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SECTION 012300 - ALTERNATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for alternates.

1.3 DEFINITIONS

A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the Bidding Requirements that may be added to or deducted from the Base Bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.

1. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.

1.4 PROCEDURES

A. Coordination: Modify or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.

1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.

B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated modifications to alternates.

C. Execute accepted alternates under the same conditions as other work of the Contract.

D. Schedule: A Schedule of Alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

A. Alternate No. 1: The scope of work includes removal of the existing clay tile roof system over the mansard areas of the building and installation of a new clay tile roof system and associated flashings.

1. Replacement will include a new clay tile roof system of 1-Piece “S” profile tile.
2. Basis-of-Design Product: Boral Limited (www.boralna.com), and in accordance with these Contract Documents.

B. Alternate No. 2: The scope of work includes removal of the existing clay tile roof system over the mansard areas of the building and installation of a new standing seam metal panel roof system and associated flashings.

1. Basis-of-Design Product: Firestone Building Products - UC 6 standing seam panel and in accordance with these Contract Documents.

C. Alternate No. 3: The scope of work includes repairs to existing clay tile roof fascia gutter system with installation of new liquid-applied flashing over existing gutter seams.

1. Basis-of-Design Product: Siplast Parapro 123 Flashing System, as manufactured by Siplast (Parapro), Irving TX.

END OF SECTION 012300

SECTION 024119 - SELECTIVE STRUCTURE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. General provisions for demolition and removal of selected portions of building or structure.

B. Related Sections include the following:

1. Section 061053 "Miscellaneous Rough Carpentry" for installation of wood curbs, nailers, wood framed walls and miscellaneous sheathing repairs.
2. Section 070150 "Preparation for Re-Roofing" for methods of existing roof tear-off procedures and requirements.
3. Section 073213 "Clay Roof Tiles" for installation of clay tile roof system and accessories.
4. Section 074113 "Metal Roof Panels" for installation of standing seam metal panel roof system and flashings.
5. Section 074213 "Metal Wall Panels" for installation of manufactured metal panels for walls, with related flashings and accessory components.
6. Section 075216 "SBS-Modified Bituminous Membrane Roofing" for 2-ply system with self-adhering base ply and torch-applied top ply sheet.
7. Section 076200 "Sheet Metal Flashing and Trim" for installing sheet metal flashing and trim integral with roofing.
8. Section 076201 "Sheet Metal Flashing and Trim Repairs" for repair of existing sheet metal gutter system where indicated on the Drawings.
9. Section 221423 "Storm Drainage Piping" for installation of low-sloped overflow drains.

1.3 DEFINITIONS

A. Remove: Detach items from existing construction and legally dispose of them off-site, unless indicated to be removed and salvaged or removed and reinstalled.

B. Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.

C. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.4 MATERIALS OWNERSHIP

A. Historic items, relics, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, antiques, and other items of interest or value to Owner that may be encountered during selective demolition remain Owner's property. Carefully remove and salvage each item or object in a manner to prevent damage and deliver promptly to Owner.

B. Unless otherwise indicated, demolition waste becomes property of Contractor.

1.5 PREINSTALLATION MEETING

A. Comply with requirements as specified in Section 075216 "SBS-Modified Bituminous Membrane Roofing".

1.6 INFORMATIONAL SUBMITTALS

A. Proposed Protection Measures: Submit report, including drawings, that indicates the measures proposed for protecting individuals and property, for environmental protection, for dust control and, for noise control. Indicate proposed locations and construction of barriers.

B. Schedule of Selective Demolition Activities: Indicate the following:

1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owners', building managers' and other tenants' on-site operations are uninterrupted.
2. Locations of proposed dust and noise-control temporary partitions and means of egress, including for other tenants affected by selective demolition operations.
3. Interruption of utility services. Indicate how long utility services will be interrupted.
4. Coordination for shutoff, capping, and continuation of utility services.
5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.
6. Use of elevator and stairs.
7. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.
8. Means of protection for items to remain and items in path of waste removal from building.

C. Inventory: Submit a list of items to be removed and salvaged and deliver to Owner prior to start of demolition.

D. Pre-demolition Photographs: Show existing conditions of adjoining construction and site improvements, including finish surfaces that might be misconstrued as damage caused by selective demolition operations.

E. Warranties: Documentation indicated that existing warranties are still in effect after completion of selective demolition, if applicable.

1.7 CLOSEOUT SUBMITTALS

A. Inventory: Submit a list of items that have been removed and salvaged.

B. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

C. Recycled Products Record: Indicate receipt and acceptance of recyclable construction waste by a facility licensed to recycle construction waste.

1.8 QUALITY ASSURANCE

A. Demolition Firm Qualifications: An experienced firm that has specialized in demolition work similar in material and extent to that indicated for this Project.

1.9 PROJECT CONDITIONS

A. Owner will occupy building during time of demolition. Conduct selective demolition so Owner's operations will not be disrupted.

B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

C. Notify Owner Representative of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

D. Materials removed may be retained and/or salvaged by Contractor for storage or sale unless otherwise noted.

E. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

1. Maintain fire-protection facilities in service during selective demolition operations.

1.10 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped.

B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.

C. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.

D. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Consultant.

E. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs.

1. Before selective demolition or removal of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.

F. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems: Maintain services/systems indicated to remain and protect them against damage during selective demolition operations.

3.3 PREPARATION

A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
4. Cover and protect furniture, furnishings, and equipment that have not been removed.

C. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.

1. Strengthen or add new supports when required during progress of selective demolition.

3.4 SELECTIVE DEMOLITION, GENERAL

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
2. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
3. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
4. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
5. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
6. Dispose of demolished items and materials promptly.

B. Reuse of Building Elements: Do not demolish building elements beyond what is indicated on Drawings without Owner's Representative approval.

C. Removed, Salvaged, and Reinstalled Items:

1. Transport salvaged items to off-site storage area unless otherwise indicated by the Owner.
2. Clean and repair items intended for reinstallation to functional condition adequate for intended reuse. Paint equipment to match new equipment.
3. Pack or crate items after cleaning and repairing. Identify contents of containers.
4. Protect items from damage during transport and storage.
5. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

D. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Owners Representative, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

A. Roofing: Remove no more existing roofing than can be covered in one day by new roofing and so that building interior remains watertight and weathertight.

1. Section 075216 "SBS-Modified Bituminous Membrane Roofing" for 2-ply system with self-adhering base ply and torch-applied top ply sheet.
2. Section 070150 "Preparation for Re-Roofing" for methods of existing roof tear-off procedures and requirements.
3. Remove existing roofing down to substrate.

B. Equipment: Demolish and remove selected roof level equipment without damaging existing roof level structures.

3.6 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Except for items or materials indicated to be recycled, reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them.

1. Do not allow demolished materials to accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.

B. Burning: Do not burn demolished materials.

C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

3.7 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

3.8 SELECTIVE DEMOLITION SCHEDULE

A. Selected items to be **Removed and/or Salvaged** for recycling include, but are not limited to, the following:

1. Existing roof system sheet metal flashings.
2. Existing plywood sheathing at perimeter crickets
3. Existing brick chimney.
4. Existing penthouse metal wall panels.
5. Existing round passive attic vents.
6. Existing roof assembly components as determined feasible by project waste management guidelines.

B. Selected items to be **Removed and Reinstalled** include, but are not limited to, the following:

1. Existing selected clay tiles, as required to install new roof system.

C. Selected items to **Remain** include, but are not limited to, the following:

1. Existing roof drains, and plumbing connections.
2. Existing roof drains, and plumbing connections.
3. Existing roof level equipment and accessories unless otherwise noted on the Drawings or Part A of this spec section to be removed.

END OF SECTION 024119

SECTION 061053 - MISCELLANEOUS ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Framing with dimension lumber.
2. Rooftop equipment bases and support curbs.
3. Wood blocking, cants, and nailers.
4. Plywood wall panels for select vertical substrates.
5. Miscellaneous blocking, as necessary.

B. Related sections include the following:

1. Section 024119 "Selective Structure Demolition" for removal and partial reuse of selected building elements.
2. Section 070150 "Preparation for Re-Roofing" for methods of existing roof tear-off procedures and requirements.
3. Section 073213 "Clay Roof Tiles" for installation of clay tile roof system and accessories.
4. Section 074113 "Metal Roof Panels" for installation of standing seam metal panel roof system and flashings.
5. Section 074213 "Metal Wall Panels" for installation of manufactured metal panels for walls, with related flashings and accessory components.
6. Section 075216 "SBS-Modified Bituminous Membrane Roofing" for 2-ply system with self-adhering base ply and torch-applied top ply sheet.
7. Section 076200 "Sheet Metal Flashing and Trim" for installing sheet metal flashing and trim integral with roofing and manufactured metal panels.
8. Section 076201 "Sheet Metal Flashing and Trim Repairs" for repair of existing sheet metal gutter system where indicated on the Drawings.
9. Section 221423 "Storm Drainage Piping" for installation of low-sloped overflow drains.

C. References:

1. IBC: International Building Code; 2009, or most recent applicable edition.
2. SFM: Sustainable Forest Management; www.forestindustries.eu.

1.3 DEFINITIONS

A. Dimension Lumber: Lumber of 2 inches nominal or greater but less than 5 inches nominal in least dimension.

B. Lumber grading agencies, and the abbreviations used to reference them, include the following:

1. NLGA: National Lumber Grades Authority.
2. WCLIB: West Coast Lumber Inspection Bureau.
3. WWPA: Western Wood Products Association.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
3. For fire-retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5664.
4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

1.5 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For the following, from ICC-ES:

1. Preservative-treated wood.
2. Power-driven fasteners.
3. Powder-actuated fasteners.
4. Expansion anchors.

1.6 QUALITY ASSURANCE

A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

B. Forest Certification: For the following wood products, provide materials produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC 1.2, "Principles and Criteria":

1. Dimension lumber framing.
2. Miscellaneous lumber.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Stack lumber flat with spacers beneath and between each bundle to provide air circulation.

B. Protect lumber from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

C. Store in designated areas as authorized by Owner.

1.8 PROTECITON

A. Protect interior surfaces during installation utilizing polyethylene sheeting or other suitable covering to limit debris accumulation within interior surfaces.

B. Protect interiors from sawdust accumulation where applicable, such as occupied living spaces or inside working machinery.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.

1. Factory mark each piece of lumber with grade stamp of grading agency.
2. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
3. Provide dressed lumber, S4S, unless otherwise indicated.

B. Maximum Moisture Content of Lumber: 19 percent unless otherwise indicated.

2.2 WOOD-PRESERVATIVE-TREATED MATERIALS

A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with the ground, but may be subject to dampness.

1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.

B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.

C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.

1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece or omit marking and provide certificates of treatment compliance issued by inspection agency.

D. Application: Treat all miscellaneous carpentry if indicated.

1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
2. Wood sleepers, blocking, and similar concealed members in contact with masonry or concrete.

2.3 DIMENSION LUMBER FRAMING

A. Maximum Moisture Content: 19 percent.

B. Framing: Construction or No. 2 grade and any of the following species:

1. Hem-fir (north); NLGA.
2. Spruce-pine-fir; NLGA.
3. Hem-fir; WCLIB or WWPA.
4. Northern species: NLGA.

2.4 MISCELLANEOUS LUMBER

A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:

1. Blocking.
2. Nailers.
3. Tapered cedar shims where indicated on Drawings.
4. Rooftop equipment bases and support curbs.
5. Cants where indicated on the Drawings.

B. For items of dimension lumber size, provide Construction or No. 2 grade lumber with 19 percent maximum moisture and any of the following species:

1. Hem-fir (north); NLGA.
2. Spruce-pine-fir; NLGA.
3. Hem-fir; WCLIB or WWPA.
4. Northern species; NLGA.

C. For exposed boards, provide lumber with 19 percent maximum moisture content and any of the following species and grades:

1. Hem-fir or hem-fir (north), Select Merchantable or No. 1 Common Construction or No. 2 Common grade; NLGA, WCLIB, or WWPA.

D. For concealed boards, provide lumber with 19 percent maximum moisture content and any of the following species and grades:

1. Hem-fir or hem-fir (north), Construction or No. 2 Common grade; NLGA, WCLIB, or WWPA.
2. Northern species, No. 2 Common grade; NLGA.

E. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.

F. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.

G. Tapered cedar shim: For parapet slope.

2.5 PLYWOOD SHEATHING (FOR OVERLAY)

A. Plywood Sheathing (for overlay): CDX Plywood Sheathing, exterior 5-ply laminated wood panels, 1/2-inch x 4-(foot) x 8-(foot) panels**.**

2.6 PLYWOOD SHEATHING (FOR PARAPETS)

A. Plywood Sheathing (for parapet walls): CDX Plywood Sheathing, exterior 5-ply laminated wood panels, 1/2-inch x 4-(foot) x 8-(foot) panels..

B. Plywood Sheathing (for cants): CDX Plywood Sheathing, exterior 5-ply laminated wood panels, 1/2-inch x 4-(foot) x 8-(foot) panels**.**

2.7 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.

B. ASTM A307 diameter as shown, hot dip galvanized. Provide cut washers ANSI B27.2.

C. Self-Drilling Lag Screws: Zinc coated wood screw with low profile hex washer head and self-drilling reamer tip; 1/4-inch x length as required to penetrate framing a minimum of 1-inch, but not more than 1¼-inch.

D. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.

1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.
2. Material: Stainless steel with bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2.

2.8 NAILS

A. FF-N-1-1 common wire and spiral or drive screw type galvanized of sufficient length to penetrate wood framing a minimum of 1-inch.

B. Plywood Sheathing Nails: Corrosion-resistant ring-shank nails. Nails must have the same gauge and head diameter as a 8d common nail – full headed; length shall be 1 3/4-inch long. Shank diameter 0.131 inches; head diameter 5/16-inch. Nails must not penetrate underside of existing roof decking.

2.9 MISCELLANEOUS MATERIALS

A. Provide all miscellaneous rough hardware and material items required for complete and proper fabrication and installation of Work.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry to other construction; scribe and cope as needed for accurate fit. Locate nailers, blocking, and similar supports to comply with requirements for attaching other construction.

B. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.

C. Install plywood sheathing panels by fastening to studs; coordinate locations with utilities requiring sheathing panels.

D. Do not splice structural members between supports unless otherwise indicated.

E. Sort and select lumber so that natural characteristics will not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

F. Securely attach carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

1. NES NER-272 for power-driven fasteners.
2. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.

G. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.

3.2 INSPECTION

A. Existing roof decking: Verify that surfaces are in sound condition and ready to receive Work.

B. Notify Owner if any roof deck materials are found to be deteriorated or damaged.

3.3 WOOD BLOCKING, AND NAILER INSTALLATION

A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.

B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.

C. Provide solid wood blocking between framing members where require to support edges of curbs or other load-bearing items.

3.4 PLYWOOD SHEATING - PARAPET WALL & OVERLAY

A. Install in accordance with the Contract Documents where indicated on the Drawings, approved good carpentry practices, and IBC and SFM requirements.

B. Reference structural scope of work as required for seismic overlay installation, or where applicable.

C. Install sheathing, cut to fit, so that long dimension is 90 degrees to main supporting members.

D. Space panels approximately 1/8-inch apart at edges and ends.

E. Secure sheathing using ring-shanked nails.

F. Secure fasteners through sheathing along edges of panels at 6-inches on center.

G. Minimum edge distance of fasteners from edge of panels shall be ¾-inch.

H. Do not over-drive fasteners so that the head of the fastener is below the top surface of the panel.

3.5 SEPARATION WALL (NON LOAD-BEARING), GENERAL

A. Install separation wall where indicated on the Drawings.

B. Install in accordance with the Contract Documents where indicated on the Drawings, approved good carpentry practices, and IBC and SFM requirements.

C. Install in accordance with structural scope of work of these Contract Documents.

3.6 SEPARATION WALL (NON LOAD-BEARING, INSTALLATION

A. Provide single bottom plate and top plates using members of 2-inch nominal thickness whose widths equal that of studs.

B. Fasten plates to supporting construction unless otherwise indicated.

C. Provide 2-by-4-inch size wood studs spaced 24-inches o.c. unless otherwise indicated.

D. Construct corners and intersections with two studs.

E. Install sheathing, cut to fit, so that long dimension is 90 degrees to main supporting members.

F. Space panels approximately 1/8-inch apart at edges and ends.

G. Secure sheathing using ring-shanked nails or self-drilling screws.

H. Secure fasteners through sheathing along edges of panels at 6-inches on center.

I. Minimum edge distance of fasteners from edge of panels shall be ¾-inch.

J. Do not over-drive fasteners so that the head of the fastener is below the top surface of the panel.

3.7 MISCELLANEOUS INSTALLATION

A. Install in accordance with these specifications.

B. Install miscellaneous wood materials as required to conform to IBC and SFM requirements.

3.8 PROTECTION

A. Verify that all substrates are in sound condition and ready to receive Work.

B. Verify that related Work of other trades has been properly completed prior to starting Work. Beginning of installation means acceptance of existing conditions.

C. Protect miscellaneous rough carpentry from weather.

3.9 CLEANING

A. Clean-up Work and leave site in clean, finished condition.

END OF SECTION 061053

SECTION 070150 - PREPARATION FOR RE-ROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Roof tear-off.
2. Removal of base flashings.
3. Removal of existing sheet metal flashings.
4. Removal, storage, and/or reuse of existing clay tiles.

a. **Base Bid**:

1) Removal, storage, and reuse of clay tiles, as necessary to install new SBS built-up roof system.

b. **Alternate #1**:

1) Removal and recycling of clay tiles as necessary for installation of new clay tile roof system.

c. **Alternate #2**:

1) Removal and recycling of clay tiles as necessary for installation of new standing seam metal panel roof system.

d. **Alternate #3**:

1) Removal, storage, and reuse of selected clay tiles as necessary for installation of gutter system repairs.

B. Related Sections include the following:

1. Section 024119 "Selective Structure Demolition" for removal and partial reuse of selected building elements.
2. Section 061053 "Miscellaneous Rough Carpentry" for installation of wood curbs, nailers, miscellaneous sheathing repairs, and seismic overlay.
3. Section 073213 "Clay Roof Tiles" for installation of clay tile roof system and accessories.
4. Section 074113 "Metal Roof Panels" for installation of standing seam metal panel roof system and flashings.

