SECTION 07110 - SHEET MEMBRANE WATERPROOFING

PART 1 - GENERAL

DESCRIPTION OF WORK

Extent of sheet waterproofing work is shown on drawings and this written section as waterproof membrane, and is hereby defined to include all sheet materials applied with sealed joints and flashings as needed to form concealed waterproof membranes.

Following applications of membrane waterproofing and related products:

Vertical membranes for below grade wall waterproofing.

Tie-in to and overlap of existing building below grade waterproofing, as well as repair of damaged existing building water proofing.
Protection board for membranes.

Below grade basement wall insulation specified in Section 07200.

Foundation Drainage pipe and fill are part of Division 2 work

QUALITY ASSURANCE

Manufacturers: Obtain primary waterproofing materials of each type required from an single manufacturer, to greatest extent possible. Provide secondary materials only as recommended by manufacturer of primary materials.

Installer: Firm with not less than 3 years of successful experience in installation of waterproofing similar to requirements for this project and which is acceptable to manufacturer to primary waterproofing materials.

Preinstallation Conference: Prior to installing waterproofing and associated work, meet at project site with the Installer of each component of associated work, General Contractor, Architect, and installers of waterproofing work. Review material selections and procedures to be followed in performing the work. Notify Architect at least 48 hours before conducting meeting.

SUBMITTALS

Manufacturer's Data: Submit test data from Manufacturer on proposed waterproofing system from independent testing facility. Include complete Manufacturer's data and installation procedures for all materials. Data shall indicate head of water system is designed to withstand.

Waterproofing system and product sample.
Protection Board product data and product sample.

JOB CONDITIONS

Proceed with work of this Section only after substrate construction, openings, and penetrating work has been completed and areas are free from sharp or ragged out-angles, honeycombing, rock pockets, depressions, and projections.

Installer must examine substrate and conditions under which waterproofing work is to be preformed, and notify Contractor in writing of unsatisfactory conditions. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to installer.

Proceed with waterproofing and associated work only when existing and forecasted weather conditions will permit work to be performed in accordance with manufacturer's recommendations and warranty requirements.

SPECIAL PROJECT WARRANTY

Provide written warranty, agreeing to replace/repair defective materials and workmanship. Warranty includes responsibility for removal and replacement of other work which conceals sheet waterproofing. Furnish (3) copies of the Manufacturer's Warranty to the Architect. **Warranty period is 5 years after date of substantial completion.**

The warranty shall not deprive the Owner of other rights the Owner may have under other warranties made by the Contractor under requirements of the Contract Documents.

PART 2 - PRODUCTS

MATERIALS

General: Provide sheet waterproofing materials recognized to be of generic type indicated and tested to show compliance with indicated performances, or provide other similar materials certified in writing to be equal to or better than specified in every significant respect, and acceptable to Architect.

RUBBERIZED ASPHALT/POLYETHYLENE SHEET WATERPROOFING

Self-adhering membrane of rubberized asphalt integrally bonded to polyethylene sheeting, formed into uniform flexible sheets of thickness shown, or not less than 56 mils if no thickness is shown, complying with the following:

Tensile Strength (ASTM D412): 250 psi min.
Ultimate Elongation (ASTM D412: 300% minimum
Brittleness Temperature (ASTM D746): minus 25 degrees F; ASTM D746.
Hydrostatic Head Resistance: 150 ft. min.
Water Absorption (ASTM D570): Not more than 0.5% weight gain after 48 hours of immersion at 70 degrees F, ASTM D570.

Available Products: Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:

Bithuthene; W.R. Grace & Co.
MEL-ROL, W.R. Meadows, Inc.
Duramem 700-SM, Pecora Corporation

Miscellaneous Materials: Provide type of adhesive compound and type, primer, flashing materials, and protection course recommended by manufacture of waterproofing sheet membrane.

AUXILIARY MATERIALS

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

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

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

Protection Board: Hydraway 300 subsurface Geocomposite Drainage System by Monsanto or equals by other manufacturers.

PART 3 - EXECUTION

INSPECTION

Installer must examine substrate and conditions under which waterproofing work is to be performed and must notify Contractor in writing of unsatisfactory conditions until corrected in manner acceptable to installer.

PREPARATION AND INSTALLATION

Prior to installation of waterproofing request meeting with Architect and installers of work for purpose of reviewing material selections and procedures to be followed in performing work.

ASPHALT/POLYETHYLENE SHEET WATERPROOFING MEMBRANE

Temperature: Install system in temperatures above 40 degrees F.

Priming: Prime all concrete surfaces to receive membrane by method and with coverage as recommended by manufacturer. Prime only the area which will be covered with membrane in a working day. Areas not covered with membrane in 24 hours must be reprimed. Dry primed surface should be covered immediately where contaminants from the air are accumulating on the surface.

Membrane: Install membrane to provide complete waterproofing protection in extent shown on drawing and in strict accord with manufacturer's latest recommendation, including edge and seam sealing with mastic (2 1/2" seam overlap) and double-ply coverage, 12" wide, at both inside and outside corners. Seal to projections through membrane and at termination at waterstop seal membrane between split projection of same.

Protection course: Install protection course of type indicated over complete membrane, and within five (5) days after application. Protection course on vertical surface shall be installed in manufacturer's recommended adhesive at the rate of 250-150 sq. ft. per gal. and in accordance with their instructions.

Special precautions & protections: Care must be taken not to puncture or tear the membrane prior to covering. Careful inspection must be made prior to covering membrane and any holes or tears must be patched with new membrane. Misaligned or wrinkled seams should also be patched with new membrane.

Sheet membrane is incompatible with tars, pitches, and certain liquid waterproofing products and sealants. Care should be exercised to avoid direct contact of the adhesive layer with such systems. Consult manufacturer's recommendations.

Seal top Edge of Waterproofing as recommended by waterproofing manufacturer.

PERFORMANCE REQUIREMENTS

It is required that waterproof membranes be watertight and not deteriorate in excess of limitations published by manufacturer.

PROTECTION

Institute all required procedures for protecting of completed membrane during installation of work over membrane and throughout remainder of construction period. Do not allow traffic of any type on unprotected membrane.

End of SECTION 07110

SECTION 07200 - INSULATION

PART 1 - GENERAL

RELATED DOCUMENTS:

Drawings, General Conditions and Supplementary General Conditions and other Division-1 Specification Sections, apply to this Section.

DESCRIPTION OF WORK:

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

Applications of insulation specified in this section include the following:

Insulation under slabs-on-grade. (vertical/gorizontal boards)

Blanket/Batt-type building insulation.

Exterior wall assembly thermal insulation.

General usage throughout perimeter wall / roof intersection gap filler.

"Tapered and Flat" roof insulation is specified in the Division-7 section in which those roofing insulation products, including roofing membrane are covered.

Sound attenuation blankets installed as part of metal-framed gypsum drywall assemblies are specified in Division-9 section "Gypsum Drywall".

QUALITY ASSURANCE:

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

Fire Performance Characteristics: Provide insulation materials which are identical to those whose fire performance characteristics, as listed for each material or assembly of which insulation is a part, have been determined by testing, per methods indicated below, by UL or other testing and inspecting agency acceptable to authorities having jurisdiction.

Surface Burning Characteristics: ASTM E 84.

Fire Resistance Ratings: ASTM E 119.

Combustion Characteristics: ASTM E 136.

SUBMITTALS:

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

DELIVERY, STORAGE, AND HANDLING:

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

Do not expose to sunlight, except to extent necessary for period of installation and concealment.

Protect against ignition at all times. Do not deliver plastic insulating materials to project site ahead of installation time.

Complete installation and concealment of plastic materials as rapidly as possible in each area of work.

PART 2 - PRODUCTS

ACCEPTABLE MANUFACTURERS:

Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:

Manufacturers of Extruded Polystyrene Board Insulation:

Amoco Foam Products Co.
Dow Chemical U.S.A.
Minnesota Diversified Products, Inc.
UC Industries.

Manufacturers of Glass Fiber Insulation:

CertainTeed Corp.
Johns Manville
Knauf Fiber Glass GbmH.
McCormick Corp.
Owens-Corning Fiberglas Corp.

INSULATING MATERIALS:

General: Provide insulating materials which comply with requirements indicated for materials, compliance with referenced standards, and other characteristics.

Preformed Units: Sizes to fit applications indicated, selected from manufacturer's standard thicknesses, widths and lengths.

EXTRUDED POLYSTYRENE BOARD INSULATION: Rigid, cellular thermal insulation with closed-cells and integral high density skin, formed by the expansion of polystyrene base resin in an extrusion process to comply with ASTM C 578 for Type indicated; with 5-year aged r-values of 5.4 and 5 at 40 and 75 deg. F (4.4 and 23.9 deg.C), respectively; and as follows:

Type IV, 1.6 lb./cu. ft. min. density, unless otherwise indicated.

Surface Burning Characteristics: Maximum flame spread and smoke developed values of 5 and 165, respectively.

Use: Rigid board perimeter insulation.

Size: 2'-0" widths each of horizontal and tall vertical widths . (See Wall Section details.) **x 3" thickness** x continuous placement around building perimeters at slab-on-grades.

RIGID INSULATION for Insulating floor of Steeple base: Glass-Fiber-Reinforced Polyisocyanurate Foam Core Insulating Sheathing Board with reinforced fiberglass facers.

Application: Typical exterior sheathing over stud framing.

Thickness: two layers of **2"** floor insulation unless noted otherwise on drawings. R=11.4 per/2" board

Must Meet Code requirements for Foam Plastic Insulation (2012 NC Building Code, Section 2603):

Surface Burning: ASTM E 84 or UL 723
Fire-Resistance-rated walls: ASTM E 119 or UL 263

Thermal Barrier: FM 4880, UL 1040, NFPA 286 or UL 1715.
Potential Heat: NFPA 259
Wall Assembly - Test Standard and Labeling Standard: NFPA 285
Exterior Wall Ignition: NFPA 268

Mineral Fiber Type: Fibers manufactured from glass.

Thickness: Fiber blanket/batt insulation shall completely fill framing space of wall receiving insulation.

Exterior stud walls: R=21 (Typical) with Kraft paper facing.
(Use typical at exterior stud wall applications)

Combustion Characteristics: Unfaced blanket/batt passes ASTM E 136 test.

Surface Burning Characteristics: Maximum flame spread and smoke developed values of 25 and 50, respectively.

