt underlayment has been installed over solid plywood or OSB sheathing and fastened in place] or [ice & water shield membrane on metal deck].
2. One (1) layer of #30 asphalt roofing felt paper for roof slopes of 3:12 and up, two (2) layers for roof slopes of 1:12 - 3:12 in moderate climates (check with Berridge).
3. Ice & Water Shield underlayment to be used on all curved applications and on low (less than 1:12) slope or complex roofs per Berridge recommendation.
4. Underlayment materials approved by Berridge for a watertightness warranty include - Grace Ice & Water Shield (40 mil), Grace Ultra (30 mil), Tamko TW Underlayment (40 mil), Tamko TW Metal & Tile (75 mil), Carlisle WIP 300 HT (40 mil), Soprema Lastobond Shield HT (40 mil), Polyglass Polystick MTS (60 mil), and Mid-States Asphalt Quik-Stick HT Pro (60 mil) *PLEASE NOTE, NO OTHER MID-STATES ASPHALT PRODUCTS WITH SIMILAR NAMES OR OTHERWISE ARE APPROVED FOR THE BERRIDGE WATERTIGHTNESS WARRANTY PROGRAM
5. Ensure felt installed horizontally, starting at eave to ridge with a 6" minimum overlap and 18" endlaps.
6. Ensure that all nail heads and felt caps are totally flush with the substrate. Fasteners shall be galvanized roofing nails or zinc-coated fasteners with Berridge Coated Felt Caps.

3.02 Installation

- A. Comply with manufacturers standard instructions and conform to standards set forth in the Architectural Sheet Metal Manual published by SMACNA, in order to achieve a watertight installation.
- B. Install panels in such a manner that horizontal lines are true and level and vertical lines are plumb.
- C. Install starter and edge trim before installing roof panels.
- D. Remove protective strippable film prior to installation of roof panels.
- E. Attach panels using manufacturer's standard clips and fasteners, spaced in accordance with approved shop drawings.
- F. Install sealants for preformed roofing panels as approved on shop drawings.
- G. Do not allow panels or trim to come into contact with dissimilar materials.
- H. Do not allow traffic on completed roof. If required, provide cushioned walk boards.
- I. Protect installed roof panels and trim from damage caused by adjacent construction until completion of installation.
- J. Remove and replace any panels or components which are damaged beyond successful repair.

3.03 Cleaning

- A. Clean any grease, finger marks or stains from the panels per manufacturer's recommendations.
- B. Remove all scrap and construction debris from the site.

3.04 Final Inspection

- A. Final inspection will be performed by a firm appointed and paid for by the owner in accordance with Section: 01 45 23 Testing and Inspection Services.

*****End of Section 07 61 13*****