5. Section 074213 "Metal Wall Panels" for installation of manufactured metal panels for walls, with related flashings and accessory components.
6. Section 075216 "SBS-Modified Bituminous Membrane Roofing" for 2-ply system with self-adhering base ply and torch-applied top ply sheet.
7. Section 076200 "Sheet Metal Flashing and Trim" for installing sheet metal flashing and trim integral with roofing and manufactured metal panels.
8. Section 076201 "Sheet Metal Flashing and Trim Repairs" for repair of existing sheet metal gutter system where indicated on the Drawings.

1.3 MATERIALS OWNERSHIP

A. Except for items or materials indicated to be reused, reinstalled, or otherwise indicated to remain Owner's property, demolished materials shall become Contractor's property and shall be removed from Project site and recycled.

1.4 DEFINITIONS

A. Roofing Terminology: Refer to ASTM D 1079 and glossary in most recent edition of NRCA's "The NRCA Roofing and Waterproofing Manual" for definition of terms related to roofing work in this Section.

B. Roof Tear-Off: Removal of existing membrane roofing system and associated flashings from deck.

C. Existing Membrane Roofing System: Existing built-up asphalt roofing membrane, roof insulation, base flashings, and components and accessories between deck and roofing membrane.

D. Existing sheet metal flashings: Existing copings, wall panels, counter flashing, fasteners and accessories, etc. over various substrates.

E. Temporary removal: Removal and reinstallation of select building and existing roof system elements as required to perform roofing repairs.

F. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and reinstalled.

G. Existing to Remain: Existing items of construction that are not indicated to be removed.

1.5 ACTION SUBMITTALS

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

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer is approved by warrantor of existing roofing system.

B. Photographs: Show existing conditions of adjoining construction and site improvements, including exterior and interior finish surfaces that might be misconstrued as having been damaged by reroofing operations. Submit before Work begins.

C. Landfill Records: Indicate receipt and acceptance of demolished materials, including hazardous wastes (such as asbestos-containing material) by a landfill facility licensed to accept hazardous wastes.

D. Recycling Records: Indicate receipt and acceptance of recycled construction materials by a qualified recycling center.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: Installer of new membrane roofing system approved by warrantor of existing roofing system to work on existing roofing.

B. Regulatory Requirements: Comply with governing EPA notification regulations before beginning membrane roofing removal. Comply with hauling and disposal regulations of authorities having jurisdiction.

C. Reroofing Conference: Conduct conference at Project site.

1. Meet with Owner, Consultant, testing and inspecting agency representative; roofing system manufacturer's representative, roofing Installer including project manager, superintendent and foreman, and installers whose work interfaces with or affects reroofing including installers of roof accessories and roof-mounted equipment.
2. Review methods and procedures related to roofing system tear-off and replacement including, but not limited to, the following:

    a. Reroofing preparation, including membrane roofing system manufacturer's written instructions.
    b. Temporary protection requirements for existing roofing system that is to remain during and after installation.
    c. Existing roof drains and roof drainage during each stage of reroofing, and roof drain plugging and plug removal requirements.
    d. Construction schedule and availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
    e. Existing deck removal procedures and Owner notifications.
    f. Condition and acceptance of existing roof deck and base flashing substrate for reuse.
    g. Structural loading limitations of deck during reroofing.
    h. Base flashings, special roofing details, drainage, penetrations, equipment curbs, and condition of other construction that will affect reroofing.
    i. Shutdown of fire-suppression, -protection, and -alarm and -detection systems, if applicable.
    j. Existing conditions that may require notification of Consultant or Engineer before proceeding.
    k. Protection requirements for interior spaces, both occupied and unoccupied, of the building.

1.8 PROJECT CONDITIONS

A. Owner will occupy portions of building immediately below reroofing area. Conduct reroofing so Owner's operations will not be disrupted. Provide Owner with not less than 48 hours' notice of activities that may affect Owner's operations.

1. Coordinate work activities daily with Owner so Owner can place protective dust or water leakage covers over sensitive equipment or furnishings,and fire-alarm or -detection equipment if needed, and evacuate occupants from below the work area.
2. Before working over structurally impaired areas of deck, if any are discovered, notify Owner to evacuate occupants from below the affected area. Verify that occupants below the work area have been evacuated before proceeding with work over the impaired deck area.

B. Protect building to be reroofed, adjacent buildings, walkways, site improvements, exterior plantings, and landscaping from damage or soiling from reroofing and other scope operations.

C. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities.

D. Conditions existing at time of inspection for bidding will be maintained by Owner as far as practical.

E. Weather Limitations: Proceed with reroofing preparation only when existing and forecasted weather conditions permit Work to proceed without water entering existing roofing system or building.

F. Hazardous Materials: It is not expected that hazardous materials such as asbestos-containing materials will be encountered in the Work.

1. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Consultant and Owner. Hazardous materials will be removed by Owner under a separate contract.

PART 2 - PRODUCTS

2.1 AUXILIARY REROOFING MATERIALS

A. General: Auxiliary reroofing preparation materials recommended by roofing system manufacturer for intended use and compatible with components of new membrane roofing system.

B. Protection: Provide plastic sheets, tarps, and/or other appropriate products to use as protective coverings at roof repair and replacement locations exposed during work.

1. Use protective coverings as necessary as temporary means to prevent moisture intrusion into building interior.
2. Comply with requirement specified in Section 024119 "Selective Structure Demolition".

PART 3 - EXECUTION

3.1 PREPARATION

A. Coordinate with Owner, if applicable, the cover of air-intake louvers before proceeding with reroofing work that could affect indoor air quality or activate smoke detectors in the ductwork.

B. During removal operations, have sufficient and suitable materials on-site to facilitate rapid installation of temporary protection in the event of unexpected rain.

C. Maintain roof drains in functioning condition to ensure roof drainage at end of each workday. Prevent debris from entering or blocking roof drains and conductors. Use roof-drain plugs specifically designed for this purpose. Remove roof-drain plugs at end of each workday, when no work is taking place, or when rain is forecast.

1. If roof drains are temporarily blocked or unserviceable due to roofing system removal or partial installation of new membrane roofing system, provide alternative drainage method to remove water and eliminate ponding. Do not permit water to enter into or under existing membrane roofing system components that are to remain.

3.2 ROOF TEAR-OFF

A. General: Notify Owner each day of extent of roof tear-off proposed for that day.

B. Comply with requirements as specified in Section 024119 "Selective Structure Demolition".

C. Roofing membrane and other membrane roofing system components down to the deck.

D. Sheet Metal Removal: Detach and discard existing sheet metal flashings where new flashings are to be installed, as shown on the Drawings.

1. Take care to avoid damaging existing sheet metal flashings that are to remain.
2. Existing flashings or metal elements that will remain and that are damaged beyond acceptable use are to be replaced with new that match.
3. Immediately offload and transport to remove flashings to location indicated by the Owner as conditions allow until permanent disposal is performed.

3.3 DECK PREPARATION

A. Inspect deck after tear-off of existing roofing system.

B. Verify that concrete and metal substrates are visibly dry and free of moisture at start of each day’s work. Do not proceed with roofing work if moisture is present.

C. If deck surface is not suitable for receiving new roofing or if structural integrity of deck is suspect, immediately notify Owner and/or Consultant. Do not proceed with installation until directed by Owner and/or Consultant.

3.4 ROOF SYSTEM INSTALLATION

A. Comply with requirements specified in Section 075216 "SBS-Modified Bituminous Membrane Roofing".

B. Comply with requirement specified in Section 073213 "Clay Roof Tiles".

C. Existing Base Flashings:

1. Remove existing base flashings around parapets, curbs, walls, and penetrations.
2. Clean substrates of contaminants such as asphalt, sheet materials, dirt, and debris.

D. Existing Sheet Metal Copings and Wall Panels:

1. Remove existing sheet metal copings and wall panels, and other sheet metal materials as applicable.
2. Avoid damaging existing clay tiles associated with work to be performed as much as practical.

E. Existing Clay Tiles:

1. **Base Bid**: Temporarily remove clay tiles as necessary to install new SBS built-up roof system.
    a. Avoid damaging existing clay tiles associated with work to be performed as much as practical.
    b. Store for reuse in designated zones protected against inclement weather until reinstallation occurs.
2. **Alternate #1**: Remove and recycle clay tiles as necessary to install new clay tile roof system.
3. **Alternate #2**: Remove and recycle clay tiles as necessary to install new standing seam metal panel roof system.
4. **Alternate #3**: Temporarily remove clay tiles as necessary to install repairs to existing mansard gutter system.
    a. Avoid damaging existing clay tiles associated with work to be performed as much as practical.
    b. Avoid damaging existing clay tiles associated with work to be performed as much as practical.

F. Inspect existing substrate nailers and sheathing for deterioration and damage. If nailers and/or sheathing has deteriorated, immediately notify Consultant.

3.5 DISPOSAL

A. Collect demolished materials and place in containers. Promptly dispose of demolished materials not indicated to be recycled. Do not allow demolished materials to accumulate on-site. Transport and legally dispose of demolished materials off Owner's property.

END OF SECTION 070150

SECTION 073213 - CLAY ROOF TILES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. **Base Bid**: Selected temporary removal and reinstallation of existing clay roof tiles as required to install new SBS built-up roof system, including repair of damaged clay tiles as necessary.
2. **Alternate #1**: Installation of new clay tile roof system to replace existing.

    a. Self-adhering underlayment.
    b. Tile accessories.

3. **Alternate #2**: Removal and recycling of existing clay tile roof system as required to install new standing seam metal panel roof system.
4. **Alternate #3**: Selected removal and reinstallation of existing clay roof tiles as required to repair existing mansard gutter system, including repair of damaged clay tiles as necessary.

B. Related Sections include the following:

1. Section 024119 "Selective Structure Demolition" for removal and partial reuse of selected building elements.
2. Section 061053 "Miscellaneous Rough Carpentry" for installation of wood curbs, nailers, miscellaneous sheathing repairs, and seismic overlay.
3. Section 070150 "Preparation for Re-Roofing" for methods of existing roof tear-off procedures and requirements.
4. Section 075216 "SBS-Modified Bituminous Membrane Roofing" for 2-ply system with self-adhering base ply and torch-applied top ply sheet.
5. Section 076200 "Sheet Metal Flashing and Trim" for installing sheet metal flashing and trim integral with roofing and manufactured metal panels.
6. Section 076201 "Sheet Metal Flashing and Trim" for repair of existing sheet metal gutter system where indicated on the Drawings.

1.3 DEFINITIONS

A. Roofing Terminology: See ASTM D 1079, glossaries in TRI/WSRCA's "Concrete and Clay Roof Tile Design Criteria Installation Manual for Moderate Climate Regions," and NRCA's

"NRCA Roofing and Waterproofing Manual" for definitions of terms related to roofing work in this Section.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

B. Comply with requirements as specified in Section 075216 "SBS-Modified Bituminous Membrane Roofing".

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each exposed product and for each color and texture specified.

1. Clay Roof Tiles: Full size, showing full range of values and blends.
2. Accessory Tiles: Full size.
3. Metal Valley Flashing: 12 inches square.
4. Fastenings: Wire-tie system components, 12 inches long.

C. Samples for Initial Selection: For each type of clay roof tile and accessory tile.

1. Include Samples of clay roof tiles and accessories involving color selection.

D. Samples for Verification: For the following products, in manufacturer's standard sizes:

1. **Base Bid**: Full-size clay roof tile (used to replace any existing damaged clay tiles), color to match existing.

    a. Comply with Part 2 of this specification.

2. **Alternate #1**:

    a. Field Tile(s): Full-size clay roof tile, one or more that shows full range of values and blends; color as specified.
    b. Ridge/Rake Cap Tile: Full-size clay roof tile; color as specified.
    c. Accessory Tiles: Full-size, each type, as applicable.
    d. Fastenings: Wire-tie system components, 12 inches long.
    e. Self-Adhering Underlayment: 12-inches square.

3. **Alternate #2**: Not applicable.
4. **Alternate #3**: Full-size clay roof tile (used to replace any existing damaged clay tiles), color to match existing.

    a. Comply with Part 2 of this specification.

1.6 INFORMATIONAL SUBMITTALS

A. Material Test Reports: For each type of clay roof tile, based on evaluation of comprehensive tests performed by a qualified testing agency.

B. Evaluation Reports: From ICC-ES or other testing and inspecting agency acceptable to authorities having jurisdiction, indicating that product is suitable for intended use under applicable building codes for the following:

1. Clay roof tiles, fasteners, and attachment systems.
2. High-temperature self-adhering underlayment.

C. Sample Warranty: For manufacturer's materials warranty.

1.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: For roofing to include in maintenance manuals.

1.8 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Clay Roof Tiles: 50 sq. ft. of each type, in unbroken bundles.

1.9 QUALITY ASSURANCE

A. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1. Build mockups for clay roof tiles including related roofing materials.

a. Size: 48 inches long by 48 inches wide.

2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Engineer and Consultant specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Store roofing tile and underlayment materials in a dry, well-ventilated, weathertight location according to clay tile manufacturer's written instructions.

1. Store underlayment rolls on end on pallets or other raised surfaces.
2. Do not double-stack underlayment rolls.

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

C. Handle, store, and place roofing materials in a manner to prevent damage to roof deck or structural supporting members.

1.11 FIELD CONDITIONS

A. Environmental Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing to be installed according to manufacturer's written instructions and warranty requirements.

1. Install self-adhering sheet underlayment within the range of ambient and substrate temperatures recommended by manufacturer.

1.12 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace clay tiles that fail in materials or workmanship within specified warranty period. Material failures include manufacturing defects and failure of clay tiles to perform without breaks after a reasonable time.

1. Warranty Period: 50 years from date of Substantial Completion.

B. Roofing Installer's Warranty: On warranty form at end of this Section, signed by Installer, in which Installer agrees to repair or replace components of clay-tile roofing that fail in materials or workmanship within specified warranty period.

C. Roofing Installer’s Warranty: The Installer shall provide a signed written warranty in which Installer agrees to repair or replace components of clay-tile roofing that fail in materials or workmanship within specified warranty period and guaranteeing all roofing and flashing against defects of quality of Work and materials and shall maintain the re-roofed areas in watertight condition during the warranty period. The warranty shall be delivered to the Owner prior to final acceptance of the Work

1. Warranty Period: Two (2) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Exterior Fire-Test Exposure: Provide clay roof tiles and related roofing materials identical to those of assemblies tested for Class A fire resistance according to ASTM E 108 or UL 790 by Underwriters Laboratories, Inc. or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify products with appropriate markings of applicable testing agency.

2.2 CLAY ROOF TILES - BASE BID & ALTERNATE #3

A. Base Bid and Alternate #3 pertain to selected temporary removal of existing clay tiles as necessary to perform scope of work under SBS replacement and gutter repairs.

B. Existing Clay Roof Tiles: Remove selected clay tiles as necessary to perform work and store in designated location protected from weather for duration of project and until reinstallation can occur.

1. Comply with requirements as specified in Section 070150 "Preparation for Re-Roofing".
2. Replace tiles that are damaged during construction activities.

C. Damaged Clay Roof Tiles: Damage to clay roof tiles shall be defined as follows: 1) cracked or broken across the face of the tile in either direction, and/or 2) are chipped at corners where breaks exceed 1-inch in length.

1. Manufacturer: For replacement of existing damaged clay tiles provide the following:

a. Gladding McBean - ½ Round Clay Tile - Cordova Profile.
b. Color: Match existing.
c. Or Approve that closely match.

2. Prior to obtaining replacement clay tiles, verify match with Engineer and Consultant. Do not proceed without approval.

2.3 CLAY ROOF TILES - **ALTERNATE #1**

A. Clay Roof Tiles: ASTM C 1167, molded- or extruded-clay roof tile units of shape and configuration indicated, kiln fired, and free of surface imperfections. Provide with fastening holes.

1. Durability: Grade 1.
2. High-Profile Shape: Type I, 1-Piece "S" Profile.

a. Accessory Tiles (as applicable): Ridge, hip, rake.
b. Accessories: Units as required by the manufacturer.
3. Finish and Texture: Matte.
4. Color: Color to match existing, as approved by Engineer and Consultant.

B. Manufacturers: Subject to compliance with requirements, provide one of the following;

1. Basis of Design: Boral Limited - www.boralna.com.
2. Or Approved.

2.4 UNDERLAYMENT MATERIALS

A. Self-Adhering Sheet Underlayment, High Temperature: Minimum of 40-mil- thick; with slip-resisting, polymer-film-reinforced or glass-reinforced top surface laminated to layer of butyl or SBS-modified-asphalt adhesive; with release backing; cold applied; and evaluated and

documented to be suitable for use for intended purpose under applicable codes by a testing and inspecting agency acceptable to authorities having jurisdiction. Provide primer for adjoining concrete or masonry surfaces to receive underlayment, if applicable.

1. Thermal Stability: Stable after testing at 240 deg F according to ASTM D 1970/D 1970M.
2. Low-Temperature Flexibility: Passes after testing at minus 20 deg F according to ASTM D 1970/D 1970M.
3. Products: Provide one of the following:

    a. Certainteed Corporation.
    b. Henry Company.
    c. Or Approved.

2.5 SHEET METAL FLASHING AND TRIM

A. Comply with requirements specified in Section 076200 "Sheet Metal Flashing and Trim".

B. Comply with requirements specified in Section 076201 "Sheet Metal Flashing and Trim Repairs".

2.6 ACCESSORIES

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

B. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied.

C. Elastomeric Sealant: ASTM C 920, elastomeric silicone-based joint sealant of type, grade, class, and use classifications required to seal joints in clay-tile roofing and remain watertight.

D. Weather Blocking Mortar: ASTM C 270, Type M, with ASTM C 979/C 979M, pigmented mortar matching the color of clay roof tiles for exposed-to-view mortar, and natural color for concealed-from-view mortar.

E. Eave Closure: Manufacturer's standard pre-coated galvanized-steel eave closure formed to shape of clay roof tile.

F. Wood Nailers/Battens: Comply with requirements for pressure-preservative-treated wood in Section 061053 "Miscellaneous Rough Carpentry."

G. Mesh Fabric (for insect screen): 18-by-14 mesh of PVC-coated, glass-fiber thread.

2.7 FASTENERS

A. Tile Screws: Secure with screws as required by the manufacturer.

B. Wood Batten Nails: ASTM F 1667; common or box, steel wire, flat head, and smooth shank.

C. Wire Ties: Stainless steel, 0.083-inch minimum diameter.

PART 3 - EXECUTION

3.1 PREPARATION

A. Familiarize all crewmembers with the intent of the project and all applicable project documents.

B. Existing underlayment, if not replaced, shall be inspected for excessive deterioration or damage. Repair where integrity has been compromised.