FACED MINERAL FIBER BLANKET/BATT INSULATION: Thermal insulation produced by combining mineral fibers of type described below with thermosetting resins to comply with ASTM C 665, Type I and ASTM E 84 Surface Burning Characteristics (with flame spread of 25 or less) and as follows:

Sound Insulation: Within interior walls - R=11 batt insulation. Where noted on drawings.

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

Mechanical Anchors: Type and size indicated or, if not indicated, as recommended by insulation manufacturer for type of application and condition of substrate.

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

Polypropelene Netting: Type recommended by insulation manufacturer for suspending insulation between structural members.

Vinyl Tape: Type recommended by insulation manufacturer for sealing plastic vapor barrier seams.

PART 3 - EXECUTION

INSPECTION AND PREPARATION:

Require Installer to examine substrates and conditions under which insulation work is to be performed. A satisfactory substrate is one that complies with requirements of the section in which substrate and related work is specified. Obtain Installer's written report listing conditions detrimental to performance of work in this section. Do not proceed with installation of insulation until unsatisfactory conditions have been corrected.

Clean substrates of substances harmful to insulations or vapor retarders, including removal of projections which might puncture vapor retarders.

INSTALLATION, GENERAL:

Comply with manufacturer's instructions for particular conditions of installation in each case. If printed instructions are not available or do not apply to project conditions, consult manufacturer's technical representative for specific recommendations before proceeding with work.

Extend insulation full thickness as shown over entire area to be insulated. Cut and fit tightly around obstructions, and fill voids with insulation. Remove projections which interfere with placement.

NOTE: FIBERGLASS BATT INSULATION WITH VAPOR BARRIER BACKING MUST BE INSTALLED BY EXTENDING THE EDGES OF THE BACKING NEATLY

OVER THE FACE OF THE STUD OR JOIST FORMING THE SPACE BEING INSULATED. THESE EDGES SHALL BE NEATLY STRETCHED AND FASTENED TO ALLOW THE INTERIOR FINISH MATERIAL TO "LAY FLAT" OVER THE STUDS AND INSULATION.

INSTALLATION OF GENERAL BUILDING INSULATION:

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

Set vapor retarder faced units with vapor retarder to warm side of construction, except as otherwise indicated. Do not obstruct ventilation spaces, except for firestopping.

Tape joints and ruptures in vapor retarder, and seal each continuous area of insulation to surrounding construction to ensure air-tight installation.

Stuff loose glass fiber insulation into miscellaneous voids and cavity spaces around building's exterior walls systems. Compact 40% above normal maximum volume (to a density of approximately 2.5 lbs. per cu. ft.)

PROTECTION:

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

End of SECTION 07200

SECTION 07241 **A** - EXTERIOR INSULATION AND FINISH SYSTEMS - CLASS PB

PART 1 - GENERAL

RELATED DOCUMENTS

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

SUMMARY

This Section includes the following:

ALTERNATE #1 WORK

Exterior Insulation and Finish System (EIFS) system used for an insulated exterior wall finish as indicated on the drawings. Work also includes providing waterproof coating under EIFS where exterior ledges occur that will accumulate standing water or snow. **Provide high impact reinforcing mesh over the entire visible surface.** Related Sections: The following Sections contain requirements that relate to this Section:

Division 6 Section "Rough Carpentry" for gypsum sheathing and wood framing behind system.

Division 7 Section "Joint Sealants" for sealing joints in system with elastomeric joint sealants.

DEFINITIONS

Exterior insulation and finish systems refer to exterior assemblies composed of an inner layer of board (block) insulation and an outer layer composed of a glass-fiber-mesh-reinforced base coat applied directly to board insulation and a textured protective finish coat. These assemblies are applied to supporting substrates of construction indicated.

Designation PB for class of exterior insulation and finish systems specified in this Section is based on the classification developed by the EIFS Industry Members Association (EIMA).

System in this Section refers to Class PB exterior insulation and finish systems.

System manufacturer refers to the manufacturer of exterior insulation and finish systems.

PERFORMANCE REQUIREMENTS

General: Provide systems that comply with the following performance requirements:

Bond Integrity: Free from bond failure within system components or between system and supporting wall construction, resulting from exposure to fire, wind loads, weather, or other in-service conditions.

Weathertightness: Resistant to water penetration from exterior into system and assemblies behind it or through them into interior of building that results in deterioration of thermal-insulating effectiveness or other degradation of system and assemblies behind system, including substrates, supporting wall construction, and interior finish.

Physical Properties of Class PB: Provide exterior insulation and finish systems whose physical properties and structural performance comply with the following requirements when tested per methods referenced.

Accelerated Weathering Characteristics: Sample of size suitable for test equipment and consisting of 1-inch- (25.4-mm-) thick exterior insulation system mounted on 1/2-inch- (12.7-mm-) thick gypsum board, cured for 28 days, shows no evidence of cracking, flaking, or deleterious effects after testing for 2,000 hours per Method 1 of ASTM G 23.

Water Penetration: Sample, consisting of 1-inch- (25.4-mm-) thick exterior insulation and finish system mounted on 1/2-inch- (12.7-mm-) thick gypsum board, cured for 28 days, shows no water penetration into the plane of the innermost face of the test specimen under 2.86 psf (137 Pa) of air pressure difference across the specimen during a 15-minute test period when tested per ASTM E 331.

Water Resistance: Sample, consisting of 1-inch- (25.4-mm-) thick exterior insulation and finish system mounted on 1/2-inch- (12.7-mm-) thick board, cured for 28 days, shows no deleterious effects after testing for 14 days per ASTM D 2247.

Salt-Spray Resistance: Sample, consisting of 1-inch- (25.4-mm-) thick exterior insulation and finish system mounted on 1/2-inch- (12.7-mm-) thick gypsum board, cured for 28 days, shows no deleterious effects after testing for 300 hours per ASTM B 117.

Absorption-Freeze Resistance: Three samples, 4 by 8 by 1 inch (101.6 by 203.2 by 25.4 mm) in size, consisting of exterior insulation and finish system coated on all sides with base and finish coats including reinforcing fabric, cured for 28 days, show no visible change when subjected to 4 days' underwater soak followed by 60 cycles of alternating exposure for 2 hours to minus 10 deg C and 2 hours to plus 20 deg C.

Mildew Resistance: Sample, consisting of finish coat applied to 2 by 2 inch (50.8 by 50.8 mm) clean glass substrate, cured for 28 days, shows no mildew growth when tested per MIL Standard 810C, Method 508.

Abrasion Resistance: Sample, consisting of l-inch- (25.4-mm-) thick exterior insulation and finish system mounted on 1/2-inch- (12.7-mm-) thick gypsum board, cured for a minimum of 28 days, shows no evidence of cracking, checking, or loss of film integrity after exposure to 500 liters of sand when tested per ASTM D 968, Method A.

Impact Resistance: Sample, consisting of 1-inch- (25.4-mm-) thick exterior insulation and finish system when constructed, conditioned, and tested per EIMA 101.86, produces the following impact classification and range:

Medium Impact Resistance: 50-89 inch-lb.

Negative Wind Load Performance: Sample assembly, 48 by 48 inches (1220 by 1220 mm) in size, consisting of studs, sheathing, and 1-inch- (25.4-mm-) thick exterior insulation and finish system, shows capability to withstand wind loads indicated when tested per ASTM E 330.

Structural Performance of Prefabricated Panels: Engineer, fabricate, and install prefabricated panels to withstand the effects of normal thermal movement, gravity loads, and the following loads and stresses within the limits and under the conditions indicated:

Normal thermal movement is defined as that resulting from the following maximum change (range) in ambient temperature. Base design calculations on actual surface temperatures of materials due to both solar heat gain and nighttime sky heat loss.

Temperature Change (Range): 100 deg F (56 deg C).

Wind Loads: Uniform pressures (velocity pressures) indicated on drawings, acting inward or outward.

Drainable EIFS System: Moisture drainage system: Provide a means for releasing any moisture that may occur between the insulation panels and the sheathing and a warranted concealed trim ledger that allows the moisture to vent and exit to the outside of the wall.

Provide EIFS assembly that includes a moisture drainage system and an applied waterproofing coating under EIFS surfaces that have the potential for standing or running water or snow accumulation..

SUBMITTALS

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

Product data for each component of exterior insulation and finish systems specified.

Shop drawings showing fabrication and installation of prefabricated panels including plans, elevations, sections, details of components, joint locations and configurations, and attachments to other units of work.

Samples for initial selection in the form of manufacturer's color charts and small-scale samples consisting of actual units or sections of units showing the full range of colors, textures, and patterns available for each type of textural choices indicated.

Samples for verification in the form of 24-inch- (600-mm-) square panels for each finish, color, texture, and pattern specified. Prepare samples using same tools and techniques intended for actual work.

Installer certificates signed by manufacturer certifying that Installers comply with requirements under the "Quality Assurance" Article.

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

QUALITY ASSURANCE

Installer Qualifications: Engage an experienced Installer who is certified in writing by system manufacturer as qualified to install manufacturer's system.

Manufacturer Qualifications: Firm experienced in manufacturing systems similar to those indicated for this Project and that have a record of successful in-service performance.

Fire-Test-Response Characteristics: Provide materials and construction that are identical to those tested with the following fire-test-response characteristics, as determined by testing per ASTM test method indicated below, by UL or other testing and inspecting agencies acceptable to authorities having jurisdiction. Identify products with appropriate markings of applicable testing and inspecting agency.

Flame Spread of Insulation Board and Finish Coats: 25 or less when tested individually per ASTM E 84.

Smoke Developed of Insulation Board and Finish Coats: 450 or less when tested individually per ASTM E 84.

Single-Source Responsibility: Obtain materials for system from one source and by a single manufacturer or by manufacturers approved by the system manufacturer as compatible with other system components.

Mockup: Prior to installing system, construct mockups for each form of construction and finish required to verify selections made under sample submittals and to demonstrate aesthetic effects as well as qualities of materials and execution. Build mockups to comply with the following requirements, using materials indicated for final unit of Work.

Locate mockups on site in the location and of the size indicated or, if not indicated, as directed by Architect.

Notify Architect one week in advance of the dates and times when mockups will be constructed.

Demonstrate the proposed range of aesthetic effects and workmanship.

Obtain Architect's acceptance of mockups before start of final unit of Work.

Retain and maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.

Protect mockups from weather and from construction activities. Brace to resist design wind loads and provide waterproof coverings for construction materials not intended to be permanently exposed to the weather.

When directed, demolish and remove mockups from Project site.

DELIVERY, STORAGE, AND HANDLING

Deliver products in original, unopened packages with manufacturer's labels identifying products legible and intact.

Store materials inside and under cover; keep them dry and protected from the weather, direct sunlight, surface contamination, aging, corrosion, damaging temperatures, damage from construction traffic, and other causes.

Stack insulation board flat and off the ground.

PROJECT CONDITIONS

Environmental Conditions: Do not install system when ambient outdoor air and substrate temperatures are 40 deg F (4 deg C) and falling unless temporary protection and heat are provided to maintain ambient temperatures above 40 deg F (4 deg C) during installation of wet materials and until they have dried thoroughly and become weather resistant, but for not less than 24 hours after installation.

COORDINATION AND SCHEDULING

Coordinate installation of system with related units of Work specified in other Sections to ensure that wall assemblies, including sheathing, flashing, trim, and joint sealers, are protected against damage from the effects of weather, age, corrosion, and other causes.

PART 2 - PRODUCTS

MANUFACTURERS

Available Manufacturers: Subject to compliance with requirements, manufacturers offering Class PB systems that may be incorporated in the Work include, but are not limited to, the following:

Sto Corp.; Sto Finish Systems Div.: StoTherm Premier NExT w/ Sto gold on horizontal surfaces and recessed ledges.

Or **equal** vented/drainable systems by

Senergy (BASF Wall Systems, Senerflex ® Series)
Dryvit Systems, Inc.: Outsulation Plus (Basis of Design)
Finestone, Simplex Products
Parex Incorporated

MATERIALS

Compatibility: Provide adhesive, board insulation, reinforcing fabrics, base and finish coat materials, sealants, and accessories that are compatible with one another and approved for use by system manufacturer.

Colors and Textures of Finish Coat: Comply with the following requirements:

Provide Architect's selections from manufacturer's full range of colors and textures for type of finish coat indicated

Provide smooth limestone finish with fine pebble texture.

Color to be "off white" limestone color.

Primer-Sealer: System manufacturer's standard substrate conditioner designed to seal substrates from moisture penetration and to improve the bond between substrate of type indicated and adhesive used for application of insulation.

Adhesive for Application of Insulation: System manufacturer's standard formulation designed for indicated use, compatible with substrate, and complying with the following requirements:

Job-mixed formulation of portland cement complying with ASTM C 150, Type I, and polymer-based adhesive specified for base coat.

Factory-blended dry formulation of portland cement, dry polymer admixture, and fillers specified for base coat.

Factory-mixed formulation designed for adhesive attachment of insulation to substrates of type indicated, as approved by system manufacturer.

Any of the formulations indicated above.

Molded Polystyrene Board Insulation: Rigid cellular thermal insulation formed by the expansion of polystyrene resin beads or granules in a closed mold, complying with ASTM C 578 for Type I, approved by system manufacturer for material qualities including corner squareness, other dimensional tolerances, and the following:

Age insulation in block form prior to cutting and shipping by air drying for not less than 6 weeks or by another method approved by system manufacturer that produces equivalent results.

Provide insulation in boards not more than 24 by 48 inches (610 by 1219 mm) and in thickness indicated but not less than that allowed by system manufacturer, nor more than 4 inches (102 mm).

Insulation board thicknesses used include: 1-1/2" unless otherwise noted on the drawings.

Reinforcing Fabric: Balanced, alkali-resistant open-weave glass-fiber fabric treated for compatibility with other system materials, made from continuous multiend strands with tensile strength of not less than 145 lb (645 N) and 150 lb (667 N) in warp and fill directions per ASTM D 5035, complying with ASTM D 578 and the following requirements for minimum weight:

High Impact Mesh Reinforcing Fabric : At all locations

Base Coat Materials: System manufacturer's standard mixture complying with the following requirements for material composition and method of combining materials:

Factory-mixed formulation of polymer emulsion adhesive and inert fillers that is ready to use without the addition of other materials.

Factory-blended dry formulation of portland cement, dry polymer admixture, and inert fillers to which only water is added at the job site.

Job-combined formulation of manufacturer's standard polymer emulsion adhesive and manufacturer's standard dry mix containing portland cement.

Job-mixed formulation of portland cement complying with ASTM C 150, Type I, white or natural color; and system manufacturer's standard polymer emulsion adhesive designed for use indicated.

Any of the formulations indicated above.

Finish Coat Materials: System manufacturer's standard mixture complying with the following requirements for material composition and method of combining materials:

Factory-mixed formulation of polymer emulsion binder, colorfast mineral pigments, sound stone particles, and fillers.

Water: Clean and potable.

Trim Accessories: Type as designated or required to suit conditions indicated and to comply with system manufacturer's requirements, manufactured from vinyl plastic and complying with ASTM C 1063.

Casing Bead: Prefabricated 1-piece type for attachment behind insulation, of depth required to suit thickness of coating and thickness of insulation as well, with face leg perforated for bonding to coating.

Drip Screed: Prefabricated 1-piece type for attachment behind insulation, of depth required to suit thickness of coating and thickness of insulation as well, with face leg perforated for bonding to coating and extended to form a drip.

Drainage weep termination as required for the drainable EIFS system.

ELASTOMERIC SEALANTS

Sealant Products: Provide system manufacturer's recommended chemically curing, elastomeric sealant that is compatible with joint fillers, joint substrates, and other related materials and complies with requirements of Division 7 Section "Joint Sealants".

EIFS installer shall caulk and seal all EIFS intersections with dissimilar materials.

Sealant Color: Comply with the following requirement:

Provide Architect's selections from sealant manufacturer's full range of standard colors.

MIXING

General: Comply with system manufacturer's requirements for combining and mixing materials. Do not introduce admixtures, water, or other materials except as approved by system manufacturer. Mix materials in clean containers. Use materials within time period specified by system manufacturer or discard.

PART 3 - EXECUTION

EXAMINATION

Examine substrates, with Installer present, to determine if they are in satisfactory condition for installation of system. Do not proceed with installation of system until unsatisfactory conditions have been corrected.

PREPARATION

Protect contiguous work from moisture deterioration and soiling resulting from application of systems. Provide temporary covering and other protection needed to prevent spattering of exterior finish coatings on other work.

Protect system, substrates, and wall construction behind them from inclement weather during installation. Prevent infiltration of moisture behind system and deterioration of substrates.

Prepare and clean substrates to comply with system manufacturer's requirements to obtain optimum bond between substrate and adhesive for insulation.

Apply primer-sealer over substrates where required by system manufacturer for improving adhesion or for protecting substrates from premature degradation.

INSTALLATION

Comply with manufacturer's current published instructions for installation of system as applicable to each type of substrate indicated.

Apply trim accessories at perimeter of system, at expansion joints, and elsewhere, as indicated. Use drip screed at bottom edge of system unless otherwise indicated. Use casing beads at other locations.

Adhesively and mechanically attach insulation to comply with the following requirements:

Apply adhesive to insulation by the notched trowel method in a manner that results in adhesive coating the entire surface of gypsum sheathing once insulation is adhered to the sheathing, unless system manufacturer's instructions specify the use of primer-sealer in combination with the ribbon and dab method.

Allow adhered insulation to remain undisturbed for period prescribed by system manufacturer, but not less than 24 hours, prior to beginning rasping and sanding insulation or application of base coat and reinforcing fabric.

Apply insulation boards over dry substrates in courses with long edges oriented horizontally. Begin first course from drip screed and work upward. Work from perimeter casing beads toward interior of panels when possible. Apply a thin coat of adhesive to edges of insulation before inserting into trim accessories.

Stagger vertical joints in successive courses to produce running bond pattern. Locate joints so that no piece of insulation is less than 12 inches (300 mm) wide or 6 inches (150 mm) high. Offset joints at least 6 inches (150 mm) from corners of window and door openings.

Offset joints of insulation at least 4 inches (100 mm) from joints in sheathing.

Interlock ends at internal and external corners.

Abut boards tightly at joints within and between each course to produce flush, continuously even surfaces without gaps or raised edges between insulation boards. If gaps occur, fill with insulation cut to fit gaps exactly; insert without use of adhesive.

Cut insulation to fit openings, corners, and projections precisely and to produce edges and shapes conforming to details indicated.

Rasp or sand flush entire surface of insulation to remove irregularities projecting more than 1/32 inch (0.8 mm) from surface of insulation and to remove yellowed areas due to sun exposure; do not create depressions deeper than 1/16 inch (1.6 mm).

Cut grooves, rabbets, and other features in outside face of insulation with high-speed router and bit configured to produce grooves, rabbets, and other features that conform accurately to profiles and locations indicated. Do not reduce insulation thickness at features to less than 3/4 inch (19 mm).

Interrupt insulation where expansion joints are indicated in substrates behind exterior insulation and finish systems.

Form joints for sealant application with back-to-back casing beads for joints within system and with perimeter casing beads at dissimilar adjoining surfaces. Make gaps between casing beads and between perimeter casing beads and adjoining surfaces of width indicated.

Treat exposed edges of insulation board, including those forming substrates of sealed joints within system or between system and other work, by encapsulating with base coat, reinforcing fabric, and finish coat, unless otherwise indicated.

Coordinate flashing installation with installation of insulation to produce a wall system that does not allow water to penetrate behind protective coating.

Apply base coat to exposed surfaces of insulation in minimum thickness specified by system manufacturer.

Embed reinforcing fabric of type indicated below in wet base coat to produce wrinkle-free installation with fabric continuous or lapped at corners and lapped or otherwise treated at joints to comply with system manufacturer's requirements. Completely embed fabric, applying additional base coat material if necessary, so that reinforcing fabric pattern is not visible.

High Impact reinforcing fabric where indicated.

Additional Reinforcing Fabric: Apply strip reinforcing fabric around openings extending 4 inches (100 mm) beyond perimeter. Apply additional 8 by 16 inch (200 by 400 mm) strip reinforcing fabric diagonally at corners of openings (re-entrant corners). Apply 8-inch- (200-mm-) wide strip reinforcing at both inside and outside corners unless base layer of fabric is lapped at least 4 inches (100 mm) on each side of corners.

At decorative grooves (false joints), apply strip reinforcing at least 8 inches (200 mm) wide.

Embed strip reinforcing fabric in base coat before applying first layer of reinforcing fabric.

Double Base Coat Application: Apply a second base coat in same manner as first application, except without reinforcing fabric. Do not apply until first base coat has cured.

Apply finish coat over dry base coat in thickness required by system manufacturer to produce a uniform finish of texture and color matching approved sample.