C. Observe safety requirements when working along the eaves of repair areas, and provide appropriate fall protection and safety equipment.

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

1. Examine roof sheathing to verify that sheathing joints are supported by framing and blocking or metal clips and that installation is within flatness tolerances.
2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and completely anchored and that provision has been made for flashings and penetrations through roofing.

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

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

3.2 QUALITY OF WORK

A. Work shall be performed by experienced mechanics in type of roofing work specified.

B. Contractor shall be fully aware of work involved and the requirements under this contract, and shall direct workers in the proper application of materials and repairs specified.

C. Supervision shall be maintained by the same person throughout the entire course of the installation of roof repairs.

D. Work shall be performed in accordance with manufacturer's directions, and requirements specified herein, but not less than those recommended by RTI/WSRCA's "Concrete and Clay Roof Tile Design Criteria Installation Manual for Moderate Climate Regions" or "The NRCA's Steep Roofing Manual".

3.3 INSTALLATON - TILE ROOF REPAIRS - BASE BID & ALTERNATE #2

A. Refer to the Drawings for locations where selected clay tile removal is to occur.

B. Underlayments: Repair if necessary according to tile manufacturer's written recommendations and recommendations in NRCA's "The NRCA Roofing and Waterproofing Manual."

C. Clay Tiles: Install replacement roof tiles according to manufacturer's written instructions and recommendations in RTI/WSRCA's "Concrete and Clay Roof Tile Design Criteria Installation Manual for Moderate Climate Regions," and to NRCA's "The NRCA Roofing and Waterproofing Manual."

D. Valley Underlayment: Install two layers of 36-inch- wide felt underlayment centered in valley. Stagger end laps between layers at least 72 inches. Lap ends of each layer at least 12 inches in direction that sheds water, and seal with asphalt roofing cement. Fasten each layer to roof deck with underlayment nails.

1. Lap roof-deck underlayment over first layer of valley underlayment at least 6 inches.

3.4 SHEET METAL FLASHING INSTALLATION

A. General: Install metal flashings and other sheet metal to comply with requirements in Section 076200 "Sheet Metal Flashing and Trim."

1. Install metal flashings according to clay roof tile manufacturer's written instructions and recommendations in NRCA's "NRCA Roofing Manual: Steep-Slope Roof Systems."

3.5 CLAY ROOF TILE INSTALLATION - ALTERNATE #1

A. General: Install clay roof tiles according to manufacturer's written instructions and recommendations in TRI/WSRCA's "Concrete and Clay Roof Tile Design Criteria Installation Manual for Moderate Climate Regions" and NRCA's "NRCA Roofing Manual: Steep-Slope Roof Systems" unless more stringent requirements are indicated.

B. Remove and recycle existing clay tile roof system components according to Section 024119 "Selective Structure Demolition" and Section 070150 "Preparation for Re-Roofing".

C. Self-Adhering Sheet Underlayment:

1. Install wrinkle free; comply with low-temperature installation restrictions of underlayment manufacturer if applicable.
2. Install lapped in direction that sheds water. Lap sides not less than 3-1/2 inches.
3. Lap ends not less than 6 inches, staggered 24 inches between succeeding courses.
4. Roll laps with roller.
5. Prime concrete and masonry surfaces to receive self-adhering sheet underlayment, where applicable.
6. Extend self-adhering sheet underlayment over entire roof deck.
7. Eaves: Extend from edges of eaves 24 inches beyond interior face of exterior wall.
8. Rakes: Extend from edges of rakes 24 inches beyond interior face of exterior wall.
9. Valleys: Extend from lowest to highest point 18 inches on each side.
10. Hips: Extend 18 inches on each side.
11. Ridges: Extend 36 inches on each side.

12. Sidewalls: Extend 18 inches beyond sidewalls and return vertically against sidewalls not less than 4 inches.
13. Roof-Penetrating Elements: Extend 18 inches beyond penetrating elements and return vertically against penetrating elements not less than 4 inches.
14. Roof-Slope Transitions: Extend 18 inches on each roof slope.
15. Cover underlayment within seven days.

D. Wood Nailers / Battens:

1. Install wood nailers securely fastened to roof deck at the following locations;

    a. Hips.
    b. Ridges.
    c. Rakes.

2. Install beveled wood cant at eaves and securely fasten to roof deck.
3. Install nominal 1-by-2-inch wood battens horizontally in 48-inch lengths with ends separated by 1/2 inch, at spacing required by clay roof tile manufacturer, and securely fasten to roof deck.
4. Install nominal 1-by-2-inch wood counter battens vertically spaced 24 inches apart and securely fasten to roof deck.

E. Clay Roof Tiles

1. Maintain uniform exposure and coursing of clay roof tiles throughout roof.
2. Extend tiles 2 inches over eave fasciae.
3. Nail Fastening: Drive nails to clear the clay roof tile so the tile hangs from the nail and is not drawn up.

    a. Install wire through nail holes of cut tiles that cannot be nailed directly to roof deck and fasten to nails driven into deck.

4. Wire-Tie Fastening: Install wire-tie systems and fasten clay roof tiles according to manufacturer's written instructions.
5. Mortar Setting: Install clay roof tile according to TRI/FRSA's "Concrete and Clay Roof Tile Installation Manual."

F. Open Valleys: Cut clay roof tiles at open valleys to form straight lines. Maintain uniform width of exposed open valley from highest to lowest point.

1. Drill or notch cut valley tiles and wire-tie to fastener placed clear of valley metal flashings.
2. Do not nail tiles to metal flashings.

3.6 ADJUSTING AND CLEANING

A. Remove trash, debris, temporary protection, and equipment from job site and leave site in clean condition.

B. Remove excess clay roof tiles and debris from Project site.

END OF SECTION 073213

SECTION 074113.16 - STANDING-SEAM METAL ROOF PANELS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes installation of hydrostatic standing-seam metal panel roof system.

B. Related Sections include the following:

1. Section 024119 "Selective Structure Demolition" for removal and partial reuse of selected building elements.
2. Section 061053 "Miscellaneous Rough Carpentry" for installation of wood curbs, nailers, miscellaneous sheathing repairs, and seismic overlay
3. Section 070150.19 "Preparation for Re-Roofing" for methods of existing roof tear-off procedures and requirements.
4. Section 076200 "Sheet Metal Flashing and Trim" for installing sheet metal flashing and trim integral with roofing and manufactured metal panels.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Meet with Owner, Engineer, Consultant, Owner's insurer if applicable, metal panel Installer, metal panel manufacturer's representative, structural-support Installer, and installers whose work interfaces with or affects metal panels, including installers of roof accessories and roof-mounted equipment.
2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
3. Review methods and procedures related to metal panel installation, including manufacturer's written instructions.
4. Examine support conditions for compliance with requirements, including alignment between and attachment to structural members.
5. Review structural loading limitations of deck during and after roofing.
6. Review flashings, special details, drainage, penetrations, equipment curbs, and condition of other construction that affect metal panels.
7. Review governing regulations and requirements for insurance, certificates, and tests and inspections if applicable.
8. Review temporary protection requirements for metal panel systems during and after installation.
9. Review procedures for repair of metal panels damaged after installation.

10. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

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

B. Shop Drawings:

1. Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.
2. Accessories: Include details of the flashing, trim, and anchorage systems, at a scale of not less than 1-1/2 inches per 12 inches.

C. Samples for Initial Selection: For each type of metal panel indicated with factory-applied color finishes.

1. Include similar Samples of trim and accessories involving color selection.

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

1. Metal Panels: 12 inches long by actual panel width. Include clips, fasteners, closures, and other metal panel accessories.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

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

C. Field quality-control reports.

D. Engineering Package which demonstrates compliance with requirements in this section, if applicable.

E. Sample Warranties: For special warranties.

1.6 CLOSEOUT SUBMITTALS

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

1.7 QUALITY ASSURANCE

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

B. Source Limitations: Obtain each component of metal roof panel system from single manufacturer or as approved by Roof Panel Manufacturer.

C. Fire-Resistance Ratings: Where indicated, provide metal roof panels identical to those of assemblies tested for fire resistance per ASTM E 119 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.
2. Combustion Characteristics: ASTM E 136.

D. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.

1. Build mockups for typical roof area only, including accessories.

    a. Size: 12 feet long by 6 feet.
    b. Each type of exposed seam and seam termination.

2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, metal panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.

B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.

D. Retain strippable protective covering on metal panels during installation. Protect strippable protective covering on metal roof panels from exposure to sunlight and high humidity, except to extent necessary for period of metal roof panel installation.

E. Store materials on pallets, blocking, or other means to keep materials from coming into contact with moisture, dirt, debris, and other contaminates.

F. Handle and store roofing materials and place equipment in a manner to avoid permanent deflection of deck.

1.9 FIELD CONDITIONS

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

B. Field Measurements: Verify actual dimensions of construction contiguous with metal roof panels by field measurements before fabrication.

1.10 COORDINATION

A. Coordinate sizes and locations of roof level penetrations with actual equipment provided.

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

1.11 WARRANTY

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

1. Failures include, but are not limited to, the following:

a. Structural failures including rupturing, cracking, or puncturing.
b. Deterioration of metals and other materials beyond normal weathering.

2. Warranty Period: Two (2) years from date of Substantial Completion.

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

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 20 years from date of Substantial Completion.

C. Special Weathertightness Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace standing-seam metal roof panel assemblies that fail to remain weathertight, including leaks, within specified warranty period.

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

2. Contractor's obligation to weathertightness warranty shall not extend past the first two years after substantial completion and shall have no provisions for contractor obligations two years after substantial completion.
3. Dollar Limitation: No dollar limitation shall be placed on the warranty terms and shall not be limited to the manufacturer's cost of materials.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General Performance: Metal roof panel assembly shall comply with performance requirements without failure due to defective manufacture, fabrication, installation, or other defects in construction.

B. Delegated Design: Design metal roof panel assembly, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated on Drawings for specific project location. Analysis shall also demonstrate conformance to wind resistance requirements of ASCE 7 as required by Code. Design for snow load and associated drag loads.

C. Air Infiltration: Air leakage through assembly of not more than 0.06 cfm/sf. of roof area when tested according to ASTM E 1680 at the following test-pressure difference.

1. Test-Pressure Difference: Negative 1.57 lbs/sf.
2. Test-Pressure Difference: Positive and negative 1.57 lbs/sf.
3. Positive Preload Test-Pressure Difference: Greater than or equal to 15.0 lbs/sf. and the greater of 75 percent of building live load or 50 percent of building design positive wind-pressure difference.
4. Negative Preload Test-Pressure Difference: 50 percent of design wind-uplift-pressure difference.

D. Water Penetration: No water penetration when tested according to ASTM E 1646 at the following test-pressure difference.

1. Test-Pressure Difference: 2.86 lbs/sf.
2. Test-Pressure Difference: 20 percent of positive design wind pressure, but not less than 6.24 lbs/sf and not more than 12.0 lbs/sf.
3. Positive Preload Test-Pressure Difference: Greater than or equal to 15.0 lbs/sf and the greater of 75 percent of building live load or 50 percent of building design positive wind-pressure difference.
4. Negative Preload Test-Pressure Difference: 50 percent of design wind-uplift-pressure difference.

E. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for wind-uplift-resistance class indicated. Actual wind uplift requirements established in this section may exceed pressures tested by UL and is not necessarily the determining factor for panel attachment requirements, but shall be considered a minimum requirement if designed or other tested attachment is determined to be lesser.

1. Uplift Rating: UL 90.
2. Fire/Windstorm Classification: Class 1A- 90 Insert number.
3. Hail Resistance: MH.

F. Structural Performance: Uniform load capacity shall be determined by testing in accord with the principles of ASTM E-1592. Calculations showing compliance with project loads shall be stamped by a professional engineer registered in the state of Oregon. Calculations shall be based on data obtained from the ASTM E-1592 testing. The roof panels and accessories shall resist wind and snow loads indicated on the Drawings and described herein. Actual attachment requirements established in this section may exceed pressures tested by ASTM and is not necessarily the determining factor for panel attachment requirements, but shall be considered a minimum requirement if designed or other tested attachment is determined to be lesser.

G. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

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

2.2 STANDING-SEAM METAL ROOF PANELS

A. General: Provide factory-formed metal roof panels designed to be installed by lapping and interconnecting raised side edges of adjacent panels with joint type indicated and mechanically attaching panels to supports using concealed clips in side laps. Include clips, cleats, pressure plates, and accessories required for weathertight installation.

1. Steel Panel Systems: Unless more stringent requirements are indicated, comply with ASTM E 1514.

B. Metal Roof Panel: Vertical-Rib, seamed-joint, standing-seam metal roof panels; formed with vertical ribs at panel edges and between ribs; designed for sequential installation by mechanically attaching panels to supports using concealed clips located under one side of panels, engaging opposite edge of adjacent panels, and mechanically seaming panels together.

1. Manufacturers:

a. Firestone Building Products – UC 6.
b. Or Approved.

2. Joint Type: Double folded.
3. Panel Height: 1.5 inches.
4. Seam Sealant: Factory applied butyl sealant.
5. Panel Coverage: 16 inches.

C. Panel Materials:

1. Metallic-Coated Steel Sheet: Zinc-coated (galvanized) steel sheet complying with ASTM A 653/A 653M, G90 coating designation, or aluminum-zinc alloy-coated steel

sheet complying with ASTM A 792/A 792M, Class AZ50 coating designation; structural quality. Prepainted by the coil-coating process to comply with ASTM A 755/A 755M.

a. Nominal Thickness: 22 gauge.
b. Exterior Finish: Two-coat fluoropolymer.
c. Color: As selected by Owner from manufacturer's full range.

2. Stainless-Steel Sheet: ASTM A167, Grade 2D, Type 304, soft temper, smooth finish.

a. Nominal Thickness: 0.025 inch.
b. Exterior Finish: 2B.

D. Panel Clips: Two-piece floating to accommodate thermal movement.

a. Material: 22 gauge nominal thickness, zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet.

E. Panel Fasteners: Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads. Provide exposed fasteners with heads matching color of metal roof panels by means of plastic caps or factory-applied coating. Provide EPDM, PVC, or neoprene sealing washers.

F. Pipe Penetration Flashing: Decktite Standard - EPDM, or approved.

2.3 UNDERLAYMENT MATERIALS

A. Self-Adhering, High-Temperature Underlayment: Provide self-adhering, cold-applied, sheet underlayment, a minimum of 30 mils thick minimum, consisting of slip-resistant, polyethylene-film top surface laminated to a layer of butyl or SBS-modified asphalt adhesive, with release-paper backing. Provide primer when recommended by underlayment manufacturer.

1. Thermal Stability: Stable after testing at 240 deg F; ASTM D 1970.
2. Low-Temperature Flexibility: Passes after testing at minus 20 deg F; ASTM D 1970.
3. Products:

a. Carlisle Coatings & Waterproofing Inc., Div. of Carlisle Companies Inc.; CCW WIP 300HT.
b. Grace Construction Products; a unit of Grace, W. R. & Co.; Ultra.
c. Henry Company; Blueskin PE200 HT.
d. Or Approved.

B. Slip Sheet: Manufacturer's recommended slip sheet, of type required for application.

2.4 MISCELLANEOUS MATERIALS

A. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.

1. Closures: Provide closures at eaves and ridges, fabricated of same metal as metal panels.
2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
3. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- thick, flexible closure strips; cut or premolded to match metal panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.

B. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance.

1. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers.
2. Finish flashing and trim with same finish system as adjacent metal panels.
3. Comply with requirements as specified in Section 076200 "Sheet Metal Flashing and Trim".

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

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

2.5 FABRICATION

A. General: Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

B. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.

C. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.

1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
2. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
3. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.

4. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
5. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
6. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal panel manufacturer.

    a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal panel manufacturer for application, but not less than thickness of metal being secured.

2.6 FINISHES

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

B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in same piece are unacceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

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

1. Examine primary and secondary roof framing to verify that rafters, purlins, angles, channels, and other structural panel support members and anchorages have been installed within alignment tolerances required by metal roof panel manufacturer.
2. Examine solid roof sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal roof panel manufacturer.

    a. Verify that air- or water-resistive barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.

B. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before installation.

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

3.2 PREPARATION

A. Clean substrates of substances harmful to new underlayment and/or slip sheet, including removing projections capable of damaging finished product.

B. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C 754 and metal panel manufacturer's written recommendations.

3.3 UNDERLAYMENT INSTALLATION

A. Self-Adhering Sheet Underlayment: Apply primer if required by manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation. Apply at locations indicated on Drawings, wrinkle free, in shingle fashion to shed water, and with end laps of not less than 6 inches staggered 24 inches between courses. Overlap side edges not less than 3-1/2 inches. Roll laps with roller. Cover underlayment within 14 days.

B. Flashings: Install flashings to cover underlayment to comply with requirements specified in Section 076200 "Sheet Metal Flashing and Trim."

3.4 METAL PANEL INSTALLATION, GENERAL

A. General: Install metal panels according to manufacturer's written instructions in orientation, sizes, and locations indicated. Install panels perpendicular to supports unless otherwise indicated. Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.

1. Provide metal roof panels of full length from eave to ridge.
2. Shim or otherwise plumb substrates receiving metal panels.
3. Flash and seal metal panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal panels are installed.
4. Install screw fasteners in predrilled holes.
5. Locate and space fastenings in uniform vertical and horizontal alignment.
6. Install flashing and trim as metal panel work proceeds.
7. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
8. Align bottoms of metal panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.
9. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.

B. Thermal Movement: Rigidly fasten metal roof panels to structure at one and only one location for each panel. Allow remainder of panel to move freely for thermal expansion and contraction.

1. Point of Fixity: Fasten each panel along a single line of fixing located at ridge.
2. Do not attach accessories through roof panels in a manner that will inhibit thermal movement of panels.

C. Fasteners: Use stainless-steel fasteners for surfaces exposed to the exterior; use galvanized-steel fasteners for surfaces exposed to the interior.

D. Anchor Clips: Anchor metal roof panels and other components of the Work securely in place, using manufacturer's approved fasteners according to manufacturers' written instructions.