INSTALLATION OF JOINT SEALANTS

Prepare joints and apply sealants, of type and at locations indicated, to comply with applicable requirements of Division 7 Section "Joint Sealants" and with EIMA "Joint Sealant Specifications for Exterior Insulation and Finish Systems (EIFS) Class PB and PM."

Clean surfaces to receive sealants to comply with indicated requirements and system manufacturer's recommendations.

Apply primer recommended by sealant manufacturer for surfaces to be sealed.

Install sealant backing to control depth and configuration of sealant joint and to prevent sealant from adhering to back of joint.

Apply masking tape to protect areas adjacent to sealant joints. Remove tape immediately after tooling joints without disturbing joint seal.

CLEANING AND PROTECTION

Remove temporary covering and protection of other work. Promptly remove coating materials from window and door frames and other surfaces outside areas indicated to receive system coatings.

Provide final protection and maintain conditions in a manner acceptable to Installer and system manufacturer that ensures system's being without damage or deterioration at time of Substantial Completion.

End of SECTION 07241**A**

SECTION 07270 - FIRESTOPPING

PART 1 - GENERAL

RELATED DOCUMENTS:

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

DESCRIPTION OF WORK:

This Section includes firestopping for the following:

Penetrations through fire-resistance-rated floor and roof construction including both empty openings and openings containing cables, pipes, ducts, conduits, and other penetrating items.

Penetrations through fire-resistance-rated walls and partitions including both empty openings and openings containing cables, pipes, ducts, conduits, and other penetrating items.

Sealant joints in fire-resistance-rated construction.

Related Sections: The following Sections contain requirements that relate to this Section:

Division 3 Section "Cast-In-Place Concrete" for construction of openings in concrete slabs.

Division 4 Section "Unit Masonry" for joint fillers for non-fire-resistive-rated masonry construction.

Division 7 Section "Building Insulation" for safing insulation and accessories.

Division 7 Section "Joint Sealants" for non-fire-resistive-rated joint sealants.

Division 15 Sections specifying ducts and piping penetrations.

Division 16 Section specifying cable and conduit penetrations.

SYSTEM PERFORMANCES:

General: Provide firestopping systems that are produced and installed to reduce the spread of fire, according to the requirements indicated, and the passage of smoke and other gases.

F-Rated Through Penetration-Firestop systems: Provide through-penetration firestop systems with F-ratings indicated, as determined per ASTM E 814, but not less than that equaling or exceeding the fire-resistance rating of the constructions penetrated.

Fire-Resistive Joint Sealants: Provide joint sealants with fire-resistance ratings indicated, as determined per ASTM E 119, but not less than that equaling or exceeding the fire-resistance rating of the construction in which the joint occurs.

QUALITY ASSURANCE:

Provide firestopping products containing no asbestos as determined by the method specified in 40 cfr Part 763, Subpart F, Appendix A, Section 1, "Polarized Light Microscopy."

Firestopping for penetrations shall be the provided by the contractor responsible for the penetration.

SUBMITTALS:

General: Submit the following according to Conditions of Contract and Division 1 Specification Sections:

Product Data: for each type of product specified.

Product certificates signed by manufacturers of firestopping products by certifying that their products comply with specified requirements.

DELIVERY, STORAGE, AND HANDLING:

Deliver firestopping products to project site in original unopened containers or packages with intact and legible manufacturers' labels identifying product and manufacturer, date of manufacture; lot number; shelf life, if applicable; qualified testing and inspecting agency's classification marking applicable to project; curing time and mixing instructions for multicomponent materials.

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

PROJECT CONDITIONS:

Environmental Conditions: Do not install firestopping:

When ambient and substrate temperature conditions are outside the limits permitted by firestopping manufacturer or below 40 degrees F.

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

PART 2 - PRODUCTS

FIRESTOPPING, GENERAL:

Compatibility: Provide firestopping composed of components that are compatible with each another, the substrates forming openings, and the items, if any, penetrating the firestopping under condition of service and application, as demonstrated by firestopping manufacturer based on testing and field experience.

Accessories: Provide components for each firestopping system that are needed to install fill materials. Use only components specified by the firestopping manufacturer for the designated fire-resistance-rated systems. Accessories include but are not limited to the following items:

Permanent forming/damming/backing materials including the following:

Semirefractory fiber (mineral wool) insulation.

Sealants used in combination with other forming/damming materials to prevent leakage of fill material in liquid state.

Fire-rated foamboard.

Joint fillers for joint sealants.

Collars.

Steel sleeves.

FILL MATERIALS FOR THROUGH-PENETRATION FIRESTOP SYSTEMS

Job-Mixed Vinyl Compound: Prepackaged vinyl-based powder product for mixing with water at Project site to produce paintable compound, passing ASTM E 136, with flame spread and smoke-developed ratings of zero per ASTM E 84.

Mortar: Prepackaged dry mix composed of a blend of inorganic binders, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.

Pillows/Bags: Re-usable, heat-expanding pillow/bags composed of glass-fiber cloth cases filled with a combination of mineral fiber, water-insoluble expansion agents and fire retardent additives.

Silicone Foam: Two component, silicone-based liquid elastomer that, when mixed, expands and curves in place to produce a flexible, nonshrinking foam.

Silicone Sealant: Moisture curing, single component, silicone based, neutral-curing elastometric sealant of grade indicated below:

Grade for horizontal surfaces: Pourable (self-leveling) grade for openings in floors and other horizontal surfaces.

Grade for Vertical Surfaces: Nonsag grade for openings in vertical and other surfaces.

Available Products: Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to the following:

Job-mixed Vinyl Compound:

USG Firecode Compound, United States Gypsum Company

Mortar:

K-2 Firestop Mortar, Bio Fireshield, Inc.
Novasit K-10 Firestop Mortar, Bio Fireshield , Inc.
KBS-Mortar Seal, International Protective Coatings Corp.

Pillows/Bags:

Firestop Pillows, Bio Fireshield Inc.

KBS Sealbags, International Protective Coatings Corp.

Silicone Sealants:

Dow Corning Firestop Sealant 2000, Dow Corning Corp.
Dow Corning Firestop Sealant SL 2003, Dow Corning Corp.
Pensil 100 Firestop Sealant, General Electric Co.
CS240 Firestop Sealant, Hilti Construction Chemicals, Inc.

FIRE-RESISTANT ELASTOMERIC JOINT SEALANTS:

Elastomeric Sealant Standard: Provide manufacturer's standard chemically curing, elastometric sealants of base polymer indicated which complies with ASTM C 920 requirements, including those referenced for Type, Grade, Class and Uses, and requirements specified in this section applicable to fire-resistive joint sealants.

Sealant colors: Provide color of exposed joint sealants to comply with the following:

Provide selections made by Architect from manufacturer's full range of standard colors for products of type indicated.

Single Component, Neutral-Curing Silicone Sealant: Type S, Grade NS, Class 25, exposure related Use NT, and joint substrate related uses M, G, A and (as applicable to joint substrates indicated) O.

Single Component, Nonsag, Urethane Sealant: Type S, Grade NS, Class 25, and uses NT, M, A, and (as applicable to joint substrates indicated) O.

Single Component, Neutral-Curing, Silicone Sealant:

Dow Corning 790, Dow Corning Corp.
Dow Corning 795, Dow Corning Corp.
864, Pecora Corp.

Single Component, Nonsag, Urethane Sealant:

Isoflex 880 GB, Harry S. Peterson Co., Inc.
Isoflex 881, Harry S. Peterson Co., Inc.
Vulkem 921, Mameco International Inc.
Sikaflex - 15LM, Sika Corp.

MIXING

For those products requiring mixing prior to application, comply with firestopping manufacturer's directions for accurate proportional materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other procedures needed to produce firestopping products of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

INSPECTION:

Require installer to inspect penetrations indicated to receive firestopping for compliance with requirements, installation tolerances and other conditions affecting firestopping performance. Obtain Installer's written report listing any conditions detrimental to performance of firestopping work. Do not allow firestopper to proceed until unsatisfactory conditions have been corrected.

PREPARATION:

Surface Cleaning: Clean out openings and joints immediately before installing firestopping to comply with recommendations of firestopping manufacturers and the following requirements:

Remove all foreign material from all openings and joint substrates which could interfere with adhesion of firestopping, including dust; paints, except for permanent, protective coatings tested and approved for firestopping adhesion and compatibility by firestopping manufacturer; oil; grease; waterproofing; water repellents; water; surface dirt and frost.

Clean opening and joint substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with firestopping. Remove loose particles remaining from cleaning operation.

Clean concrete, masonry, unglazed surfaces of ceramic tile and similar porous opening and joint substrate surfaces, by brushing, grinding, blast cleaning, mechanical abrading, acid washing or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with firestopping. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air.

Remove laitance and form release agents from concrete.

Joint Priming: Prime opening and joint substrates where recommended by firestopping manufacturer based on prior experience. Apply primer to comply with firestopping manufacturer's recommendations. Confine primers to areas of firestopping bond, do not allow spillage or migration onto adjoining surfaces.

Masking Tape: Use masking tape where required to prevent contact of firestopping with adjoining surfaces which otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove firestopping smears. Remove tape immediately after tooling without disturbing firestopping seal.

INSTALLING THROUGH-PENETRATION FIRESTOPS

General: comply with the through-penetration firestop manufacturer's installation instructions and drawings pertaining to products and applications indicated.

Install forming/damming materials and other accessories of types required to support fill materials during their application and in the position needed to produce the cross sectional shapes and depths required to achieve fire ratings of designated through-penetration firestop systems. After installing fill materials, remove combustible forming materials and other accessories not indicated as permanent components of firestop systems.

Install fill materials for through-penetration firestop systems by proven techniques to produce the following results:

Completely fill voids and cavities formed by openings, forming materials, accessories, and penetrating items.

Apply materials so they contact and adhere to substrates formed by openings and penetrating items.

For fill materials that will remain exposed after completing work, finish to produce smooth, uniform surfaces that are flush with adjoining fixtures.

INSTALLATION OF FIRE RESISTIVE JOINT SEALANTS:

General: Comply with ASTM C 1993 and with firestopping manufacturers' printed installation instructions applicable to products and applications indicated, except where more stringent requirements apply.

Install Joint-fillers of type indicated to provide support of sealants during application and at position required to produce the cross-sectional shapes and depths of installed sealants relative to joint widths which allow optimum sealant movement capability and develop fire-resistant rating required.