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

F. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for waterproof performance of metal roof panel assemblies. Provide types of gaskets, fillers, and sealants indicated or, if not indicated, types recommended by metal roof panel manufacturer.

3.5 METAL PANEL INSTALLATION

A. Standing-Seam Metal Roof Panel Installation: Fasten metal roof panels to supports with concealed clips at each standing-seam joint at location, spacing, and with fasteners recommended in writing by manufacturer.

1. Install clips to supports with self-tapping fasteners.
2. Install pressure plates at locations indicated in manufacturer's written installation instructions.
3. Seamed Joint: Crimp standing seams with manufacturer-approved, motorized seamer tool so clip, metal roof panel, and factory-applied sealant are completely engaged.

B. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete metal panel system including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
2. Provide types indicated by metal roof panel manufacturers; or, if not indicated, types recommended by metal roof panel manufacturer.

C. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

1. Install exposed flashing and trim that is without buckling and tool marks, and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and achieve waterproof and weather-resistant performance.
2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

D. Pipe Flashing: Form flashing around pipe penetration and metal roof panels. Fasten and seal to metal roof panels as recommended by manufacturer.

1. Penetration flashing fasteners shall not puncture or contact underlayment or sheathing.
2. Provide sacrificial 24 gauge galvanized steel plates under fastener locations to prevent underlayment damage from penetration flashing fasteners.

E. Valley: Valleys shall be of continuous and seamless construction.

1. Extend valley 5-inches up vertical protrusions.
2. Protect finished valley installation from damage and foot traffic.

3.6 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect metal roof panel installation, including accessories. Report results in writing.

B. Remove and replace applications of metal roof panels where tests and inspections indicate that they do not comply with specified requirements.

C. Additional tests and inspections, at Contractor's expense, are performed to determine compliance of replaced or additional work with specified requirements.

D. Prepare test and inspection reports.

3.7 CLEANING AND PROTECTION

A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.

B. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 074113.16

SECTION 074213 - METAL WALL PANELS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Manufactured metal panels for walls, with related flashings and accessory components, installed directly over wood sheathed walls.

B. Related Sections include the following:

1. Section 024119 "Selective Structure Demolition" for removal and partial reuse of selected building elements.
2. Section 061053 "Miscellaneous Rough Carpentry" for installation of wood curbs, nailers, miscellaneous sheathing repairs, and seismic overlay.
3. Section 070150 "Preparation for Re-Roofing" for methods of existing roof tear-off procedures and requirements.
4. Section 075216 "SBS-Modified Bituminous Membrane Roofing" for 2-ply system with self-adhering base ply and torch-applied top ply sheet.
5. Section 076200 "Sheet Metal Flashing and Trim" for installing sheet metal flashing and trim integral with roofing and manufactured metal panels.

1.3 DEFINITION

A. Metal Wall Panel Assembly: Metal wall panels, attachment system components, miscellaneous metal framing, underlayment, and accessories necessary for a complete weathertight wall system.

1.4 PERFORMANCE REQUIREMENTS

A. General Performance: Metal wall panel assemblies shall comply with performance requirements without failure due to defective manufacture, fabrication, installation, or other defects in construction.

B. Air Infiltration: Air leakage through assembly of not more than 0.06 cfm/sq. ft. of wall area when tested according to ASTM E 283 at the following test-pressure difference:

C. Test-Pressure Difference: 1.57 lbf/sq. ft.

1. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E 331 at the following test-pressure difference.
2. Test-Pressure Difference: 6.24 lbf/sq. ft.

D. Design Requirements:

1. Components: Design and size components to withstand dead and live loads caused by positive and negative wind pressure acting normal to plane of wall as calculated in accordance with 2010 Oregon Structural Specialty code.
2. Maximum Allowable Deflection of Panel: 1/90 of span.
3. Movement: Accommodate movement within system without damage to components or deterioration of seals, movement within system; movement between system and perimeter components when subject to seasonal temperature cycling; dynamic loading and release of loads; and deflection of structural support framing.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of wall panel and accessory.

B. Shop Drawings: Show fabrication and installation layouts of metal wall panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details, as applicable. Distinguish between factory-, shop- and field-assembled work.

C. Samples for Initial Selection: For each type of metal wall panel indicated with factory-applied color finishes.

1. Include similar Samples of trim and accessories involving color selection.
2. Include manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each sealant exposed to view.

D. Samples for Verification: For each type of exposed finish required, illustrating finish color, sheen, and texture, prepared on Samples of size indicated below.

1. Metal Wall Panels: 12 inches long by actual panel width. Include fasteners, closures, and other metal wall panel accessories.
2. Trim and Closures: 12 inches long. Include fasteners and other exposed accessories.
3. Accessories: 12-inch- long Samples for each type of accessory.

1.6 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Exterior elevations drawn to scale and coordinating penetrations and wall-mounted items. Show the following:

1. Wall panels and attachments.
2. Penetrations of wall by window systems; include all details.

B. Qualification Data: For Installer.

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

D. Field quality-control reports.

E. Warranties: Sample of special warranties.

1.7 CLOSEOUT SUBMITTALS

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

1.8 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by manufacturer.

B. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.

C. Source Limitations: Obtain each type of metal wall panel from single source from single manufacturer.

D. Fire-Resistance Ratings: Where indicated, provide metal wall panels identical to those of assemblies tested for fire resistance per ASTM E 119 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

E. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.

1. Build mockup of typical wall panel and window opening as shown on Drawings.
2. Construct mock-up full size at one window location; include panel system, glazing, and attachments to building frame, associated water resistive barrier and air seal materials, weep drainage system, sealants and seals, in mock-up.
3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Consultant specifically approves such deviations in writing.
4. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

F. Preinstallation Conference: Conduct conference at Project site.

1. Meet with Owner, Consultant, metal wall panel Installer, metal wall panel manufacturer's representative, and installers whose work interfaces with or affects metal wall panels, including installers of windows and roof systems.
2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.

3. Review methods and procedures related to metal wall panel installation, including manufacturer's written instructions.
4. Examine support conditions for compliance with requirements, including alignment between and attachment to structural members.
5. Review flashings, special siding details, wall penetrations, openings, and condition of other construction that will affect metal wall panels.
6. Review governing regulations and requirements for insurance, certificates, and tests and inspections if applicable.
7. Review temporary protection requirements for metal wall panel assembly during and after installation.
8. Review wall panel observation and repair procedures after metal wall panel installation.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, sheets, metal wall panels, and other manufactured items so as not to be damaged or deformed. Package metal wall panels for protection during transportation and handling.

B. Unload, store, and erect metal wall panels in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack metal wall panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal wall panels to ensure dryness, with positive slope for drainage of water. Do not store metal wall panels in contact with other materials that might cause staining, denting, or other surface damage.

D. Retain strippable protective covering on metal wall panel for period of metal wall panel installation.

1.10 PROJECT CONDITIONS

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

B. Field Measurements: Verify locations of structural members and wall opening dimensions by field measurements before metal wall panel fabrication, and indicate measurements on Shop Drawings.

1.11 COORDINATION

A. Coordinate metal wall panel assemblies with rain drainage work, flashing, trim, and construction of other adjoining work to provide a leak-proof, secure, and noncorrosive installation.

B. Coordinate the Work for installation of water-resistive barriers and air barrier seals.

C. Coordinate the Work with installation of window components or materials.

1.12 WARRANTY

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

1. Failures include, but are not limited to, the following:

a. Structural failures including rupturing, cracking, or puncturing.
b. Deterioration of metals and other materials beyond normal weathering.

2. Warranty Period: 20 years from date of Substantial Completion.

B. Panel Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal wall panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 20 years from date of Substantial Completion.

C. Installer Warranty: Submit metal panel Installer's warranty, signed by Installer, covering Work of this Section.

1. Warrant that metal panels are installed in accordance with the Contract Documents and will be free from defective quality of Work and or remain watertight and weatherproof with normal usage.
2. Warranty Period: Two (2) years from date of Final Acceptance.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide a product based on the following design:

1. AEP Span: HR-36 Roof and Wall.
2. Firestone Metal Products: VR-Classic Omega Panel.
3. Or Approved.

2.2 METAL PANEL MATERIALS

A. General: Provide factory-formed metal wall panels designed to be field assembled by lapping side edges of adjacent panels and mechanically attaching panels to supports using exposed fasteners in side laps. Include accessories required for weathertight installation.

1. Comply with requirements as specified in Section 076200 "Sheet Metal Flashing and Trim".

B. Panel Profile: Exposed-fastener, lap seam metal wall panels, corrugated profile, formed with alternating ribs.

C. Pre-painted, Metallic-Coated Steel Sheet (roof flashings): ASTM A6531 A653M G90 coating designation; 24 gauge. Steel sheet metallic coated by the hot-dip process and pre-painted by the coil-coating process to comply with ASTM A 755/A 755M.

1. High -Performance Organic Finish: Two-coat thermocured system containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with physical properties and coating performance requirements of AAMA 2604, except as modified for below.
2. Color: Basis of Design color shall be AEP Span Zactique II; or approved.

D. Panel Fasteners: Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads. Provide exposed fasteners with heads matching color of metal wall panels by means of plastic caps or factory-applied coating. Provide EPDM, PVC, or neoprene sealing washers.

E. Wall Panel Accessories: Provide components required for a complete metal wall panel assembly including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal wall panels, unless otherwise indicated.

1. Closures: Provide closures at eaves and rakes, fabricated of same metal as metal wall panels.
2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
3. Closure Strips: Closed-cell, expanded, cellular, rubber or cross-linked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- thick, flexible closure strips; cut or premolded to match metal wall panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.

F. Flashing and Trim: Formed from 24 gauge minimum thickness, zinc-coated (galvanized) steel sheet or aluminum-zinc alloy-coated steel sheet prepainted with coil coating. Provide flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, bases, drips, sills, jambs, corners, endwalls, framed openings, rakes, fasciae, parapet caps, soffits, reveals, and fillers. Finish flashing and trim with same finish system as adjacent metal wall panels.

1. Coordinate with Section 076200 "Sheet Metal Flashing and Trim".

G. General Finish Requirements:

1. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
2. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

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

2.3 METAL PANEL FABRICATION

A. General: Fabricate and finish metal wall panels and accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

B. Fabricate metal wall panels in a manner that eliminates condensation on interior side of panel and with joints between panels designed to form weathertight seals.

C. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.

D. Fabricate metal wall panel joints with factory-installed captive gaskets or separator strips that provide a tight seal and prevent metal-to-metal contact, and that will minimize noise from movements within panel assembly.

2.4 AUXILLARY MATERIALS

A. Sheet Metal Accessories: Fabricate flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of item indicated.

1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
2. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.
3. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
4. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended by metal wall panel manufacturer.

    a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal wall panel manufacturer for application but not less than thickness of metal being secured.

5. Coordinate with flashings covered under Section 076200 "Sheet Metal Flashing and Trim".

B. Water-Resistive Barrier: Fully integrated, self-adhered, vapor permeable, air and water barrier.

1. Manufacturers: Basis-of-Design Product: Subject to compliance with requirements, provide a product based on the following design:

    a. Henry Blueskin VP.
    b. Vaproshield Wrap Shield SA.
    c. Or approved.

C. Flexible Flashing/Self-Adhering Underlayment: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 20 mils.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following.

    a. Henry Blueskin SA.
    b. Vaproshield Vaproflashing.
    c. Or approved.

D. Panel Closure Strips: Closed-cell, expanded, cellular, rubber or cross-linked, polyolefin foam or closed-cell laminated polyethylene; minimum 1-inch-thick, flexible-closure strips; cut or premolded to match sheet metal roofing rib profile.

E. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

PART 3 - EXECUTION

3.1 EXAMINATION

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

1. Examine existing wall framing to verify that girts, angles, channels, studs, and other structural panel support members and anchorage have been installed within alignment tolerances required by metal wall panel manufacturer.
2. Examine existing wall sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal wall panel manufacturer.
3. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.

B. Examine roughing-in for components and systems penetrating metal wall panels to verify actual locations of penetrations relative to seam locations of metal wall panels before metal wall panel installation.

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

3.2 PREPARATION

A. Existing Metal Panels: Remove existing metal panels and wall underlayment down to existing wall sheathing.

1. Comply with requirements specified in Section 024119 "Selective Structure Demolition".
2. Comply with requirements specified in Section 070150.19 "Preparation for Re-Roofing".

B. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.

1. Moisture includes rain, dew, ice, frost, snow, and the like.
2. Dust and debris includes dirt, oil, and other materials not inherent in the substrate.

C. Inspect all substrates for irregularities and defects that prohibit the proper installation of new roofing materials. Notify the Owner of all defects for proper correction, prior to installation of new materials.

D. Prepare all surfaces and details in accordance with manufacturer’s printed instructions and these contract documents.

E. Protect building surfaces and equipment from damage and contamination from roofing work.

F. Replace existing sheet metal flashings where indicated on drawings. Prepare substrates as required to receive new material.

3.3 METAL WALL PANEL INSTALLAITON

A. General: Install metal wall panels according to manufacturer's written instructions in orientation, sizes, and locations indicated on Drawings. Anchor metal wall panels and other components of the Work securely in place, with provisions for thermal and structural movement.

B. Water-Resistive Barrier (WRB):

1. Install water-resistive barrier in accordance with the manufacturer’s written guidelines.
2. Cover exposed exterior surface of wall sheathing with water-resistive barrier securely adhered immediately after existing sheathing is exposed.

    a. Install WRB horizontally over existing wall sheathing. Weather-lap all side laps a minimum of 6-inches, and end laps a minimum of 6-inches. Adhere to substrate.
    b. Weather-lap new air barrier, shingle fashion, by existing water-resistive barrier at tie-in locations at upper regions of repair areas. At vertical locations exceeding 6-feet, interweave underlayment with existing water-resistive barrier.
    c. Weather-lap air barrier over top edge of existing roof system.
    d. Seal seams, edges, fasteners, and penetrations with flexible flashing where required for watertight installation.
    e. Extend into jambs of openings and seal corners with flexible flashing.

C. Metal Panels: Fasten metal wall panels to existing wall sheathing with fasteners at each lapped joint and at all locations using spacing recommended by manufacturer.

1. Do not begin installation until weather barrier and flashings that will be concealed by metal wall panels are installed.
2. Lap ribbed or fluted sheets one full rib corrugation. Apply panels and associated items for neat and weathertight enclosure. Avoid "panel creep" or application not true to line.
3. Provide metal-backed washers under heads of exposed fasteners bearing on weather side of metal wall panels.
4. Locate and space exposed fasteners in uniform vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of washer.
5. Install screw fasteners with power tools having controlled torque adjusted to compress washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.
6. Provide sealant tape at lapped joints of metal wall panels and between panels and protruding equipment, vents, and accessories.
7. Seal metal wall panel end laps with double beads of tape or sealant, full width of panel. Seal side joints where recommended by metal wall panel manufacture.
8. Apply a continuous ribbon of sealant tape to weather-side surface of fastenings on end laps; on side laps of nesting-type panels; on side laps of corrugated nesting-type, ribbed, or fluted panels; and elsewhere as needed to make panels weathertight.
9. At panel splices, nest panels with minimum 6-inch end lap, sealed with butyl-rubber sealant and fastened together by interlocking clamping plates

D. Panel Closure and Sealant: Install panels closure strips, joint fillers, and sealants where indicated and where required for weathertight performance of metal wall panel assemblies.

E. Miscellaneous Finish Installation:

1. Provide types of gaskets, fillers, and sealants indicated or, if not indicated, types recommended by metal wall panel manufacturer.
2. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action as recommended by metal wall panel manufacturer.

3.4 ACCESSORY INSTALLATION

A. General: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete metal wall panel assembly including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.

B. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

1. Install exposed flashing and trim that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance.
2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Water-Spray Test: After completing the installation, test assembly for water penetration according to AAMA 501.2 in a location as directed by Owner.

C. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect and test completed metal wall panel installation, including accessories.

D. Remove and replace metal wall panels where tests and inspections indicate that they do not comply with specified requirements.

E. Additional tests and inspections, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.6 CLEANING AND PROTECTION

A. Remove temporary protective coverings and strippable films, if any, as metal wall panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal wall panel installation, clean finished surfaces as recommended by metal wall panel manufacturer. Maintain in a clean condition during construction.

B. After metal wall panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.

C. Replace metal wall panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 074213

SECTION 075216 - SBS-MODIFIED BITUMINOUS MEMBRANE ROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMTNETS

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

1.2 SUMMARY

A. Section includes the following:

1. Granule Surfaced Roof System: Self-adhering and torch-applied, 2-ply Styrene-butadiene-styrene (SBS) modified bitumen roofing system, complete with all preparation and accessories.
2. Insulation assembly, including tapered insulation and overlay board.
3. PMMA - based liquid flashings.

B. Related Sections include the following:

1. Section 024119 "Selective Structure Demolition" for removal and partial reuse of selected building elements.
2. Section 061053 "Miscellaneous Rough Carpentry" for installation of wood curbs, nailers, and miscellaneous sheathing repairs and seismic overlay.
3. Section 070150 "Preparation for Re-Roofing" for methods of existing roof tear-off procedures and requirements.
4. Section 073213 "Clay Roof Tiles" for installation of clay tile roof system and accessories.
5. Section 074113 "Metal Roof Panels" for installation of standing seam metal panel roof system and flashings.
6. Section 074213 "Metal Wall Panels" for installation of manufactured metal panels for walls, with related flashings and accessory components.
7. Section 076200 "Sheet Metal Flashing and Trim" for installing sheet metal flashing and trim integral with roofing and manufactured metal panels.
8. Section 221423 "Storm Drainage Piping" for installation of low-sloped overflow drains.

1.3 DEFINITITIONS

A. Roofing Terminology: Refer to ASTM D 1079 and glossary in the most recent edition of NRCA's "The NRCA Roofing and Waterproofing Manual" for definition of terms related to roofing work in this Section.

1.4 ABBREVIATIONS

A. ASTM ASTM International (formerly American Society for Testing and Materials) www.astm.org.

B. FM Global Factory Mutual Global (FM Global) www.fmglobal.com.

C. NRCA National Roofing Contractors Association www.nrca.net.

D. UL Underwriters Laboratories

E. LTTR Long Term Thermal Resistance

1.5 PERFORMANCE REQUIREMENTS

A. General Performance: Installed membrane roofing and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Membrane roofing and base flashings shall remain watertight.

B. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by roofing manufacturer based on testing and field experience.

C. Roofing System Design: Provide a roofing system that is identical to systems that have been successfully tested by a qualified testing and inspecting agency to resist uplift pressure calculated according to ASCE 7.

1. Corner Uplift Pressure: 165 lbf/sq. ft.
2. Perimeter Uplift Pressure: 120 lbf/sq. ft.
3. Field-of-Roof Uplift Pressure: 75 lbf/sq. ft.

D. FM Approval Listing:

1. Provide roofing membrane, base flashings, and component materials that comply with requirements in FM Approval Standard 4450 and 4470 as part of a roofing system and that are listed in FM Approval Guide for Class 1 construction.
2. Fire/Windstorm Classification: Class 1A-90.
3. Provide modified bituminous roofing system materials bearing FM Approval marking on bundle, package, or container, indicating that materials have been subjected to FM Global examination and follow-up inspection service.

E. UL Listing:

1. Provide modified bituminous roofing systems and components that have been tested for application and slopes indicated, and are listed by Underwriter's Laboratories (UL) for Class A external fire exposure.
2. Provide modified bituminous roofing system materials bearing UL Classification marking on bundle, package, or container, indicating that materials have been produced under UL's Classification and follow-up service.
3. Provide modified bituminous roofing systems that can be installed to comply with UL requirements for Fire Classified and Class 90 wind-uplift requirements.

F. Rigid Insulation Fire Performance Characteristics:

1. Provide rigid insulation materials that are identical to those whose fire performance characteristics, as listed for each material or assembly of which rigid 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.
2. Surface Burning Characteristics: ASTM E84.
3. Fire Resistance Ratings: ASTM E119.

1.6 ACTION SUBMITTALS

A. Comply with requirements as specified in Section 013300 "Submittal Procedures".

B. Product data for each type of product specified. Include data substantiating that materials comply with requirements.

C. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other work.

1. Base flashings and membrane terminations.
2. Crickets, saddles, and tapered edge strips, including slopes.
3. Rigid insulation fastening patterns for corner, perimeter, and field-of-roof locations.

1.7 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer and manufacturer.

B. Manufacturer Certificates: Signed by roofing manufacturer certifying that roofing system complies with requirements specified.

1. Submit evidence of meeting performance requirements.

C. Installer Certification: Submit written certification from manufacturer of modified bituminous roofing systems certifying that installer is approved by manufacturer to install the specified roofing systems.

D. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for components of roofing system.

E. Research/Evaluation Reports: For components of roofing system.

F. Manufacturer’s published specifications for the proposed materials and systems.

G. Evidence of UL and FM Approvals.

H. Warranty: Submit sample copy of proposed warranties stating obligations, remedies, limitations, and exclusions of warranties.

1.8 CLOSEOUT SUBMITTALS

A. Maintenance Data: For roofing system to include in maintenance manuals.

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

1.9 QUALITY ASSURANCE

A. Installer Qualifications and Requirements:

1. A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's warranty.
2. In continuous business under same name for past five (5) years.
3. Completed at least three (3) successful installations of specified materials and systems on projects of similar scope.
4. Contractor shall provide all personnel trained in application of materials and systems and shall maintain supervision as specified elsewhere.
5. Installer Field Supervision: Require Installer to maintain a full-time supervisor / foreman on the job site during times that modified bituminous roofing systems installation is in progress, and who is experienced in installation of the specified roofing systems.

B. Manufacturer's Qualifications and Requirements:

1. A qualified manufacturer that has UL listing and FM Approval for roofing system identical to that used for this Project.
2. A technical representative of materials manufacturer shall periodically observe work in progress.
3. Technical representative, as a minimum, shall be present to observe deck preparation, general installation procedures, and final completion; submit documentation of manufacturer's final acceptance.
4. Work shall not proceed until such observations have been made and conditions have been approved in writing by the manufacturer.
5. Technical representative shall perform a punch list inspection upon substantial completion of the project indicating all items in need of attention, including conformance to manufacturer's published installation instructions and these contract documents; provide documentation.

C. Source Limitations: Obtain primary products, including each type of roofing ply sheet, bitumen, and adhesive, membrane flashings from a single manufacturer, or with primary manufacturer's endorsement. Provide secondary products as recommended and approved by the primary manufacturer for the specified roof systems.

D. Fire-Test-Response Ratings: Where indicated, provide fire-resistance-rated roof assemblies identical to those of assemblies tested for fire resistance per ASTM E 119 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Exterior Fire-Test Exposure: Class A; ASTM E 108, for application and roof slopes indicated.

E. Pre-installation Conference: Conduct conference at Project site. Review methods and procedures related to roofing system including, but not limited to, the following:

1. Meet with Owner, Consultant, Owner's insurer if applicable, testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, and installers whose work interfaces with or affects roofing including installers of roof accessories and roof-mounted equipment.
2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
3. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
4. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
5. Review structural loading limitations of roof deck during and after roofing.
6. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing system.
7. Review governing regulations and requirements for insurance and certificates if applicable.
8. Review temporary protection requirements for roofing system during and after installation.
9. Review roof observation and repair procedures after roofing installation.
10. Document proceedings, including corrective measures or actions required, and furnish copy of record to each participant.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Packing, Shipping, Handling, and Unloading:

1. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.
2. Handle and store materials and equipment in a manner to avoid significant or permanent damage and deflection of the roof deck.
3. Do not leave unused insulation, felts, and other sheet materials on the roof overnight or when roofing work is not in progress unless protected from weather or other moisture sources.
4. Remove and properly dispose of damaged, rejected and removed existing materials on a continuing basis. Do not store trash on the roof area for extended periods of time.

B. Storage and Protection:

1. Store roll goods on ends only; do no lay flat. Flattened rolls shall be rejected, and shall not be used in the construction of the roof system.
2. Store and handle roofing sheets in a dry, well-ventilated, weathertight place to ensure no possibility of significant moisture pickup.
3. Control temperature of storage areas in accordance with the manufacturer’s instructions.
4. Store materials on pallets, blocking, or other means to keep materials from coming into contact with moisture, dirt, debris, and other contaminates.
5. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.

a. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.

6. Protect roof level rigid insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with rigid insulation manufacturer's written instructions for handling, storing, and protecting during installation.
7. Handle and store roofing materials and place equipment in a manner to avoid permanent deflection of deck.

1.11 PROJECT CONDITIONS

A. Provide tarps or plastic sheeting required to protect opened roofs and flashings and to prevent the entrance of moisture or rain water into the existing structure until new materials have been applied and roof is in a watertight condition.

B. Have necessary waterproof canvas or plastic sheeting readily available in case of emergency. The Contractor will be held liable for any damage to building interior due to Contractor's negligence.

C. Roofing materials shall not be applied when water in any form (i.e., rain, dew, ice, frost, snow, etc.) is present on the deck.

D. Adhesive applied roofing materials shall not be applied when dirt, dust, debris, oil, etc.is present on the deck.

E. Weather Limitations: Proceed with roofing work only when existing and forecasted weather conditions permit roofing to be installed in accordance with manufacturer's written recommendations and warranty requirements.

1.12 WARRANTY

A. Special Manufacturer's Warranty: Manufacturer's standard form, without monetary limitation, in which manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period. Failure includes roof leaks.

1. Special warranty includes roofing membrane, base flashings, roofing membrane accessories, roof level rigid insulation, overlay boards, walkway products, and other components of roofing system.
2. Warranty Period: 20 years from date of Substantial Completion.
3. The warranty shall be written to allow for minor roofing repairs by the Owner and shall contain no disclaimer for ponded water conditions.

B. Special Installer's Warranty: Submit roofing Installer's warranty, signed by Installer, covering Work of this Section.

1. Include all components of roofing system such as roofing membrane, base flashing, fasteners, overlay boards, walkway products, and other components of the roofing systems.

2. Warranty Period: Two (2) years from date of Final Acceptance.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Siplast (Icopal).
2. Soprema.
3. Or approved.

B. In other Part 2 articles where titles below introduce lists, the following requirements apply for product selection:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the products specified.
2. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the manufacturers specified.

2.2 ROOF MEMBRANE MATERIALS

A. Base Ply Sheet: ASTM D 6163, Grade S, Type I, Self-Adhering, Random glass mat or glass scrim reinforced SBS modified bitumen ply sheet:

1. Minimum thickness 94-mils, minimum weight 69 pounds per 100 square feet.

B. Top Ply Sheet: ASTM D 6163, Grade G, Type I, heat-fusible-applied torchable grade, random glass mat or scrim reinforced SBS modified bitumen cap sheet, mineral granule surfaced, fire rated:

1. Minimum thickness: 114-mils at selvage edge, minimum weight 112 pounds per 100 square feet.
2. Granule Color: white.

C. Reinforcing Sheet: ASTM D 6163, Grade S, Type I, Self-Adhering, Random glass mat or glass scrim reinforced SBS modified bitumen ply sheet:

1. Minimum thickness 94-mils, minimum weight 69 pounds per 100 square feet.

D. Flashing Sheet: Metal-foil surfaced, ASTM D 6298, glass-fiber-reinforced, SBS-modified asphalt sheet; suitable for application method specified, and as follows:

1. Foil Surfacing: Aluminum.
2. Minimum Thickness: 134-mils, minimum weight 90 pounds per 100 square feet.

2.3 AUXILIARY ROOFING MEMBRANE MATERIALS

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

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

B. Asphalt Primer: To comply with ASTM D 41.

C. Plastic Cement: ASTM D 4586, asbestos free, of consistency required by roofing system manufacturer for application.

D. Mastic Sealant: Polyisobutylene, plain or modified bitumen, non-hardening, non-migrating, non-skinning, and nondrying.

E. Sealant in contact with roof membrane materials: Neoprene as manufactured by Gibson – Gardner.

F. Metallic Powder: Aluminum.

G. Roofing Granules: Ceramic-coated roofing granules, No. 11 screen size with 100 percent passing No. 8 sieve and 98 percent of mass retained on No. 40 sieve, color to match color of cap sheet.

H. Cleaning solution: Non-phosphate cleaning solution.

I. Cant strips: ASTM C 208, Type II, Grade 1, cellulosic-fiber insulation board, 3-inch vertical (with 3-7/8-inch face) minimum, and as shown on the drawings.

J. Tapered Edge Strip: ASTM C 208, Type II, Grade 1, cellulosic-fiber insulation board.

K. Fasteners: Factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provisions in FM 4470; designed for fastening roofing membrane components to substrate; tested by manufacturer for required pullout strength; and acceptable to roofing system manufacturer.

L. Miscellaneous Accessories: Provide miscellaneous accessories recommended by roofing system manufacturer.

M. Walkway Pads: Reinforced asphaltic composition pads with slip-resisting mineral-granule surface, manufactured as a traffic pad for foot traffic and acceptable to roofing system manufacturer, 3/8 inch thick, minimum.

1. Pad Color: White.

2.4 PENETRATION POST FLASHING

A. Pipe Flashings: 4 pound desilverized lead, where indicated on the Drawings.

B. Liquid-Applied Flashing System - Liquid applied, layered membrane, fully reinforced and seamless flashing system; Polymethyl Methacrylate (PMMA).

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

a. Siplast (Parapro), Irving TX: Siplast Parapro 123 Flashing System.
b. Or Approved.

2.5 ROOF LEVEL RIGID INSULATION

A. General: Provide preformed roof level rigid insulation units that comply with requirements and referenced standards, selected from manufacturer's standard sizes and of thickness indicated.

B. Flat Stock Rigid Insulation: ASTM C 1289, Type II, rigid closed-cell polyisocyanurate foam board, felt or glass-fiber mat facer on both major surfaces.

1. Produced using HC blowing agents in lieu of HCFCs, in accordance with standards mandated by the Environmental Protection Agency.
2. Thermal Resistance: Tested for Long Term Thermal Resistance (LTTR) in accordance with CAN/ULC-S770.
3. Compressive Strength: Nominal 20 psi per ASTM D 1621.
4. Flame Spread: 35 or less per ASTM E 84.
5. Unit sizes shall be 4-foot by 8-foot, unless otherwise required by the manufacturer.
6. Overall thickness of insulation shall equal 3½-inches. Individual layers of insulation shall not exceed 2-inches in thickness.

C. Rigid Insulation Adhesive (each layer and crickets): One part moisture curing, urethane foam adhesive.

1. Material to be supplied in pressurized cylinders with a net weight of 23 lbs. per container.
2. Adhesive material shall meet FM I-90 (Class 4450) with approved insulation boards.
3. Approved manufacturers:

a. Insta-Stik™, as manufactured by Dow.
b. OlyBond as manufactured by OMG.
c. Or Approved Equal.

2.6 TAPERED INSULATION AND CRICKETS

A. General: Provide preformed roof level rigid insulation tapered boards that comply with requirements and referenced standards, selected from manufacturer's standard sizes and of thicknesses indicated.

B. Tapered Insulation Crickets: ASTM C 1289, Type II; Rigid closed-cell polyisocyanurate foam board, felt or glass-fiber mat facer on both major surfaces.

1. Units shall be 4-foot by 4-foot, 1/2-inch minimum thickness at the start-point of the tapered insulation system.

2. Units shall be tapered to provide a finish slope of no less than 1/4-inch per foot, as indicated on the Drawings.
3. Units shall be installed in adhesive.

2.7 OVERLAY BOARD

A. General: Provide preformed roof insulation overlay boards that comply with requirements and referenced standards, selected from manufacturer's standard sizes and of thicknesses indicated.

B. Gypsum Board: ASTM C 1177/C 1177M, glass-mat faced on both sides of board with surface pre-treated with bond-improving primer; water resistant, silicone-treated gypsum core.

1. Manufacturers:

a. Georgia Pacific, 1/2-inch Dens-Deck Prime Roof Board.
b. Or Approved.

C. Overlay board adhesive: One part moisture curing, urethane foam adhesive.

1. Material to be supplied in pressurized cylinders with a net weight of 23 lbs. per container.
2. Adhesive material shall meet FM I-90 (Class 4450) with approved insulation boards.
3. Approved Manufacturers:

a. Insta-Stik™, as manufactured by Dow.
b. OlyBond as manufactured by OMG.
c. Or Approved Equal.

2.8 INSULATION ASSEMBLY ACCESSORIES

A. General: Roof level insulation accessories recommended by insulation manufacturer for intended use and compatible with membrane roofing.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with the following requirements and other conditions affecting performance of roofing system:

1. Verify that roof openings and penetrations are in place and set and braced and that roof drains are securely clamped in place.
2. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of rigid insulation.
3. Verify that all curbs, wall surfaces, equipment supports, and other roof penetrations that will receive roofing materials will allow the installation of full-height flashings. Verify heights of all penetrations which are located within crickets and slope upgrades; extend penetrations where necessary.
4. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Comply with requirements as specified in Section 070150 "Preparation for Re-Roofing".

B. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.

1. Moisture includes rain, dew, ice, frost, snow, and the like.
2. Dust and debris includes dirt, oil, and other materials not inherent in the substrate.

C. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove temporary roof-drain plugs when no work is taking place or when rain is forecast.

D. Inspect all substrates for irregularities and defects that prohibit the proper installation of new roofing materials. Notify the Owner of all defects for proper correction, prior to installation of new materials.

E. Substrates shall be clean and dry, smooth, free of fins, raised edges, sharp edges, protruding or loose nails, and free of foreign material.

F. Prepare all surfaces and details in accordance with manufacturer’s printed instructions and these contract documents.

G. Protect building surfaces and equipment from damage and contamination from roofing work.

H. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at the end of the workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.

I. Replace existing sheet metal flashings where indicated on drawings. Prepare substrates as required to receive new material.

3.3 ROOF LEVEL RIGID INSULATION INSTALLATION

A. General: Coordinate installing membrane roofing system components so roof level insulation is not exposed to precipitation or left exposed at the end of the workday.

1. Comply with membrane roofing system and rigid insulation manufacturer's written instructions for installing roof level insulation, and these contract documents.
2. Roof level insulation assembly units that become wet or damaged after installation must be removed and replaced.
3. Provide treated wood stops at flanged penetrations and edges, including ridges and as otherwise shown on the drawings. Provide additional stops as recommended by the manufacturer of the roofing materials.

B. Flat Stock Insulation: Install two layers of rigid insulation under area of roofing to achieve required thickness. Install layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6-inches in each direction.

1. Trim surface of rigid insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water. Construct formed drain sumps as shown on the Drawings.
2. Install rigid insulation units mechanically fastened with long joints in continuous straight lines, perpendicular to roof slopes with end joints staggered between rows, abutting edges and ends between boards.

    a. Adhesively fasten all layers of insulation according to recommendations in FM's "Approval Guide" for specified Windstorm Resistance and Insulation Adhesive installation instructions.

        1) Joints of insulation units shall be butted tight; leave no more than 1/4 inch gap between abutting boards, maximum. Joints exceeding 1/4 inch shall be infilled with insulation.
        2) Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
        3) Set each layer of insulation in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.
        4) Notify Owner and Consultant when installation is complete, prior to covering with overlay board, for a review of adhesive patterns.

C. Tapered Insulation: Attach tapered field and cricket board in adhesive under area of roofing to conform to slopes indicated

1. Layout and mark tapered insulation locations and heights at walls.

    a. Notify Consultant if ultimate heights interfere with new or existing counter flashing terminations.

2. Align tapered edge of board parallel with angle of slope.
3. Verify that cricket boards slope to drain a minimum 1/4-inch per foot in the direction of the drainage way or drain, and that ponding water will not occur.
4. Install cricket materials behind curbed penetrations exceeding 2-feet in width to aid in roof drainage.

    a. Joints shall be butted tight; leave no more than 1/8-inch gap between abutting boards, maximum. Joints exceeding 1/8-inch shall be in filled with rigid board insulation.

3.4 OVERLAY BOARD INSTALLATION

A. Where indicated on the Drawings, apply overlay board over the following substrates as indicated in the Drawings as follows:

1. Install overlay board over rigid insulation units using adhesive.

    a. Adhere according to requirements in FM's "Approval Guide" for specified Windstorm Resistance Classification.
    b. Offset the joints of the overlay board a minimum of 1-foot from the joints of the underlying rigid insulation units.

c. Joints of overlay board shall be butted tight; leave no more than 1/8-inch gap between abutting boards, maximum. Joints exceeding 1/8-inch shall be in filled with overlay board insulation.
d. Cut and fit overlay board within 1/4 -inch of nailers, projections, and penetrations.
e. Adhere to resist uplift pressure at corners, perimeter, and field of roof.