Installation of Sealants: Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration and providing uniform, cross-sectional shapes and depths relative to joint widths which allow optimum sealant movement capability. Install sealants at the same time joint fillers are installed.

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

CLEANING

Clean off excess fill materials and sealants adjacent to openings and joints as work progresses by methods and with cleaning materials approved by manufacturers of firestopping products and of products in which opening and joints occur.

Protect firestopping during and after curing period from contract with contaminating substances or from damage resulting from construction operations or other causes so that they are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated firestopping immediately and install new materials to produce firestopping complying with special requirements.

END OF SECTION 07270

SECTION 07275 - WEATHER BARRIERS

PART 1 - GENERAL

RELATED DOCUMENTS

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

SUMMARY

Section Includes:

Building wrap. “Air Infiltration Barrier” on Drawings.

Related Requirements:

See Section 07200 for insulation specifications.
See Section 07600 for flexible flashing and sheet metal.

ACTION SUBMITTALS

Product Data: For each type of product.

For building wrap, include data on air and water-vapor permeance based on testing according to referenced standards.

PART 2 - PRODUCTS

WATER-RESISTIVE BARRIER

Building Wrap: ASTM E 1677, Type I air barrier; with flame-spread and smoke-developed indexes of less than 10 and 10, respectively, when tested according to ASTM E 84 (Class A); ASTM D 1117 Tear resistance 10 lbs.; ASTM D 882 Tensil Strength 35 lbs./in.; UV stabilized; and acceptable to authorities having jurisdiction.

Products: Subject to compliance with requirements, **provide the following:**

DuPont - **Tyvek CommercialWrap**

Water-Vapor Permeance: Not less than 28 perms per ASTM E 96/E 96M, Desiccant Method (Procedure B).

Air Permeance: Not more than 0.001 cfm/sq. ft. at 75 Pa when tested according to ASTM E 2178.

Allowable UV Exposure Time: Not less than three months.

MISCELLANEOUS MATERIALS

Flashing system (other than that covered under Section 07600), seam tape, fasteners, sealants, adhesives, and primers shall be provided by the selected structural insulating sheathing manufacturer to be installed as a single source system.

PART 3 - EXECUTION

WATER-RESISTIVE BARRIER INSTALLATION

Cover exposed exterior surface of sheathing with water-resistive barrier securely fastened to framing immediately after sheathing is installed.

Cover sheathing with water-resistive barrier as follows:

Cut back barrier 1/2 inch (13 mm) on each side of the break in supporting members at expansion-or control-joint locations.
Apply barrier to cover vertical flashing with a minimum 4-inch (100-mm) overlap unless otherwise indicated.

Building Wrap: Comply with manufacturer's written instructions.

Seal seams, edges, fasteners, and penetrations with tape.
Extend into jambs of openings and seal corners with tape.

END OF SECTION 07275

SECTION 07311 - ASPHALT SHINGLES

PART 1 - GENERAL

RELATED DOCUMENTS:

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

Rough Carpentry (roof deck, furring, fasteners, etc.) specified in Section 06100

Flashing And Sheet Metal specified in Section 07600.

DESCRIPTION OF WORK:

Types of shingle applications specified in this section include the following:

Asphalt shingle roofing (fiberglass base) typical. **Match existing shingle Type and Color**
Roofing Underlayment.
Shingle roof related flashing.

See Section 07600 for Flashing and Sheet Metal for gutters, downspouts and trim metal.

SUBMITTALS:

Manufacturer's literature for the following:

Shingles.
Flashings.

Samples for the following:

Shingles - showing range of color and texture for chosen shingle.

Shingle Nails, Underlayment Nails, Metal Drip Edge, Metal Drip Edge, Metal Flashing and a specimen copy of Manufacturer's Warranty.

QUALITY ASSURANCE:

UL Listing: Provide labeled materials which have been tested and listed by UL for Class and Rating indicated for each shingle type required.

Guarantees: **All roofing is to be guaranteed by the Contractor to be free of defects in material and workmanship for a period of two (2) years following final acceptance.** This guarantee is over and above any manufacturer's or subcontractor's warranties. Should any such defects develop within the period of the warranty, the Owner will notify the Contractor in writing, and the defects shall be corrected promptly to the satisfaction of the Owner at no additional cost.

The Owner has the right to make temporary, emergency repairs to a roof in order to protect the building and its contents from damages reasonably possible and/or expected. Cost of such repairs shall be borne by the roofing contractor, and such action by the Owners shall not invalidate any guarantee.

The contractor shall make **two inspections of the roof** with the Owners during the time covered by this guarantee period. One inspection shall occur 12 months after the roof is satisfactory completed and one 23 months after the roof is satisfactory completed and shall repair as part of this contract any and all defects in the work to the Owner's satisfaction. **It is the responsibility of this contractor to schedule these inspections; failure to schedule these inspections will automatically extend the length of the guarantee until required inspections are performed (and related deficiencies corrected) or an additional year has pasted, whichever is less.**

DELIVERY, STORAGE AND HANDLING:

Deliver materials in manufacturer's unopened, labeled containers.

Store materials to avoid water damage, and store rolled goods on end. Comply with manufacturer's recommendations for job-site storage and protection.

JOB CONDITIONS:

Substrate: Proceed with shingle work only after substrate construction and penetrating work have been completed.

Weather Conditions: Proceed with shingle work only when weather conditions are in compliance with manufacturer's recommendations and when substrate is completely dry.

PART 2 - PRODUCTS

ASPHALT SHINGLE MATERIALS:

Three-Tab Dimensional, Fiberglass, Laminated Strip Shingles: Mineral-surfaced, self-sealing, laminated, multi-ply overlay construction, fiberglass-based, strip asphalt shingles, complying with both ASTM D 3018, Type I, and ASTM D 3462. Provide shingles with a Class A fire-test-response classification that pass the wind-resistance-test requirements of ASTM D 3161.

Weight: not less than 300 lbs. per square.

Color: as selected by Architect from full range of colors matching the existing Church Shingles.

Available Products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:

Independence Shingle; CertainTeed Corp.
Timberline Prestique High Definition 40; GAF Corporation.
Atlas StormMaster LM-50, Atlas Roofing Corp.

Asphalt-Saturated Roofing Felt: No. 30, unperforated organic felt, complying with ASTM D 226, Type II., 36" wide.

Use: Typically applied over roof sheathing.

(Coordinate exact felt material specifications and characteristics with Shingle Manufacturer)

Synthetic Roofing Underlayment: Engineered, mechanically attached high strength coated woven construction of 100% synthetic polymers. Product offers 6 month UV exposure rating, high tear strength anchoring and slip resistant coating. Passing both Class A Fire (ASTM E 108) and Nail Sealability (ASTM D 1970). Permeability ASTM E96-00 of .06 perms.

Class A Fire ASTM E 108:	Pass.
Nail Sealability ASTM D 1970 :	Pass
Permeability ASTM E96-00:	06 perms.
Minimum Thickness ASTM D1777:	17 mils.

Use: **Contractor's option** – applied over roof sheathing.

Snow and Ice Guard: Self-Adhering Underlayment, ASTM D 1970, minimum of 40 mil thick sheet; slip resisting, polyethylene-film-reinforced top surface laminated to SBS-modified asphalt adhesive with release paper backing; cold applied.

Hip and Ridge Shingles: Manufacturer's standard factory pre-cut units to match shingles or job-fabricated units cut from actual shingles used.

Asphalt Plastic Cement: Fibrated asphalt cement complying with ASTM D 2822, designed for trowel application.

Nails: Aluminum or hot-dip galvanized 11 or 12-gage sharp pointed conventional roofing nails with barbed shanks, minimum 3/8" diameter head, and of sufficient length to penetrate minimum 3/4" into solid decking or to penetrate through plywood sheathing.

Felt Underlayment Nails: Hot-dipped galvanized steel nail with low-profile capped heads or disc caps, 1 inch minimum diameter.

Staples: Stapling of shingles **not permitted.**

Metal Drip Edge: **Minimum .032" prefinished** aluminum sheet, brake-formed to provide roof deck flange, and fascia flange with drip at lower edge of eaves and along gable ends. (See Drawings) Furnish in 8' or 10' lengths.

Metal Flashing: **.040" prefinished** finish sheet aluminum. Job-cut to sizes and configurations required.

Vent Flashing: Provide flexible molded rubber cone vent flashing unit at each plumbing vent through roof (VTR). Unit shall have galvanized steel base with factory adhered rubber cone boot attachment which slides over VTR and seals against leaking. Units shall be sized per vent pipe sizes. Install in sequence with shingle; setting unit in asphalt plastic cement and integrating into shingle layers.

WARRANTY

Manufacturer' Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace asphalt shingles that fail (in material) within specified warranty period. Material failures include manufacturing defects and failure of asphalt shingles to self-seal after a reasonable time.

Material Warranty Period: **25 Years** from date of Substantial Completion, prorated, with first 10 years non-prorated.

Algae-Discoloration Warranty Period: Asphalt shingles will not discolor for **10 years** from date of Substantial Completion.

PART 3 - EXECUTION

INSPECTION:

Installer of shingles must examine substrate and conditions under which shingling work is to be performed and must notify Contractor in writing of unsatisfactory conditions. Do not proceed with shingling work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

INSTALLATION:

General: Comply with instructions and recommendations of shingle manufacturer, except to extent more stringent requirements are indicated.

Asphalt Shingles:

Snow and Ice Guard (Self-Adhering Underlayment): installed in the following locations:

- Eaves: Extend underlayment membrane from edges of eaves 24 inches beyond interior face of exterior wall.
- Walls: Extend underlayment membrane from lowest to highest point 18 inches on each side.
- Ridges: Extend underlayment membrane 18 inches on each side without obstructing continuous ridge vent slot. Lap in direction to shed water. Lap sides 4 inches and ends 6 inches. Extend underlayment membrane up not less than 4 inches at sidewalls.

Underlayment (Roofing Felt): Install double layer of felt underlayment on the roof deck perpendicular to the roof slope in parallel courses. Install a 19 inch wide starter course at eaves and completely cover with full-width second course. Install succeeding courses lapping previous courses 19 inches in shingle fashion. Lap ends a minimum of 6 inches. Fasten with specified fasteners along laps at 6 inches on center. Do not over-nail underlayment. Lap felt underlayment a minimum of 4 inches over Snow and Ice Guard - self-adhering underlayment membrane.