1) Joints of insulation units shall be butted tight; leave no more than 1/4 inch gap between abutting boards, maximum. Joints exceeding 1/4 inch shall be infilled with insulation.
2) Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
3) Set each layer of insulation in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.
4) Notify Owner and Consultant when installation is complete, prior to covering with overlay board, for a review of adhesive patterns.

B. Form drain sumps as shown on the Drawings; cut overlay board to form rectangular sump, and install tapered edge strips at perimeter of sump, stacked to achieve insulation thickness.

C. Cant Strips: Bridge junctures of vertical and horizontal surfaces with preformed 45-degree insulation cant strips.

1. Install cant strips in adhesive.

3.5 ROOFING MEMBRANE INSTALLATION - GENERAL

A. Install modified bituminous membrane system according to roofing system manufacturer's written instructions and applicable recommendations of ARMA/NRCA's "Quality Control Guidelines for the Application of Polymer Modified Bitumen Roofing."

1. Install roofing system according to specification-plate classifications in NRCA's "The NRCA Roofing and Waterproofing Manual" and requirements in this Section.
2. Start installation at low point of roofing systems.

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

C. Cooperate with testing and inspecting agencies engaged or required to perform services for installing roofing system.

D. Coordinate installing roofing system so insulation assembly and other components of the roofing membrane system are not permanently exposed are not subjected to precipitation or left uncovered at the end of the workday or when rain is forecast.

1. Provide tie-offs at end of each day's work to cover exposed roofing membrane sheets and insulation assembly with a course of coated felt set in plastic cement or hot roofing asphalt with joints and edges sealed.
2. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system.
3. Remove and discard temporary seals before beginning work on adjoining roofing.

E. Roof Penetrations:

1. Install primed lead flashing at all pipe penetrations. Set flange in plastic cement on top of base ply sheet. Provide reinforcing sheet over flange, set in adhesive, prior to installation of top ply sheet.
2. Liquid-Applied Flashing Installation: Install over post penetrations in accordance with the manufacturer's written instructions as follows:

    a. Prepare substrate intended for adhesion of liquid-applied system to result in clean and dry surface, free from gross irregularities, loose material, unsound material, or any foreign material (such as dirt, ice, snow, water, grease, oil, release agents, lacquers, paint coverings), or any other condition that would be detrimental to the adhesion to the substrate.
    b. Lightly abrade and wiped down surface as required by manufacturer's instructions.
    c. Install overall coating system within 60 minutes of cleaning, or as specified by the manufacturer.

F. Install primed flange type vents in plastic cement on top of base ply sheet. Nail flange prior to application of reinforcing ply sheet.

G. Install reinforcing sheets at drain sumps as shown on the drawings.

H. Roof Drains and new Overflow Drains:

1. Set 30-by-30-inch primed lead flashing in plastic cement over base ply sheet at each drain/overflow drain location.
2. Install reinforcing sheets over lead flashing, and extend onto base ply sheet as shown on the drawings.
3. Clamp roofing membrane, metal flashing, reinforcing sheets, and flashing sheet into roof-drain clamping ring.
4. Comply with requirements as specified in Section 221423 "Storm Drainage Piping"

3.6 ROOF MEMBRANE INSTALLATION

A. Install modified bituminous roofing membrane sheet and cap sheet according to roofing manufacturer's written instructions, starting at low point of roofing system.

B. All layers of roofing shall be laid free of wrinkles, creases, or fish mouths and shall be laid at right angles to the slope of the deck.

C. At the end of the days work or when precipitation is imminent, a water cut-off shall be built at all open edges. Cut-offs can be built using adhesive or plastic cement and non-porous roofing felts, constructed to withstand protracted periods of service. Cut-offs must be completely removed prior to the installation of resumption of roofing.

D. Base Ply Sheet Installation:

1. Apply one (1) layer of self-adhering base ply sheet over installed overlay board.
2. Sufficient pressure shall be exerted during application, using an aluminum rake or broom, to ensure prevention of air pockets.

3. Sheets shall be fully bonded to the prepared substrate and each other.
4. Install base ply sheets to result in one-ply construction, with 3-inch side lap.
5. Install base ply sheets with end laps no less than 6-inches, minimum.
6. Install roofing membrane sheets so side and end laps shed water.
7. Accurately align roofing membrane sheets, without stretching, and maintain uniform side and end laps.
8. Application of roofing shall immediately follow application of insulation assembly and overlay board assembly as a continuous operation.
9. Install metal flanges into uniform layer of plastic cement.
10. Prime metal flanges, including lead flanges and precoated galvanized steel surfaces, with a uniform coating of asphalt primer.
11. Provide reinforcing sheets over all sheet metal flanges.
12. Install a continuous reinforcing sheet in all waterways. Install valley reinforcing sheets over field ply sheets.

E. Top Ply Sheet Installation:

1. Top ply sheets shall torch applied.
2. Cut top ply sheets into manageable lengths between 12-feet and 16-feet long. Lay cut sections flat and allow to relax and flatten per manufacturer's recommendations.
3. Sufficient pressure shall be exerted during application, to ensure prevention of air pockets.
4. Apply each sheet directly behind the torch applicator.
5. Accurately align top ply sheets, without stretching, and maintain uniform side and end laps.
6. Sheets shall be fully bonded to the base ply and each other and shall have a minimum of 3-inch side and 6-inch end laps.
7. Lap seams of the layers shall not be stacked; stacked laps shall be sufficient cause for rejection of the roof.
8. Apply roofing granules to cover exuded bead at laps while bead is tacky (carry a granule bag during application of top ply sheet).
9. Laps shall not buck water and shall be totally sealed.
10. Step in all T-joints. T-joints shall be fully sealed and without voids. Other methods to improve T-joint seal include a 45-degree cut and finish asphalt application at joint area.

F. Reinforcing Sheet Installation:

1. Install reinforcing sheets at horizontal to vertical transitions, including curbed penetrations and flange type penetrations, and bonded over cant strips.
2. Install flashing sheets over reinforcing sheets and top ply sheet at horizontal to vertical transitions. Extend flashing sheets to the top edge of all vertical surfaces, and a minimum of 6-inches onto the roof membrane.
3. Secure top edge of flashing sheets at vertical surfaces at 8 inches on center using fasteners appropriate to the substrate.
4. Provide corner patches or folded corners at base flashing corners. Blind cut corners are not acceptable. Folded corner tabs shall be cut so that tabs do not exceed 4 inches.
5. Install aluminum foil clad flashing sheets using torch-applied method and pressing in with damp sponge or cloth, as recommended by roof materials manufacturer. Avoid causing delamination of foil surface from underlying membrane. Ensure correct directional orientation of foil clad flashing sheets.

3.7 FINISH INSTALLATION

A. Top Ply Sheet and Flashing Sheet Finish:

1. Apply metallic powder / granules at all laps to cover and protect all exposed adhesive. An aesthetically pleasing overall appearance of the finished roof application is a standard requirement for this Project.
2. Make necessary preparations, utilize recommended application techniques, apply specified materials (i.e. granules, metallic powder, etc.), and exercise care in ensuring that the finished application is acceptable to the Owner.

3.8 WALKWAY INSTALLAITON

A. Walkway Pads: Install walkway pads using units of size indicated or, if not indicated, of manufacturer's standard size according to walkway pad manufacturer's written instructions.

1. Set walkway pads in cold-applied adhesive.

B. Avoid installation of walkway pads over drainage ways in a manner that prevents water from evacuating the roof.

3.9 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform roof tests and inspections and to prepare test reports.

B. Test Cuts: Test specimens will be removed to evaluate problems observed during quality-assurance inspections of roofing membrane as follows:

1. Approximate quantities of components within roofing membrane will be determined according to ASTM D 3617.
2. Test specimens will be examined for interply voids according to ASTM D 3617 and to comply with criteria established in Appendix 3 of ARMA/NRCA's "Quality Control Guidelines for the Application of Polymer Modified Bitumen Roofing."

C. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion and submit report to Owner.

1. Notify Owner 48 hours in advance of date and time of inspection.

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

E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.10 PROTECTING AND CLEANING

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

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

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

D. Remove trash, nails, debris, and equipment from site and leave the site clean.

END OF SECTION 075216

SECTION 075600 – FLUID-APPLIED ROOFING AND FLASHING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Roof Areas C3 and E: Two component polymethylmethacrylate (PMMA) based resin roof system gypsum overlay board.

B. Related Sections include the following:

1. Section 024119 "Selective Structure Demolition" for removal and partial reuse of selected building elements.
2. Section 061053 "Miscellaneous Rough Carpentry" for installation of wood curbs, nailers, miscellaneous sheathing repairs and seismic overlay
3. Section 070150.19 "Preparation for Re-Roofing" for methods of existing roof tear-off procedures and requirements.
4. Section 076200 "Sheet Metal Flashing and Trim" for installing sheet metal flashing and trim integral with roofing and manufactured metal panels.

1.2 REFERENCE STANDARDS

A. Agencies which may be used as references throughout this specification section include:

ASTM	American Society for Testing and Materials Philadelphia, PA
FM	Factory Mutual Engineering and Research Norwood, MA
NFPA	National Fire Protection Association Quincy, MA
NRCA	National Roofing Contractors Association Rosemont, IL
OSHA	Occupational Safety and Health Administration Washington, DC
UL	Underwriters Laboratories Northbrook, IL
ACI	American Concrete Institute Farmington Hills, MI
ICRI	International Concrete Repair Institute Des Plaines, IL

1.3 PERFORMANCE REQUIREMENTS

A. General Performance: Installed membrane roofing and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to

defective manufacture, fabrication, installation, or other defects in construction. Membrane roofing and base flashings shall remain watertight.

B. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by roofing membrane manufacturer based on testing and field experience.

C. FM Listing:

1. Provide roofing membrane, base flashings, and component materials that are equal to requirements in FM Approval 4450 and FM Approval 4470 as part of a membrane roofing system.
2. Fire/Windstorm Classification: Class 1-90.
3. Hail Resistance: SH.
4. Provide roofing system materials bearing FM Approval marking on bundle, package, or container, indicating that materials have been subjected to FM's examination and follow-up inspection service.

1.4 ACTION SUBMITTALS

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

B. Shop Drawings: Show locations and extent of waterproofing. Include details for substrate joints and cracks, sheet flashings, penetrations, inside and outside corners, tie-ins, and other termination conditions.

C. Submittal Prior to Contract Award:

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

1.5 INFORMATIONAL SUBMITTALS

A. Product test reports.

B. Manufacturer's published specifications for the proposed materials and systems.

C. Maintenance Data: For roofing system to include in maintenance manuals.

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

E. Evidence of UL and FM Approvals.

F. Warranties: Sample of special warranties specified in this Section.

1.6 QUALITY ASSURANCE

A. Installer Qualifications and Requirements:

1. A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's warranty.
2. In continuous business under same name for past 5 years.
3. Completed at least 3 successful installations of specified materials and systems on projects of similar scope.
4. Contractor shall provide all personnel trained in application of materials and systems and shall maintain supervision as specified elsewhere.
5. Installer Field Supervision: Require installer to maintain a full-time supervisor / foreman on the job site during times that single ply roofing systems installation is in progress, and who is experienced in installation of the specified roofing systems.

B. Manufacturer Qualifications:

1. Obtain primary products, including single ply, adhesive, membrane flashings, and fasteners, from a single manufacturer. Provide secondary products as recommended and approved by the primary manufacturer for the specified roof systems.
2. A qualified manufacturer that has UL listing and FM approval for membrane roofing system identical to that used for this Project.
3. Technical Representative, as a minimum, shall be present to observe deck preparation, general installation procedures, and final completion; submit documentation of manufacturer’s final acceptance.
4. Work shall not proceed until such observations have been made and conditions have been approved in writing by the manufacturer.
5. Technical Representative shall perform a punch list inspection upon substantial completion of the project indicating all items in need of attention, including conformance to manufacturer’s published installation instructions and these contract documents; provide documentation.

C. Preinstallation Conference: Conduct conference at the Project site.

1. Review waterproofing requirements including surface preparation, substrate condition and pretreatment, minimum curing period, forecasted weather conditions, special details and flashings, installation procedures, testing and inspection procedures, and protection and repairs.

D. Product Quality Assurance Program: Primary waterproofing materials shall be manufactured under a quality management system that is monitored regularly by a third party auditor under the ISO 9001:2000 audit process.

E. Project Acceptance: Submit a completed manufacturer's application for roof guarantee form along with shop drawings of the roofs showing all dimensions, penetrations, and details. The form shall contain all the technical information applicable to the project including deck types, roof slopes. The form shall also contain accurate and complete information requested including proper names, addresses, zip codes and telephone numbers. The project must receive approval by the waterproofing manufacturer, through this process, prior to shipment of materials to the project site.

F. Scope of Work: The work to be performed under this specification shall include but is not limited to the following: Attend necessary job meetings and furnish competent and full time supervision, experienced waterproofing mechanics, all materials, tools, and equipment necessary to complete, in an acceptable manner, the waterproofing membrane/flashing installation in accordance with this specification. Comply with the latest written application instructions of the manufacturer of the primary waterproofing products.

G. Local Regulations: Conform to regulations of public agencies, including any specific requirements of the city and/or state of jurisdiction.

H. Manufacturer Requirements: The waterproofing membrane/flashing system manufacturer shall provide direct trained company personnel to attend necessary job meetings, perform periodic inspections as necessary, and conduct a final inspection upon successful completion of the project.

1.7 GUARANTEE/WARRANTY

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

B. Contractor's Warranty: Installer shall provide signed warranty against workmanship defects and assurance of leak free performance for any initial waiting period stated in the waterproofing membrane manufacturer's guarantee.

1.8 PRODUCT DELIVERY STORAGE AND HANDLING

A. Delivery: Deliver materials in the manufacturer's original sealed and labeled containers and in quantities required to allow continuity of application.

B. Storage: Store closed containers in a cool, dry area away from heat, direct sunlight, oxidizing agents, strong acids, and strong alkalis. Do not store resins at temperatures below 32°F (0°C) or above 85°F (29°C). Keep away from open fire, flame or any ignition source. Store in a well ventilated area.

C. Handling: Handle all materials in such a manner as to preclude damage and contamination with moisture or foreign matter. Keep away from open fire, flame, or any ignition source. Vapors may form explosive mixtures with air. Avoid skin and eye contact with this material. Avoid breathing fumes when above the Threshold Limit Value (TVL). Do not eat, drink, or smoke in areas where materials are stored or applied.

D. Damaged Material: Any materials that are found to be damaged or stored in any manner other than stated above shall be automatically rejected, removed and replaced at the Contractor's expense.

1.9 PROJECT/SITE CONDITIONS

A. Requirements Prior to Job Start:

1. Notification: Give a minimum of five (5) days notice to the Owner and manufacturer prior to commencing any work and notify both parties on a daily basis of any change in work schedule.
2. Safety: Familiarize every member of the application crew with all fire and safety regulations recommended by OSHA, NIOSH, NRCA and other industry or local governmental groups. Workers shall wear a long sleeve shirt with long pants and work boots. Workers shall use only butyl rubber or nitrile gloves when mixing or applying PMMA products. Safety glasses with side shields are required for eye protection. Use local exhaust ventilation to maintain worker exposure below the published Threshold Limit Value (TLV). If the airborne concentration poses a health hazard, becomes irritating or exceeds recommended limits, use a NIOSH approved respirator in accordance with OSHA Respirator Protection requirements published under 29 CFR 1910.134. The specific type of respirator will depend on the airborne concentration. A filtering face piece or dust mask is not appropriate for use with this product if TLV filtering levels have been exceeded.

B. Environmental Requirements:

1. Precipitation: Do not apply waterproofing materials during precipitation or in the event there is a probability of precipitation during application. Take adequate precautions to ensure that materials, applied waterproofing, and building interiors are protected from possible moisture damage or contamination.
2. Temperature Restrictions – PMMA-based Materials: Do not apply catalyzed resin materials if there is a threat of inclement weather. Follow the resin manufacturer's specifications for minimum and maximum ambient, material and substrate temperatures. Do not apply catalyzed resin materials unless temperatures fall within the resin manufacturer's published range.

C. Protection Requirements:

1. Membrane Protection: Provide protection against staining and mechanical damage for newly applied waterproofing and adjacent surfaces.

D. Owner’s Requirements: Work methods and workers must perform work in a manner that shall not include open flames or sparks and all equipment must be non-sparking as required to conform to NFPA Class I, Division I Hazards, or implement a fire protection plan coordinated with the Owner to mitigate the hazard.

PART 2 - PRODUCTS

2.1 WATERPROOFING MEMBRANE MATERIALS

A. Cleaning Solution/Solvent: A clear solvent used to clean and prepare transition areas of in-place catalyzed resin to receive subsequent coats of resin and to clean substrate materials to receive resin.

1. Siplast – Pro Prep.
2. Or Approved.

B. Primer: A fast-curing PMMA-based and specialized epoxy resin based primers for use over horizontal concrete substrates.

1. Siplast – Pro Primer T.
2. Koster – Koester VAP 1 2000.
3. Or Approved.

C. Preparation Paste: A PMMA based paste used for remediation of depressions in substrate surfaces or other irregularities.

1. Siplast - Pro Paste Resin.
2. Or Approved.

D. Tape: A white, flexible, coated cotton cloth tape designed for treatment of insulation panel joints, deck/wall transitions and joints in flashing substrates.

1. Siplast – Pro Tape.
2. Or Approved.

E. Miscellaneous Accessories & Materials:

1. Paint Primer: Zinc oxide primer.

F. Waterproof Membrane: Reinforced PMMA Membrane/Flashing System Components.

1. Siplast – Parapro Roof System consisting of:

a. Catalyst: A peroxide-based reactive agent used to induce curing of acrylic resins.
b. Flashing Resin: A flexible, polymethylmethacrylate (PMMA) based resin combined with a thixotropic agent for use in combination with fleece fabric to form a monolithic, reinforced flashing membrane.
c. Waterproofing Membrane Resin: A flexible, polymethylmethacrylate (PMMA) based resin for use in combination with fleece fabric to form a monolithic, reinforced roofing membrane.
d. Reinforcing Fleece: A non-woven, 110 g/m², needle-punched polyester fabric reinforcement as supplied by the waterproofing system manufacturer.
e. Color Finish Resin: A pigmented, polymethylmethacrylate (PMMA) based resin for use as a wearing coat over the field of the finished roof membrane and to provide a desired color finish.