Flashing and Edge Protection: Install metal flashing including valleys, vent flashing and edge protection, as shown and in compliance with shingle manufacturer's details and recommendations.

Provide base flashing and counterflashing trim waterstops around the entire perimeter of the relocated existing steeple and the roof it sits upon.

Shingles: Install shingles in strict accordance with the shingle manufacturer's written instructions. In the event of conflict between the instructions and these specifications, these specifications shall apply – **notify architect** regarding any conflict that may jeopardize manufacturer's warranty.

Mix shingles as recommended by manufacturer to ensure a uniform blend of colors and textures throughout the roof system.

Check shingle wrappers for run numbers. If all shingles for any distinct and complete roof area are not of the same run number, be sure colors match before shingles are applied.

Do not apply shingles which vary in color, shade or texture. Such variations in appearance will not be acceptable.

Do not apply bent, burred or otherwise defaced shingles. Do not apply shingles with felt splices or suspected splices.

At all eaves, install starter course of shingles. Extend shingles beyond drip edge approximately ½ inch to ¾ inch.

Snap chalk lines to assure shingles are correctly aligned. Provide exposure as recommended by manufacturer.

Install first course of shingles at eaves directly over starter course. Stagger end joints off those of starter course as required by shingle manufacturer.

Apply shingles in courses with butt edges straight and aligned the entire width of each course.

At ridges, install individual ridge shingles supplied by the shingle manufacturer.

Secure all shingles by hand-nailing with specified fasteners in strict accordance with shingle manufacturer's latest printed instructions (except as amended herein) using not less than 6 fasteners per shingle. Staples are not permitted.

Nail laminated architectural shingles precisely as required by manufacturer. Ensure that fasteners penetrate all laminations.

All shingles, including ridge, must have tabs sealed. Cement bottom of shingles with manufacturer-approved cement applied under tab on each slope.

Apply 4 "quarter-sized" dabs of shingle tab adhesive to the back of the shingles. Avoid applying excess tab adhesive as excess adhesive may cause blistering.

END OF SECTION 07311

SECTION 07530 – THERMOPLASTIC POLYOLEFIN SINGLE PLY ROOFING (TPO)

PART 1 - GENERAL

RELATED DOCUMENTS

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

Steel Deck is specified in Division 5.

SUMMARY

This Section includes mechanically attached thermoplastic polyolefin single-ply roofing, insulation and accessories, installed in accordance with drawings and specifications approved by the roofing membrane manufacturer.

Uses: Typical over the "sloped" roof metal deck areas providing ¼" per foot slope for drainage.

Types of roofing systems specified in this section utilizing single ply roofing membranes include the following:

Mechanically fastened systems. **60 mil reinforced system**
on metal roof deck system.
Tapered rigid board roof insulation where shown
Mechanically attached Flat rigid board insulation, (UL 1256/FM 4450) typical.

REFERENCES

ASTM D 412 Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension; 1998a (or current edition)

ASTM D 471 Standard Test Method for Rubber Property – Effect of Liquids

ASTM D 573 Standard Test Method for Rubber Property –Deterioration in an Air Oven

ASTM D 751 Standard Test Method for Coated Fabrics 2000 (or current edition)

ASTM D 816 Standard Test Method for Rubber Cements 1982-2001)(or current edition)

ASTM D 1149 Standard Test Method for Rubber Deterioration – Surface Ozone Cracking in a Chamber 1999 (or current edition)

ASTM D 1204 Standard Test Method for Linear Dimensional Changes of Nonrigid Thermoplastic Sheeting or Film at Elevated Temperatures; 2002 (or current edition)

ASTM D 2137 Standard Test Method for Rubber Property – Brittleness Point of Flexible Polymers and Coated Fabrics; 1994 – 2000

FM P7825 Approval Guide Factory Mutual Research Corporation, current edition

FED STD 101 Test Procedures for Packaging Materials, Federal Specifications and Standards, Revision C 1980 – Change Noticed 3 1988 (or current edition)

UL (FRD) – Fire Resistant Directory, Underwriters Laboratories Inc, current edition

SUBMITTALS

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

Product data, installation instructions, and general recommendations from manufacturer of the roofing system. Include data substantiating that materials comply with requirements.

Product data sheets for each material required including:

- Membrane
- Membrane fasteners
- Insulation
- Insulation fasteners
- Metal Accessories
- Caulks and sealants
- Unreinforced flashing material
- Performed corners and boots
- Traffic Walk Pads
- And other required materials.

Manufacturer's standard details for each applicable project condition

Manufacturer's installation instructions.

Samples of finished roofing sheets, including T-shaped side/end-lap seam. Also include the following:

Samples of required insulation boards, walkway pad material, membrane and insulation fasteners.

Shop drawings showing roof configuration, sheet layout, seam locations, colors (as applicable), details at perimeter, and special conditions.

Indicate layout of mechanical fasteners.

Indicate layout of tapered insulation materials.

Indicate method of Insulation attachment.

Base flashings and terminations.

Pre-roofing Conference records.

Test data for pullout resistance of fastening systems.

Sample warranty of standard roofing system warranty stating obligations, remedies, limitations, and exclusions of warranty.

Inspection Report: Copy of roofing system manufacturer's inspection report of completed roofing inspection.

QUALITY ASSURANCE

Installer: Engage an experienced Installer to apply single ply membrane roofing who has specialized in application of roofing systems similar to those required for this project. Installer must be acceptable to or licensed by manufacturer of primary roofing material.

Work associated with single ply membrane roofing, including (but not limited to) insulation, flashing and counterflashing, expansion joints, and joint sealers, is to be performed by Installer of this work.

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

PROJECT CONDITIONS

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

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

WARRANTY

Special Project Warranty: Submit two executed copies of 2-year "Roofing Warranty" covering work of this section including roofing membrane, composition flashing, roof insulation, and roof accessories, signed and countersigned by Installer (Roofer) and Contractor.

Manufacturer's Warranty: Submit executed copy of single ply membrane manufacturer's "Limited Service Warranty" agreement including flashing endorsement, signed by an authorized representative of manufacturer. Provide form that was published with product literature as of date of Contract Documents, for the following period of time:

Warranty Period: 20 years NDL after date of Substantial Completion.

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

PART 2 - PRODUCTS

MANUFACTURER

Acceptable Manufacturer: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the work include, but are not limited to, the following:

Carlisle Syntec Systems. Sure Weld
EverGuard TPO 60
Johns Manville TPO
Firestone Building Products Co. Ultra Ply
Versico Roofing Systems “Versiweld”

ROOFING SYSTEM

Provide: **One of the above roofing products** or pre-approved equal.

Classified by Underwriters Laboratories as a Class A roofing material for use in construction of Class A roofing assemblies.

Meet test requirements for FM Class 1A fire and **I-90** wind resistance.

Membrane: Scrim-reinforced, **thermoplastic polyolefin** (TPO) based sheet, bearing UL label on the packaging.

Thickness: 60 mil reinforced., nominal when measure in accordance with ASTM D 751

Sheet Length: as required to avoid end seams.

Color: **White**.

Breaking Strength: 225 lbf, when tested in accordance with ASTM D 751, Grab Method.

Elongation: ultimate of unreinforced membrane (ASTM D 412, Die C) 500 percent.

Tear Strength: ASTM D 751 Procedure B (8 x 8 inch sample) 55 lbf

Brittleness Test: ASTM D 2137 at minus 40 deg C – Pass

Dimensional Stability percent change max (ASEM D 1204 B 1 hr at 212 deg F , W; 6hrs at 176 deg F); White plus/minus .5 percent

Factory seam strength (ASTM D 816 method B) sheet failure

Water Absorption (ASTM D 471) 158 deg F for 7 days; Plus 2 percent max weight change.

Ozone Resistance of unreinforced membrane: No cracking when tested in accordance with ASTM D 1149 for 70 hr at 100 deg F

Weather Resistance (Xenon arch: 4000 hrs, EMMAQUA; 2,000,000 Langleys) Pass.

Puncture Resistance (FED STD 101, Method 2031) 350 lb.

Heat Aging (ASTM D 573) 28 days at 212 deg F; break at 225 lbf; elongation of 500 percent.

ACCESSORY MATERIALS

Seam Sealing System: Manufacturer's standard materials for sealing lapped joints, including edge sealer to cover spliced edges as recommended by membrane manufacturer.

Flashing Material: Manufacturer's standard system compatible with membrane specified here in.

Bonding Adhesive: Manufacturer's recommended Bonding Adhesive

Perimeter Sheets: as specified here in.

All purpose Sealant: Use for water cut-off mastic, pitch box sealer and to seal membrane to metal.

Cut Edge Sealant: Use toe seal exposed cut edges of reinforced membrane.

Seam Cleaner: Use to remove contaminates from the surface of the membrane where hot air welding is to occur.

Insulation: Isocyanurate foam that is accepted in writing by membrane manufacturer and approved by its manufacturer for mechanically attached installations.

R-Value: Minimum roof value of R30 LTTR for 5." thickness – insulation only. Provide **UL 1256/FM 4450 certified insulation.**

Thickness: min. 5" as indicated on drawings **OR Greater if necessary** to meet required R-Value. Rigid insulation shall be installed in a minimum of two 2.5" layers with all joints staggered.

Tapered insulation at thinnest point of 4" shall have a minimum R value 24

Code requirements for Foam Plastic Insulation (2012 NC Building Code Section 2603)

Surface Burning: ASTM E 84 or UL 723
Fire-Resistant Rating: ASTM E 119 or UL 263
Thermal Barrier: FM 4880, UL 1040. NFPA 286 or UL 17215
Potential Heat: NFPA 259
Roof: Class A, B,C, roof coverings FM 4450 or UL 1256.

All packages and containers of foam plastic insulation shall bear the label of Factory Mutual showing compliance with FM 4450.

Slip Sheet: Approved by membrane manufacturer; use if required by membrane manufacturer.

Tapered Edge Strips: Non Combustible, High density fiber board.

Mechanical Fasteners: Corrosion resistant type and spacing as required by and supplied by roof membrane manufacturer.

Termination Bar: Corrosion resistant type Termination Bar fastened 6 inches on center, or as required by roof membrane manufacturer.

Roof Walkway Pads: As recommended by the membrane manufacturer heat welded to membrane. LOCATIONS AS SHOWN ON PLANS

PART 2 - EXECUTION

GENERAL

Do not deviate from this specification without written approval of the manufacturer. Should deviations or changes occur without the manufacturer's approval, the project will not be eligible for warranty coverage.

Do not deviate from this specification without written approval of Ramsay Burgin Smith Architects, Inc.

EXAMINATION

Verify that surfaces to be bonded to are dry, clean and free of debris. Suitable surfaces are smooth, solid masonry wood, and metal, plus insulation board fastened to the specific manufacturer's recommendations for receiving adhered roofing membranes and accepted by Roofing Manufacturer formechanically attached application.

Verify that positive roof slope exists in all areas.

Verify that rooftop mechanical units are to have their condensation lines piped to drains or off the roof.

Verify that mechanical roof curb units are installed in a watertight condition and that all curb penetrations for conduits, etc are not compromising a watertight roof flashing installion.

Correct unsuitable conditions before proceeding with insulation. Commencing installation signifies acceptance by the installer of the substrate.

SUBSTRATE PREPARATION

Prior to the start of work, make the substrate smooth and free of debris, sharp edges, and other surface irregularities that will be detrimental to the installation.

Correct unevenness and joint gaps greater than ¼ inch in the membrane substrate as they can cause inconsistent membrane welds. When such conditions occur fill with appropriate and properly secured insulation or material approved by manufacturer's technical review department

Nailers: Verify that:

Nailers are pressure-preservative treated (fire-retardant-treated where required; creosote and asphaltic preservatives are not acceptable).

Nailers are anchored with fasteners suitable for the application having a minimum withdrawal resistance of 100 lb. Staggered 6 inches on center within 8 feet of an outside corners and 12 inches on center along other perimeter areas.

Top surfaces of nailers match the top surface of adjacent construction plus/minus ¼ inch, without contributing to ponding.

Flashing Substrates: Verify that the substrate is smooth and free of sharp edges and other surface irregularities that will be detrimental to 100-percent adhesion of the flashing membrane.

FASTENERS – GENERAL

Install fasteners with a depth-sensing screw gun to prevent overdriving or underdriving, unless otherwise approved or required by project conditions.

ADHESIVES:

Provide adhesive approved for use by both the membrane and insulation suppliers.

INSULATION INSTALLATION

Handle and secure insulation boards so as to not damage or rupture the facer and surface. Cut out damaged areas and replace with structurally sound insulation, properly secured in place.

General: Extend insulation full thickness in two layers, over entire surface tobe insulated, cutting and fitting tightly around obstructions. Form cant strips, crickets, saddles, and tapered areas with additional material as shown and as required for proper drainage of membrane.

Install boards with the longest dimension perpendicular to the direction of the membrane seams and with end joints staggered. Butt boards as closely as possible with no gaps over ¼ inch.

Do not install more insulation each day than can be covered with membrane before the end of the day or before the start of inclement weather.

Mechanically attach boards:

Secure roof insulation to substrate with bar or other type of mechanical fastener patterns and spacing in accordance with approved submittals to meet specified wind-uplift spacing but in no case, less than anchorage for field, perimeter and corner uplift resistance as determined by NC Building Code requirements. Tapered insulation at crickets or saddles shall be adhered with ribbons of insulation adhesive as determined by NC Building CCode requirements.

Provide additional fasteners as necessary to conform to the substrate surface geometry.

Tapered Insulation: Install tapered boards under a layer of flat insulation boards; maintain smooth transition at changes of slope.

MEMBRANE INSTALLATION

Attachment of Membrane: Mechanically fastened. Space fasteners in accordance with manufacturer's standard details and approved submittals.

Perimeter Sheets: Install perimeter sheets and full-sheet in accordance with fastener pattern specified below, approved shop drawings. Install fasteners along the edge of the membrane through the insulation, and into the roof deck.

Field Sheets:

Unroll membrane on the area to be covered.

Install fasteners along the leading edge of the membrane, as illustrated in membrane manufacture's details, through the insulation, and into the roof deck.

Lap adjoining rolls of membrane over the fastened edge of the installed membrane by 5 ½ inches in accordance with standard details for fastener location and specific deck type penetration requirements.

SEALING OF MEMBRANE

Lap Splices: Overlap and hot-air weld membrane without any contaminants (adhesive, dirt, debris, etc.) in the seam.

An automatic hot-air welder and hand-held welder that are functionally in top condition are required.

Use hand-held welders for small work and repairs.

Use automatic hot-air welders for field seaming.

Caulk cut edges by applying Cut-Edge Sealant from a squeeze bottle.

Welding of Membrane After Exposure:

Remove visible dirt and debris with a clean cloth and water. If necessary, use a detergent cleaner (e.g. Fantastik or 409) followed by a water fines.

With a clean scrub pad saturated with Seam Cleaner, aggressively agitate the seaming area. With a clean white cloth, make a final one-swipe pass over the seaming area, being careful not to redeposit contaminants onto the cleaned surface.

Allow Seam Cleaner to completely flash off (membrane should be completely dry).

Follow the standard hot-air welding procedure with an approximate 20 percent reduction in speed.

Final weld strength may not be achieved for several days.

FLASHINGS, EXPANSION JOINTS, DRAINS, AND WALKWAYS

Flashing: Flash perimeters, curbs, vents, drains, and other details as shown by manufacturer's Standard Detail Drawings. Do not cover weep holes or any form of through-wall drainage.

Expansion Joints: Install in accordance with membrane manufacturer's details.

Metal Work:

Install and anchor in a manner that prevents damage from buckling or wind in accordance with SMACNA guidelines or in manner approved by membrane manufacturer.

Seal and waterproof in an acceptable manner to prevent leakage.

Make and install Metal flashing at perimeter in accordance with membrane manufacturer's details.

Roof Walkway Pads: Install pads in accordance with roofing manufacturer's instructions.

Prepare dirty or weathered membrane:

Remove any visible dirt and debris with a clean rag and water.

For heavily contaminated surface, scrubbing with a detergent cleaner (i.e. Fantastik or 409) followed by a water rinse may be necessary.

With a clean scrub pad saturated Seam Cleaner, aggressively agitate the seaming area of the roof membrane surface.

With a clean white rag, follow with a final one-swipe pass being careful not to redeposit any contaminants back onto the cleansed sheet surface.

Allow Seam Cleaner to completely flash off; membrane should be completely dry.

Position walkway pad and cut to desired length.

Whenever possible, do not cover membrane seams with walkway pad. When installed adjacent to a seam, keep the pad a minimum of 2 inches from the edge of the seam on the bottom sheet of the completed lap and a minimum of 6 inches from the edge of the seam when located on the top sheet of a completed lap.

When covering seams is unavoidable, the lap seam should be completed per manufacturer's specifications and thoroughly probed with any deficiencies repaired prior to pad installation.

In circumstances where drainage around the walkway pad is a concern, shorter walkway pad lengths spaced with a 2-inch gap may be desired.

Weld perimeter of walkway pad to the membrane following standard welding procedures. Periodic breaks in the weld of 1 to 2 inches are required on the low slope edge of the pad to prevent the accumulation of water under the pad.

FIELD QUALITY CONTROL

Ensure that metal work shall be secured in a manner approved by roof membrane manufacturer, or in accordance with SMACNA guidelines, to prevent damage from buckling, or wind exposure. All metal work that is part of the waterproofing envelope shall be sealed, structurally sound, and approximately anchored to prevent leakage.

Tests:

Seam Tests: Probe the entire lap edge of each seam with an approved seam-probing tool (cotter-pin extractor) after seam has cooled completely to verify seam consistency. Probing before the seam area has cooled will damage the membrane

Destructive Seam Tests: Test 3-inch wide area of seam weld to verify good peel strength. A properly welded seam will have membrane delamination from scrim prior to weld failure. Perform the following destructive tests on welds:

First seam of each working day.

First seam after the automatic hot-air welder has been allowed to cool down.

After any extreme changes in weather conditions.

Manufacturer's Field Service: Upon completion of the installation, have the manufacturer's representative make an inspection to ascertain that the roofing membrane system has been installed according to manufacturer's approved specifications and details.

Warranty Inspection: Provide manufacturer's inspection for acceptance for warranty.

Rejection of Defective Work: Areas having excessive patching as a result of damage to the membrane or faulty installation may be rejected by membrane manufacturer or the Architect.; replace the membrane completely in these areas.

PROTECTION AND CLEANING

Protect membrane in progress and completed membrane from foot and vehicular traffic.

Clean soiled surfaces, remove trash and debris, and leave project site in a clean condition.

END OF SECTION 07533

SECTION 07600 - FLASHING AND SHEET METAL

PART 1 - GENERAL

RELATED DOCUMENTS

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

SUMMARY

This Section includes the following:

Prefinished metal counter flashing and base flashing
Exposed prefinished metal trim/coping units.
Miscellaneous sheet metal accessories.

Prefinished aluminum downspouts and gutters
Elastic flashing.

Integral masonry flashings are specified as masonry work in sections of Division 4.

Roofing accessories, including gutters and downspouts, installed integral with roofing system are specified in this section but shall be part of the roofing system work.

All roof and rain drainage work shall be assigned to the same roofing subcontractor for single point of responsibility.

Note: All sheet metal flashings, copings shall be designed and installed to meet minimum UL -90 wind certification. Gutters and downspouts shall have additional stapping to secure them above that required to meet the above certification.

Flashing and Sheet Metal for Warehouse and Vehicle Shed are specified in" Metal BuildingsSystems" Section 13125

SUBMITTALS

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

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

Samples of the following flashing, sheet metal, and accessory items:

8-inch-square samples of specified sheet materials to be exposed as finished surfaces.

12-inch-long samples of factory-fabricated products exposed as finished work. Provide complete with specified factory finish.

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

SPECIFICALLY PROVIDE SPECIAL ATTENTION TO WATERTIGHT DETAILING OF FLASHING AT THE STEEPLE BASE AND WHERE FLASHING MEETS EIFS MATERIAL.

PROJECT CONDITIONS

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

PART 2 - PRODUCTS

SHEET METAL FLASHING AND TRIM MATERIALS

Aluminum (Metal Trim fascia, coping units, counterflashing, gutters and downspouts, window flashings and flashings roof edge termination strips): ASTM B 446, alloy 3005, temper H14, 70% Kynar 500 finish; 0.040" thick minimum except as otherwise indicated. Treat with asphaltic compound as required against dissimilar materials.Colors: Color to be selected by architect.

Finish: 70% Kynar-500 based fluoropolymer coating. Submit Standard manufacturer's color samples from companies with a wide variety of colors for architect's approval and selection. (Color selections shall include a several shades of white/off white.)