1) Color: As indicated on Drawings.

f. Thixotropic Agent: A liquid additive used to increase the viscosity of the PMMA-based resin products, allowing the resins to be applied over vertical or sloped substrates.
g. Anti-Skid Surfacing: Ceramic Granules No. 11 grade specification ceramic granules suitable for broadcast into the PMMA based wearing layer.

2. Or Approved.

2.2 OVERLAY BOARD

A. Gypsum Board: ASTM C 1177/C 1177M, glass-mat faced on both sides of board with surface pre-treated with bond-improving primer; water resistant, silicone-treated gypsum core.

1. Manufacturers:

a. Georgia Pacific, 1/4-inch Dens-Deck Prime Roof Board.
b. Or Approved.

B. Board size shall be 4-foot by 4-foot.

C. Overlay Board Adhesive: One part moisture curing, urethane foam adhesive.

1. Material to be supplied in pressurized cylinders with a net weight of 23 lbs. per container.
2. Adhesive material shall meet FM I-90 (Class 4450) with approved insulation boards.
3. Approved manufacturers:

a. Insta-Stik™, as manufactured by Dow.
b. I.S.O. Twin Pack Adhesive; as manufactured by Firestone.
c. Or Approved.

PART 3 - EXECUTION

3.1 SUBSTRATE EXAMINATION/PREPARATION

A. General: Ensure that substrates are free from gross irregularities, loose, unsound or foreign material such as dirt, ice, snow, water, grease, oil, bituminous products, release agents, laitance, paint, loose particles/friable matter, rust or any other material that would be detrimental to adhesion of the catalyzed primer and/or resin to the substrate.

1. Some surfaces may require scarification, shotblasting, or grinding to achieve a suitable substrate.
2. Wipe surfaces with a clean cloth saturated with the specified cleaner/solvent to remove grease, oils or dust that may affect adhesion and to cured PMMA surfaces to receive a subsequent coat of resin.

B. Moisture Evaluation: Evaluate the level of moisture in the substrate to determine that moisture levels are acceptable for application of specified roofing system.

1. If applicable, Concrete substrates to receive a application of the specified PMMA, roofing system shall have a maximum moisture content of 6% and a maximum internal relative humidity of 75% for use of PMMA based primer.
2. Moisture contents in concrete surfaces that exceed 6% shall require the use of epoxy resin based primer.

C. Preparation of Existing Concrete/Masonry Substrates to Receive Resin: Existing concrete substrates shall have a minimum hardness of 3,500 psi (24 N/mm2). Scarify or shot-blast concrete or masonry surfaces to provide a sound substrate free from laitance and residue from bitumen, coal tar, primer, coatings, adhesives, sealer or any material that may inhibit adhesion. Prepare the concrete surface to generate a concrete surface profile of CSP-2 to CSP-4 as defined by the ICRI. Repair spalls and voids on vertical or horizontal surfaces using the specified primer and preparation paste.

D. Concrete Substrate to Receive Resin - Repair and Leveling: Before application of the roofing membrane, and after priming, fill all joints, cracks, voids, fractures, depressions, small indentations, and low areas in the substrate using repair mortar.

E. Static Crack and Cold Joint Preparation: Prime cracks and joints with the specified PMMA primer and fill cracks and joints using the specified preparation paste prior to membrane/flashing application. Commence membrane and flashing application immediately following catalyzation of the preparation paste.

F. Preparation of Steel/Stainless Steel Substrates: Grind to generate a "white-metal" surface and remove loose particles. Extend preparation area a minimum of 1/2-inch beyond the termination of the roofing/flashing system. Do not use cleaner/solvent after grinding. Notch steel surfaces to provide a rust-stop where detailed.

3.2 MIXING OF RESIN PRODUCTS

A. Preparation/Mixing/Repair Mortar: Explicitly follow manufacturer’s mixing instructions, additive options and requirements and aggregate extension limitations.

B. Preparation/Mixing/Catalyzing Flashing and Waterproofing Resin Products: Pour the desired quantity of resin into a clean container and using a spiral mixer or mixing paddle, stir the liquid for the time period specified by the resin manufacturer. Calculate the amount of catalyst powder needed using the manufacturer's guidelines and add the pre-measured catalyst to the resin component. Mix again for the time period specified by the resin manufacturer, ensuring that the product is free from swirls and bubbles. Ensure that air is not entrained into the product during the mixing process. To avoid aeration, do not use a spiral mixer unless the spiral section of the mixer can be fully contained in the liquid during the mixing process. Mix only enough product to ensure that it can be applied before expiration of resin pot life.

3.3 PREPARATION PASTE AND PRIMER MIXING/APPLICATION

A. Primer Application: Apply primer resin using a roller or brush at the minimum rate specified by the primer manufacturer over poured reinforced concrete substrates. Increase application rates over other absorbent substrates. Do not let resin pool or pond. Do not under-apply or over-apply primers as this may interfere with proper primer catalyzation. Make allowances for saturation of roller covers and application equipment.

B. Paste Application: Allow the primer to set and apply catalyzed preparation paste using a trowel. Before application of resin over the catalyzed paste surface, the specified cleaner/solvent, wipe the surface of the paste using the specified cleaner/solvent and allow to dry. Treat the surface again if not followed up by resin application within 60 minutes.

3.4 BASE FLASHING AND WATERPROOF MEMBRANE APPLICATION

A. Base Flashing Application:

1. Using masking tape, mask the perimeter of the area to receive the flashing system. Apply resin primer to substrates requiring additional preparation and allow primer to set.
2. Pre-cut fleece to ensure a proper fit at transitions and corners prior to membrane application.
3. Apply an even, generous base coat of flashing resin using a roller at the minimum rate specified by the resin manufacturer to prepared surfaces requiring flashing coverage. Work the fleece into the wet, catalyzed resin using a brush or roller to fully embed the fleece in the resin and remove trapped air. Lap fleece layers a minimum of 2 inch (5 cm) and apply an additional coat of catalyzed resin between layers of overlapping fleece. Again using a roller, apply an even top coat of catalyzed resin at the minimum rate specified by the resin manufacturer immediately following embedment of the fleece, ensuring full saturation of the fleece. Ensure that the flashing resin is applied to extend a 0.25 inch (6 mm) beyond the fleece. Remove the tape before the catalyzed resin sets. Make allowances for saturation of roller covers and application equipment.
4. Should work be interrupted for more than 12 hours or the surface of the catalyzed resin becomes dirty or contaminated by the elements, wipe the surface to be lapped with new flashing resin using the specified cleaner/solvent. Allow the surface to dry for a minimum 20 minutes and a maximum 60 minutes before continuing work.

B. Waterproof Membrane Application:

1. Using the specified cleaner/solvent, wipe flashing membrane surfaces to be lapped with field membrane. Allow the surface to dry for a minimum 20 minutes before continuing work.
2. Apply an even, generous base coat of field membrane resin using a roller at the minimum rate specified by the resin manufacturer to prepared surfaces. Work the fleece into the wet, catalyzed resin using a roller to fully embed the fleece in the resin and remove trapped air. Lap fleece layers a minimum of 2 inch (5 cm) and apply an additional coat of catalyzed resin between layers of overlapping fleece. Again using a roller, apply an even top coat of catalyzed resin at the minimum rate specified by the resin manufacturer immediately following embedment of the fleece, ensuring full saturation of the fleece. Make allowances for saturation of roller covers and application equipment. Allow 2 hours cure time prior to exposing the membrane to foot traffic.

C. Wearing Layer:

1. Granule Anti-Skid Application: Utilize masking tape to outline the areas to receive the anti-skid system. Apply an additional top coat of the catalyzed roof resin at the minimum rate specified by the resin manufacturer; and broadcast granules before the resin sets. Remove tape before the resin sets.

D. Color Finish Application:

1. Apply the color finish over the installed field membrane after the membrane is set, dry and has been in place for a minimum 2 hours.
2. Using the specified cleaner/solvent, wipe field membrane surfaces to receive the color finish layer. Allow the surface to dry for a minimum 20 minutes before continuing work.

3. Apply an even top coat of catalyzed color finish resin at the minimum rate specified by the resin manufacturer. Allow 2 hours cure time prior to exposing the membrane to foot traffic.

3.5 FIELD QUALITY CONTROL AND INSPECTIONS

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

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

C. Final Inspection:

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

D. Issuance of The Guarantee: Complete all post installation procedures and meet the manufacturer's final endorsement for issuance of the specified guarantee.

END OF SECTION 071416

SECTION 076200 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

1. **Base Bid**: Formed metal and low-slope roof flashing and trim including copings, counter flashings, metal panel wall system, and associated accessories.
2. **Alternate #1**: Formed metal and steep-slope roof flashing and trim and associated accessories for new clay tile roof system.
3. **Alternate #2**: Formed metal and steep-slope roof flashing and trim and associated accessories for new standing seam metal panel roof system.

B. Related Sections include the following:

1. Section 024119 "Selective Structure Demolition" for removal and partial reuse of selected building elements.
2. Section 061053 "Miscellaneous Rough Carpentry" for installation of wood curbs, nailers, miscellaneous sheathing repairs and seismic overlay.
3. Section 070150 "Preparation for Re-Roofing" for methods of existing roof tear-off procedures and requirements.
4. Section 073213 "Clay Roof Tiles" for installation of clay tile roof system and accessories.
5. Section 074113 "Metal Roof Panels" for installation of standing seam metal panel roof system and flashings.
6. Section 074213 "Metal Wall Panels" for installation of manufactured metal panels for walls, with related flashings and accessory components.
7. Section 075216 "SBS-Modified Bituminous Membrane Roofing" for 2-ply system with self-adhering base ply and torch-applied top ply sheet.

1.3 PERFORMANCE REQUIREMENTS

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

B. Fabricate and install roof edge flashing and copings capable of resisting the following forces according to recommendations in FM Loss Prevention Data Sheet 1-49:

1. Wind Zone 2: For velocity pressures of 31 to 45 lbf/sq. ft.: 90-lbf/sq. ft. perimeter uplift force, 120-lbf/sq. ft. corner uplift force, and 45-lbf/sq. ft. outward force.

C. Thermal Movements: Provide sheet metal flashing and trim that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Provide clips that resist rotation and avoid shear stress as a result of sheet metal and trim thermal movements. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

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

D. Water Infiltration: Provide sheet metal flashing and trim that do not allow water infiltration to building interior.

1.4 REFERENCES

A. National Association of Architectural Metal Manufacturers (NAAMM) - Metal Finishes Handbook; Metal Finishes Manual for Architectural and Metal Products.

B. National Roofing Contractors Association (NRCA) Roofing and Waterproofing Manual, Fifth Edition.

C. National Roofing Contractors Association (NRCA) Roofing Manual: Membrane Roof Systems; 2011 Edition.

D. Sheet Metal and Air Conditioning Contractors National Association (SMACNA) - Architectural Sheet Metal Manual, Seventh Edition.

E. ASTM A 653 (formerly A 525) - Steel Sheet, Zinc-coated (Galvanized) by the Hot-Dip Process for Roofing and Siding.

F. FM - Factory Mutual.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: Show fabrication and installation layouts of sheet metal flashing and trim, including plans, elevations, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled work. Include the following:

1. Identify material, thickness, weight, and finish for each item and location in Project.
2. Details for forming sheet metal flashing and trim, including profiles, shapes, seams, and dimensions.
3. Details for fastening, joining, supporting, and anchoring sheet metal flashing and trim, including fasteners, clips, cleats, and attachments to adjoining work.

4. Details of expansion-joint covers, including showing direction of expansion and contraction.
5. Details of edge conditions, including eaves, ridges, valleys, rakes, crickets, and counter lashings as applicable.
6. Details of special conditions.
7. Details of connections to adjoining work.

C. Samples for Initial Selection: For each type of sheet metal flashing and trim indicated with factory-applied color finishes.

1. Include similar Samples of trim and accessories involving color selection.

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

1. Sheet Metal Flashing: 12-inches long. Include fasteners, cleats, clips, closures, and other attachments.
2. Diamond Plate Landing: Standard manufacturer's sample for initial inspection.
3. Trim: 12-inches long. Include fasteners and other exposed accessories.
4. Accessories: Full-size Sample.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified fabricator.

B. Warranty: Sample of special warranty.

1.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: For sheet metal flashing, trim, and accessories to include in maintenance manuals.

1.8 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.

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

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver sheet metal flashing materials and fabrications undamaged. Protect sheet metal flashing and trim materials and fabrications during transportation and handling.

B. Unload, store, and install sheet metal flashing materials and fabrications in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack materials on platforms or pallets, covered with suitable weathertight and ventilated covering. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage.

D. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to the extent necessary for the period of sheet metal flashing and trim installation.

1.10 COORDINATION

A. Coordinate installation of sheet metal flashing and trim with interfacing and adjoining construction to provide a leakproof, secure, and noncorrosive installation.

B. Coordinate material storage and staging with facility manager prior to delivery of materials.

1.11 WARRANTY

A. Manufacturers Warranty:

1. Manufacturers standard warranty for 20 years, following Final Acceptance by Owner, that metal will not fail structurally, perforate, rupture, or leak due to corrosion.
2. Warranty shall include performance of paint / coating system in which manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.

B. Contractor's Quality of Work Warranty:

1. Warrant that all sheet metal flashings are installed in accordance with the Contract Documents and will be free from defective quality of Work and or remain watertight and weatherproof with normal usage for a period of 2 years following Final Acceptance.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.
2. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

2.2 SHEET METALS

A. Zinc-Coated (Galvanized) Steel Sheet (concealed cleats): ASTM A 653/A 653M, G90 coating designation; structural quality; 22 gauge.

B. Pre-painted, Metallic-Coated Steel Sheet (roof flashings): ASTM A6531 A653M G90 coating designation 24 gauge. Steel sheet metallic coated by the hot-dip process and pre-painted by the coil-coating process to comply with ASTM A 755/A 755M.

1. High-Performance Organic Finish: Two-coat thermocured system containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with physical properties and coating performance requirements of AAMA 2604, except as modified for below:

    a. Humidity and Salt Spray Resistance: 1,000 hours.
    b. Color: Colors shall be selected from manufacturer's full range of standard colors.

C. Stainless Steel: ASTM A167, Grade 2D, Type 304, soft temper, smooth finish No 2B bright; cold rolled finish.

1. Minimum 0.025-inch thick (24 gauge).

2.3 UNDERLAYMENT MATERIALS

A. Felts: ASTM D 226, Type II (No. 30), asphalt-saturated organic felt, nonperforated.

B. Self-Adhering, High-Temperature Sheet: Minimum 40 mils (1.0 mm) thick, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.

1. Thermal Stability: ASTM D 1970; stable after testing at 240 deg F.
2. Low-Temperature Flexibility: ASTM D 1970; passes after testing at minus 20 deg F.
3. Products: Comply with requirements as specified in the following:

    a. Section 073213 "Clay Roof Tiles".
    b. Section 074113 "Metal Roof Panels".
    c. Section 074213 "Metal Wall Panels".
    d. Section 075216 "SBS-Modified Bituminous Membrane Roofing".

2.4 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation.

B. Fasteners: Wood screws, flat head screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads.

1. Exposed Fasteners: Galvanized steel with EPDM washers; heads matching color of sheet metal by means of plastic caps or factory-applied coating.
2. Blind Fasteners: Galvanized, self-drilling screws, gasketed, with hex washer head.
3. Masonry Anchors: Rawl Zamac Nailins with EPDM washers at masonry / concrete substrates; heads matching color of sheet metal by means of plastic caps or factory-applied coating.

C. Stainless Steel Clamping Bands; sizes as dictated by conditions, screw type tightening system.

D. Solder for Stainless Steel: ASTM B 32, Grade Sn60, with acid flux of type recommended by stainless-steel sheet manufacturer.

E. Solder for Zinc-Tin Alloy-Coated Stainless Steel: ASTM B 32, 100 percent tin.

F. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

1. Grade: NS (non-sag) for storm collars.

G. Silicone Joint Sealants: Single Component, Nonsag, Low-Modulus, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 100/50, for Use NT.

1. Utilize for saddle flashings at metal panels and other sheet flashing interfaces and seams.

H. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant, polyisobutylene plasticized, heavy bodied for hooked-type expansion joints with limited movement.

I. Plastic Cement: ASTM D 4856, asbestos free, of consistency required for application.

2.5 MANUFACTURED SHEET METAL PENETRATION FLASHINGS

A. Pre-formed lead type pipe flashing pre-manufactured with two-piece design as shown on Drawings, and fabricated to conform to slope requirements.

1. Provide lead sleeve sized to slip over pipe, soldered to skirt at slope of roof and extending at least 4-inches from pipe onto roof.
2. Provide lead counter flashing sized to overlap a minimum of 2-inches onto lead sleeve, and to extend into vent pipe a minimum of 1-inch.

B. Passive Vents (for replacement of existing at select locations):

1. Galvanized steel 1-piece roof vents; as manufactured by Famco; or approved.
2. Minimum 8-inches tall.

2.6 FABRICATION, GENERAL

A. General: Custom fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and

other characteristics of item indicated. Shop fabricate items where practicable. Obtain field measurements for accurate fit before shop fabrication.

B. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.

C. Fabricate sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated.

1. Seams for Stainless Steel and Lead: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.

D. Sealed Joints: Form non-expansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA recommendations.

E. Expansion Provisions: Where lapped or bayonet-type expansion provisions in the Work cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1-inch deep, filled with butyl sealant concealed within joints.

F. Conceal fasteners and expansion provisions where possible on exposed-to-view sheet metal flashing and trim, unless otherwise indicated.

G. Fabricate exposed cleats from same material as accessory being anchored.

H. Fabricate concealed cleats from Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 coating designation; structural quality; 22 gauge.