Typical use: All roof top copings, cleats, edge trims, gutters, downspouts, etc. exposed to view.

Extruded Aluminum (reglets): Manufacturer's standard extrusions of sizes and profiles indicated, 6063-T52, mill finish; 0.08" minimum thickness for primary legs of extrusions.

FLEXIBLE SHEET MEMBRANE FLASHING

Elastic Sheet Flashing/Membrane: Nonreinforced flexible, black elastic sheet flashing of 50 to 65 mils' thickness and complying with the following:

Shore A Hardness (ASTM D 2240): 50 to 70.
Tensile Strength (ASTM D 412): 1200 psi.
Tear Resistance (ASTM D 624, Die C): 20 lbs. per linear inch.
Ultimate elongation (ASTM D 412): 250 percent.
Low temperature brittleness (ASTM D 746): minus 30 deg F (minus 35 deg C).
Resistance to ozone aging (ASTM D 1149): no cracks for 10 percent elongated sample for 100 hours in 50 pphm (50.5 mPa) ozone at 104 deg F (70 deg C).
Resistance to Heat Aging (ASTM D 573): maximum hardness increase of 15 points, elongation reduction of 40 percent, and tensile strength reduction of 30 percent, for 70 hours at 212 deg F (100 deg C).

Acceptable Products:

Neoprene synthetic rubber sheet.
Butyl synthetic rubber sheet.
EPDM synthetic rubber sheet.

Miscellaneous Materials and Accessories:

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

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

Mastic Sealant: Polyisobutylene; nonhardening, nonskinning, non-drying, nonmigrating sealant or, if in contact with roof membrane, as recommended by single-ply roof membrane manufacturer for its intended use.

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

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

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

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

Reglets: Metal units of type and profile indicated, compatible with flashing indicated, noncorrosive.

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

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

Roofing Cement: ASTM D 2822, asphaltic or, if in contact with roof membrane, as recommended by single-ply manufacturer for intended use.

FABRICATED UNITS

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

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

Expansion Provisions: Where lapped or bayonet-type expansion provisions in work cannot be used or would not be sufficiently water/weatherproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

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

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

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

PART 3 - EXECUTION

INSTALLATION REQUIREMENTS

General: Except as otherwise indicated, comply with manufacturer's installation instructions and recommendations and with SMACNA "Architectural Sheet Metal Manual." Anchor units of work securely in place by methods indicated, providing for thermal expansion of metal units; conceal fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weatherproof.

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

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

Install reglets to receive counterflashing in manner and by methods indicated. Where shown in concrete, furnish reglets to trades of concrete work for installation as work of Division 3 sections. Where shown in masonry, furnish reglets to trades of masonry work, for installation as work of Division 4 sections.

Install counterflashing in reglets, either by snap-in seal arrangement or by welding in place for anchorage and filling reglet with mastic or elastomeric sealant, as indicated and depending on degree of sealant exposure.

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

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

CLEANING AND PROTECTION

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

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

END OF SECTION 07600

SECTION 07900 - JOINT SEALERS

PART 1 - GENERAL

RELATED DOCUMENTS:

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

DESCRIPTION OF WORK:

Extent of each form and type of joint sealer is indicated on drawings and described in this section.

Refer to Division-8 Section "Tile" for joint sealers in tile work; not work of this section.

Refer to Division-8 sections for glazing requirements; not work of this section.

Refer to Division-15 and 16 sections for joint sealers in mechanical and electrical work; not work of this section.

SYSTEM PERFORMANCES:

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

QUALITY ASSURANCE:

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

SUBMITTALS:

Product Data: Submit manufacturer's technical data for each joint sealer product required, including instructions for joint preparation and joint sealer application and range of manufacturer's standard color selection.

DELIVERY, STORAGE, AND HANDLING:

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

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

PROJECT CONDITIONS:

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

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

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

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

PART 2 - PRODUCTS

MATERIALS, GENERAL:

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

Colors: Provide color of exposed joint sealer indicated or, if not otherwise indicated, as selected by Architect from manufacturer's standard colors.

ELASTOMERIC JOINT SEALANTS:

Elastomeric Sealant Standard: Provide manufacturer's standard chemically curing, elastomeric sealant of base polymer indicated which complies with ASTM C 920 requirements, including those for Type, Grade, Class and Uses.

Multi-Part Nonsag Urethane Sealant: Type M, Grade NS, Class 25, and complying with the following requirements for uses:

Uses NT, M, G, A and, as applicable to joint substrates indicated, O.

Applications: Typical exterior building joints horizontal and vertical between similar and dissimilar materials closing all potential water, air and light leaks.

One-Part Pourable Urethane Sealant: Type S, Grade P; Class 25; Uses T, M, and, as applicable to joint substrates indicated, O.

Applications: Typical all exterior building joints over expansion joints in concrete walkways.

One-Part Mildew-Resistant Silicone Sealant: Type S; Grade NS; Class 25; Uses NT, G, A, and, as applicable to nonporous joint substrates indicated, O; formulated with furgicide for sealing interior joints with nonporous substrates around ceramic tile, showers, sinks and plumbing fixtures.

Applications: Typical all caulking in toilets, kitchens, shower rooms, labs and similar wet areas. Apply as required to seal all light and air leaks, between counter backsplashes and walls, around door frames, around perimeter of fixtures at walls, etc. whether or not specifically shown on drawings.

Available Products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:

Multi-Part Nonsag Urethane Sealant for Uses NT, M, G, A, and O:

"Chem-Calk 500"; Bostik Construction Products Div.
"Dynatrol II"; Pecora Corp.
"Sikaflex 2c NS"; Sika Corp.
"Sonolastic NP 2"; Sonneborn Building Products Div., Rexnord Chem. Prod. Inc.

One-Part, Pourable, Urethane Sealant:

"Vulkem 45"; Mameco International, Inc.
"NR-201 Urexpan"; Pecora Corp.
"Sonolastic SL-1";Sonneborn B.P.Div., Rexnord Chem Prod. Inc.

One-Part Mildew-Resistant Silicone Sealant:

"Dow-Corning 786"; Dow Corning Corp.
"SCS 1702"; General Electric Co.
"863 #345 White"; Pecora Corp.
"Proglaze White"; Tremco Corp.

LATEX JOINT SEALANTS:

Acrylic-Emulsion Sealant: Manufacturer's standard, one part, nonsag, acrylic, mildew-resistant, acrylic-emulsion sealant complying with ASTM C 834, formulated to be painted and recommended for exposed applications on interior and on protected exterior exposures involving joint movement of not more than ±7.5 percent.

Applications: Typical interior building joints horizontal and vertical between similar and dissimilar materials closing all potential water, air and light leaks.

Available Products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:

"Chem-Calk 600"; Bostik Construction Products Div.
"AC-20"; Pecora Corp.
"Sonolac"; Sonneborne Building Products Div.; Rexnord Chem. Prod., Inc.
"Tremco Acrylic Latex Caulk"; Tremco Inc.

JOINT FILLERS FOR CONCRETE PAVING:

General: Provide joint fillers of thickness and widths indicated or if not indicated 1/2" thick.

Bituminous Fiber Joint Filler: Preformed strips of composition below, complying with ASTM D 1751:

Asphalt saturated fiberboard.

JOINT SEALANT BACKING:

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

Plastic Foam Joint Fillers: Preformed, compressible, resilient, non-waxing, non-extruding strips of plastic foam of material indicated below, and of size, shape and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

Elastomeric Tubing Joint-Fillers: Neoprene, butyl or EPDM tubing complying with ASTM D 1056, non_absorbent to water and gas, capable of remaining resilient at temperatures down to -26 degrees F (-15 degrees C). Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth and otherwise contribute to optimum sealant performance.

Bond-Breaker Tape: Polyethylene tape or other plastic tape as recommended by sealant manufacturer for preventing bond between sealant and joint filler or other materials at back (3rd) surface of joint. Provide self-adhesive tape where applicable.

MISCELLANEOUS MATERIALS:

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

Cleaners for Nonporous Surfaces: Provide non-staining, chemical cleaner of type acceptable to manufacturer of sealant and sealant backing materials which are not harmful to substrates and adjacent nonporous materials.

PART 3 - EXECUTION

INSPECTION:

Require installer to inspect joints indicated to receive joint sealers for compliance with requirements for joint configurations, installation tolerances and other conditions affecting joint sealer performance. Obtain Installer's written report listing any conditions detrimental to performance of joint sealer work. Do not allow joint sealer to proceed until unsatisfactory conditions have been corrected.

PREPARATION:

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

Remove all foreign material from joint substrates which could interfere with adhesion of joint sealer, including dust; paints, except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer; oil; grease; waterproofing; water repellants; water; surface dirt and frost.

Clean concrete, masonry, unglazed surfaces of ceramic tile and similar porous joint substrate surfaces, by brushing, grinding, blast cleaning, mechanical abrading, acid washing or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealers. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air.

Remove laitance and form release agents from concrete.

Clean metal, glass, porcelain enamel, glazed surfaces of ceramic tile and other non-porous surfaces by chemical cleaners or other means which are not harmful to substrates or leave residues capable of interfering with adhesion of joint sealers.

Joint Priming: Prime joint substrates where recommended by joint sealer manufacturer based on prior experience. Apply primer to comply with joint sealer manufacturer's recommendations. Confine primers to areas of joint sealer bond, do not allow spillage or migration onto adjoining surfaces.

Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces which otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

INSTALLATION OF JOINT SEALERS:

General: Comply with joint sealer manufacturers' printed installation instructions applicable to products and applications indicated, except where more stringent requirements apply.

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

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

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

Install Joint-fillers of type indicated to provide support of sealants during application and at position required to produce the cross-sectional shapes and depths of installed sealants relative to joint widths which allow optimum sealant movement capability.

Do not leave gaps between ends of joint-fillers.

Do not stretch, twist, puncture or tear joint fillers.

Remove absorbent joint-fillers which have become wet prior to sealant application and replace with dry material.

Install bond breaker tape between sealants and joint-fillers, compression seals or back of joints where required to prevent third_side adhesion of sealant to back of joint.

Installation of Sealants: Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration and providing uniform, cross-sectional shapes and depths relative to joint widths which allow optimum sealant movement capability.

Tooling of Nonsag Sealants: Immediately after sealant application and prior to time skinning or curing begins, tool sealants to form smooth, uniform beads of concave configuration, to eliminate air pockets and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they are without deterioration or damage at time of substantial completion.

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

END OF SECTION 07900