2.7 FABRICATION

A. Coping: Fabricate with profiles as shown on the Drawings.

1. Joint Style: Standing seam to match existing.
2. Pre-painted, metallic-coated sheet, 24 gauge.

B. Counter Flashing: Fabricate with profiles as shown on the Drawings.

1. Joint Style: Lapped and sealed.
2. Sheet Metal: Pre-painted, metallic-coated sheet, 24 gauge.

C. Receiver Flashing: Fabricate with profiles as shown on the Drawings.

1. Joint Style: Lapped and sealed.
2. Sheet Metal: Pre-painted, metallic-coated sheet, 24 gauge.

D. Drip Edge / Closure Metal: Fabricate with profiles as shown on the Drawings.

1. Joint Style: Joint Style: Lapped and sealed.
2. Sheet Metal: Pre-painted, metallic-coated sheet, 24 gauge.

E. Rake Flashing: Fabricate with profiles as shown on the Drawings.

1. Joint Style: Lapped and sealed.
2. Sheet Metal: Pre-painted, metallic-coated sheet, 24 gauge.

F. Modified J-Channel: Fabricate with profiles as shown on the Drawings.

1. Joint Style: Joint Style: Lapped and sealed.
2. Sheet Metal: Pre-painted, metallic-coated sheet, 24 gauge.

G. Wall Panels: Fabricate with profiles as shown on the Drawings.

1. Joint Style: S-locks at 48-inches on center.
2. Sheet Metal: Prepainted, metallic-coated sheet, 24 gauge.
3. Provide vertically oriented breaks in sheet metal panels to control oil-canning; breaks to occur at 24-inches on center.

H. Overflow Scupper: Fabricate with profiles as shown on the Drawings.

1. Joint Style: Seamed and Soldered.
2. Stainless Steel: 0.025-inch thick.

I. Leader Box: Fabricate with profiles as shown on the Drawings.

1. Joint Style: Interlocking, seamed and sealed. Pop-rivet for extra strength where required.
2. Sheet Metal: Pre-painted, metallic-coated sheet, 24 gauge.

J. Head Flashing: Fabricate with profiles as shown on the Drawings

1. Joint Style: Lapped and sealed.
2. Sheet Metal: Pre-painted, metallic-coated sheet, 24 gauge.

K. Step- and Diverter Flashings:

1. Fabricate with headlap of 4-inches and a minimum extension of 4-inches over the underlying asphalt shingle and up the vertical surface.
2. Fabricate from prepainted, metallic-coated steel: 24 gauge.

L. Valley Flashing:

1. Fabricate in lengths not exceeding 10-feet with inverted-V profile at center of valley and flange widths a minimum of 10-inches, with ½-inch hemmed end dams.
2. Fabricate from prepainted, metallic-coated steel: 24 gauge.
3. Fabricate in accordance with the clay tile roof system manufacturer's written instruction where applicable.

M. Storm Collars: Fabricate with profiles as shown on the Drawings.

1. Joint Style: Interlocking, seamed and sealed. Pop-rivet for extra strength where required.
2. Stainless Steel: 0.025-inch thick.

N. Door Threshold Flashing: Fabricate with profiles as shown on the Drawings.

1. Joint Style: Seamed and soldered.

2. Sheet Metal: Stainless Steel, 0.025-inch thick.

O. Miscellaneous Flashings: Fabricate with profiles as shown on the Drawings and from sheet metal materials indicated.

2.8 FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

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

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

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions and other conditions affecting performance of work.

1. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Comply with requirements specified in 070150 Section "Preparation for Re-Roofing".

3.3 INSTALLATION, GENERAL

A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.

1. Torch cutting of sheet metal flashing and trim is not permitted.

B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by fabricator or manufacturers of dissimilar metals.

C. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.

D. Install sheet metal flashing and trim true to line and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds, and butyl sealant.

E. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.

F. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10-feet with no joints allowed within 24-inches of corner or intersection. Where lapped or bayonet-type expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than 1-inch deep, filled with butyl sealant concealed within joints.

G. Fasteners: Use fasteners of sizes that will penetrate substrate not less than 1-1/4-inches for nails and not less than 3/4-inch for wood screws.

1. Galvanized or Pre-painted, Metallic-Coated Steel: Use stainless-steel fasteners.
2. Stainless Steel: Use stainless-steel fasteners.

H. Seal joints with butyl sealant as required for watertight construction.

1. Where sealant-filled joints are used, embed hooked flanges of joint members not less than 1-inch into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is moderate, between 40 and 70 deg F, set joint members for 50 percent movement either way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F.
2. Prepare joints and apply sealants in accordance with manufacturer's published installation instructions.

I. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets to be soldered to a width of 1-1/2 inches except where pre-tinned surface would show in finished Work.

1. Do not solder pre-painted, metallic-coated steel sheet.
2. Pre-tinning is not required for lead.
3. Stainless-Steel Soldering: Pre-tin edges of uncoated sheets to be soldered using solder recommended for stainless steel and phosphoric acid flux. Promptly wash off acid flux residue from metal after soldering.
4. Where surfaces to be soldered are lead coated, do not tin edges, but wire brush lead coating before soldering.
5. Do not use open-flame torches for soldering. Heat surfaces to receive solder and flow solder into joints. Fill joints completely. Completely remove flux and spatter from exposed surfaces.

J. Storm collars: Seal joints and top edges with elastomeric non-sag sealant for watertight construction.

1. Tool top edge to shed water.

3.4 ROOF FLASHING INSTALLATION

A. General: Install sheet metal roof flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, set units true to line, and level as indicated. Install work with laps, joints, and seams that will be permanently watertight.

B. Anchor to resist uplift and outward forces according to recommendations in FM Loss Prevention Data Sheet 1-49 for specified wind zone and as indicated.

C. Secure in a waterproof manner by means of snap-in installation and sealant.

D. Field measure all site conditions prior to fabrication and installation.

E. Form sections true to shape, accurate in size, square, and free from distortion or defects.

3.5 MISCELLANEOUS FLASHING INSTALLATION

A. Install miscellaneous sheet metal roof flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual."

3.6 CLEANING AND PROTECTION

A. Clean and neutralize flux materials. Clean off excess solder and sealants.

B. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed. On completion of installation, clean finished surfaces, including removing unused fasteners, metal filings, pop rivet stems, and pieces of flashing. Maintain in a clean condition during construction.

C. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 076200

SECTION 076201 - SHEET METAL FLASHING AND TRIM REPAIRS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

1. **Alternate #3**: Repair of existing sheet metal gutter system where indicated on the Drawings.

B. Related Sections include the following:

1. Section 024119 "Selective Structure Demolition" for removal and partial reuse of selected building elements.
2. Section 070150.19 "Preparation for Re-Roofing" for methods of existing roof tear-off procedures and requirements.
3. Section 073213 "Clay Roof Tiles" for installation of clay tile roof system and accessories.
4. Section 076200 "Sheet Metal Flashing and Trim" for installing sheet metal flashing and trim integral with roofing and manufactured metal panels.

1.3 PERFORMANCE REQUIREMENTS

A. General: Provide repairs to sheet metal flashing and trim that do not allow water infiltration to building interior.

1.4 REFERENCES

A. National Association of Architectural Metal Manufacturers (NAAMM) - Metal Finishes Handbook; Metal Finishes Manual for Architectural and Metal Products.

B. National Roofing Contractors Association (NRCA) Roofing and Waterproofing Manual, Fifth Edition.

C. Sheet Metal and Air Conditioning Contractors National Association (SMACNA) - Architectural Sheet Metal Manual, Fifth Edition.

D. ASTM A 653 (formerly A 525) - Steel Sheet, Zinc-coated (Galvanized) by the Hot-Dip Process for Roofing and Siding.

E. FMG - Factory Mutual Global.

1.5 SUBMITTALS

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

B. Manufacturer’s published specification data sheets for the proposed materials.

C. Installer Certificates: Signed by roofing system manufacturer certifying that Installer is approved, authorized, or licensed by manufacturer to install roofing system repairs.

D. Qualification Data: For Installer and manufacturer.

1.6 QUALITY ASSURANCE

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

B. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's material products and/or repair products and that is eligible to receive manufacturer's warranty.

1. The applicator responsible for sheet metal repairs shall be a company specializing in sheet metal flashing work with 5 years minimum experience.
2. All applicators shall have been in continuous business under the same name for the past 5 years.

C. Field Quality Control: The installer shall provide all personnel trained in the application of the repair materials and systems and shall maintain supervision throughout the entire project.

D. Pre-construction Conference: Conduct conference at Project site. Comply with requirements in Division 01 “Summary”. Review methods and procedures related to roofing system repairs including, but not limited to, the following:

1. Meet with Owner, Engineer, Consultant, Owner's insurer if applicable, roofing Installer, and installers whose work interfaces with or affects roofing repairs including installers of roof accessories and roof-mounted equipment.
2. Review methods and procedures related to installation of sheet metal repairs, including manufacturer's written instructions, if available.
3. Review and finalize repair installation schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
4. Review special roofing details and condition of other construction that will affect installation of repairs.
5. Review governing regulations and requirements for insurance and certificates if applicable.
6. Review temporary protection requirements for roofing system during and after roof system repair installation.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver repair materials and fabrications undamaged. Protect repair materials during transportation and handling.

B. Unload, store, and install repair materials in a manner to prevent damage.

1.8 COORDINATION

A. Coordinate installation of repairs with interfacing and adjoining construction to provide a leakproof, secure, and noncorrosive installation.

1.9 PROJECT CONDITIONS

A. Provide tarps or plastic sheeting required to protect opened repair locations and to prevent the entrance of moisture or rain water into the existing structure until new and/or repair materials have been applied and roof is in a watertight condition.

B. Have necessary waterproof canvas or plastic sheeting readily available in case of emergency. The Contractor will be held liable for any damage to building interior due to Contractor's negligence.

C. Do not open up any more repair locations at one time than can be adequately covered and protected in the event of sudden, unexpected rainfall.

D. Liquid-applied roofing repair materials shall not be applied when dirt, dust, debris, oil, etc. is present on the deck.

E. Weather Limitations: Proceed with work only when existing and forecasted weather conditions permit repairs to be installed in accordance with manufacturer's written recommendations and warranty requirements.

1. Do no Work unless the temperature is 40 degrees F (4.44 degrees C) and rising unless otherwise approved by the Owner.
2. Do no Work during rainy weather or immediately thereafter until surfaces are sufficiently dry to receive new Work.

1.10 WARRANTY

A. The Contractor shall provide a written warranty guaranteeing all repairs against defects of quality of Work and materials for a period of [**two**] year[**s**] from the date of Final Acceptance.

B. The warranty shall be delivered to the Owner prior to final acceptance of the Work.

PART 2 - PRODUCTS

2.1 GUTTER REPAIR FLASHING

A. Siplast Parapro 123 Flashing System, as manufactured by Siplast (Parapro), Irving TX.

B. Or Approved.

2.2 MISCELLANEOUS MATERIALS

A. Miscellaneous Accessories: Provide miscellaneous accessories recommended by flashing system manufacturer.

B. Provide all miscellaneous items as required for a complete and proper repair installation.

PART 3 - EXECUTION

3.1 PAREPARATION

A. Contractor shall require repair technicians to repair all existing fascia gutter seams.

B. Repair technicians shall locate and identify all existing fascia gutter seams and notify Engineer and Consultant if conditions are believed to require modified repair procedures.

C. Beginning of installation represents acceptance of existing conditions.

3.2 QUALITY OF WORK

A. Work shall be performed by experienced mechanics in type of repair work specified.

B. The Contractor shall be fully aware of work involved and the requirements under this Contract, and shall direct workers in the proper application of materials and repairs specified.

C. Supervision shall be maintained by the same person throughout the entire course of the installation of repairs.

D. Work shall be performed in accordance with industry standards and requirements specified herein.

3.3 PROTECTION

A. Protect adjacent building and work areas from damage overspray of repair materials prior to, during and subsequent to repair installation.

3.4 GUTTER REPAIR INSTALLATION, GENERAL

A. General: Familiarize all crewmembers with the intent of the project, the project drawings, and locations to receive repairs.

B. Prepare all surfaces and details in accordance with standards as set forth by SMACNA, and in accordance with these Contract Documents.

C. Inspect all gutter areas for defects and verify with items noted on drawings. Familiarize locations and mark each defect for repair.

D. All repairs shall be in compliance with the roofing materials manufacturer's published installation instructions, and as specified within these contract documents.

3.5 GUTTER REPAIR INSTALLATION

A. General: Ensure that substrates are free from gross irregularities, loose, unsound or foreign material such as dirt, ice, snow, water, grease, oil, bituminous products, release agents, laitance, paint, loose particles/friable matter, rust or any other material that would be detrimental to adhesion of the catalyzed primer and/or resin to the substrate.

1. Remove all existing repair materials from seams and other surfaces of the existing sheet metal gutter, where applicable for a clean and dry substrate and in accordance with the manufacturer's written instructions.
2. Some surfaces may require scarification, shotblasting, or grinding to achieve a suitable substrate.

B. Preparation of Steel Substrates: Grind to generate a "white-metal" surface and remove loose particles. Extend preparation area a minimum of 1/2-inch (13 mm) beyond the termination of the roofing/flashing system. Notch steel surfaces to provide a rust-stop where detailed.

C. Mixing of Resin Products: Preparation/Mixing/Catalyzing Resin Products: Pour the desired quantity of resin into a clean container and using a spiral mixer or mixing paddle, stir the liquid for the time period specified by the resin manufacturer. Calculate the amount of catalyst powder needed using the manufacturer's guidelines and add the pre-measured catalyst to the resin component. Mix again for the time period specified by the resin manufacturer, ensuring that the product is free from swirls and bubbles. To avoid aeration, do not use a spiral mixer unless the spiral section of the mixer can be fully contained in the liquid during the mixing process. Mix only enough product to ensure that it can be applied before pot life expires.

D. Preparation Paste and Primer Mixing/Applications:

1. Primer Application: Apply primer resin using a roller or brush at the rate specified by the primer manufacturer over qualified and prepared substrates. Apply primer resin at the increased rate specified by the primer manufacturer over DensDeck Prime or other porous substrates. Do not let resin pool or pond. Do not under-apply or over-apply primers as this may interfere with proper primer catalyzation. Make allowances for waste, including saturation of roller covers and application equipment.
2. Paste Application: Apply catalyzed preparation paste using a trowel over prepared and primed substrates. Before application of any resin product over cured paste, wipe the

surface of the paste using the specified cleaner/solvent and allow to dry. Treat the surface again if not followed up by resin application within 60 minutes.

E. Flash all inside and outside corners; extend liquid flashing a minimum of 3-inches beyond edge of seams.

F. Flash all downspout connections using as required to seal connections watertight. Extend liquid flashing a minimum of 1-inch into downspouts.

3.6 FINISH INSTALLATION, CLEANING, AND PROTECTION

A. Make necessary preparations, utilize recommended application techniques, apply specified materials, and exercise care in ensuring that the finished application is acceptable to the Owner.

B. Verify roof repairs at work areas are completed, or completed to a point where further roof repairs will not affect sheet metal flashings.

C. Remove all repair related materials, including left over scraps, construction waste, and repair materials, from repair areas and roof surface.

D. Remove temporary protective coverings from repair areas. On completion of installation, clean finished surfaces. Maintain in a clean condition during construction.

END OF SECTION 076201

SECTION 221423 - STORM DRAINAGE PIPING SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Roof overflow drains.
2. Downspout nozzles.

B. Related Sections include the following:

1. Section 024119 "Selective Structure Demolition" for removal and partial reuse of selected building elements.
2. Section 061053 "Miscellaneous Rough Carpentry" for installation of wood curbs, nailers, miscellaneous sheathing repairs and seismic overlay.
3. Section 070150.19 "Preparation for Re-Roofing" for methods of existing roof tear-off procedures and requirements.
4. Section 075216 "SBS-Modified Bituminous Membrane Roofing" for 2-ply system with self-adhering base ply and torch-applied top ply sheet.

1.3 ACTION SUBMITTALS

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

1.4 QUALITY ASSURANCE

A. Drainage piping specialties shall bear label, stamp, or other markings of specified testing agency.

B. Comply with requirements as specified in Section 061053 "Miscellaneous Rough Carpentry".

PART 2 - PRODUCTS

2.1 ROOF OVERFLOW DRAINS

A. Cast-Iron, General-Purpose Roof Overflow Drains, sump size to be field verified.

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

    a. Josam Company.
    b. Smith Jay R Mfg. Co.
    c. Zurn Plumbing Products Group; Specification Drainage Operation.
    d. Or Approved.

2. Standard: ASME A112.6.4, for general-purpose roof drains.
3. Body Material: Cast iron.
4. Dimension of Body: Contractor to verify.
5. Combination Flashing Ring and Gravel Stop: Required.
6. Flow-Control Weirs: Not required.
7. Outlet: Bottom.
8. Underdeck Clamp: Required.
9. Expansion Joint: Confirm via field verification.
10. Sump Receiver Plate: Required.
11. Dome Material: Cast iron.
12. Perforated Gravel Guard: Not required.
13. Vandal-Proof Dome: Not required.
14. Water Dam: 2 inches high.

2.2 DOWNSPOUT NOZZLE

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

1. Josam Company.
2. Smith, Jay R. Mfg. Co.
3. Zurn Plumbing Products Group; Specification Drainage Operation.
4. Or Approved.

B. Description: Bronze body with threaded inlet and bronze wall flange with mounting holes.

C. Size: Same as connected conductor, and storm drain piping.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install overflow drains at low points of roof areas where indicated on the Drawings according to roof membrane manufacturer's written installation instructions.

1. Install to provide overflow drainage located in proper proximity to existing roof drains.
2. Install flashing collar or flange of roof drain to prevent leakage between drain and adjoining roofing. Maintain integrity of waterproof membranes where penetrated.
3. Install expansion joints, if indicated, in roof drain outlets.
4. Position roof drains for easy access and maintenance.

B. Install drain piping under-deck with no-hub connectors. Hang and support piping from structural members in accordance with manufacturer's recommended installation instructions. Insulate all piping.

1. Piping shall be braced in accordance with the most current edition of Seismic Manual Guidelines for Mechanical Systems (SMACNA) and National Uniform Seismic Installation Guidelines (NUSIG).
2. Unless otherwise shown by SMACNA or NUSIG, provide required details and structural calculations to completely address seismic bracing requirements.

C. Downspout Nozzle: Install downspout nozzles at face of building exteriors with flange sealed to face of wall and securely anchored to building structure. Connect to drain piping with watertight seal.

3.2 CONNECTIONS

A. Comply with requirements and manufacturer's installation instructions. Drawings indicate general arrangement of piping, fittings, and specialties.

3.3 PROTECTION

A. Protect drains during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.

B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

END OF SECTION 221423