

**DIVISION 04 - MASONRY**

040121 Maintenance of Unit Masonry

**DIVISION 07 - THERMAL AND MOISTURE PROTECTION**

070150.19 Preparation for Re-Roofing

070150.74 Rehabilitation of Single Ply Roofing

071900 Water Repellents

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**DIVISION 11 - EQUIPMENT**

112429 Facility Fall Protection

## **SECTION 040121 - MAINTENANCE OF UNIT MASONRY**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Section includes maintenance of unit masonry consisting of brick clay masonry restoration as follows:
  - 1. Repointing joints.
- B. Related Information:
  - 1. Division 07 Section "Water Repellents" for water repellents applied to clay masonry.
- C. Unit Prices: Work of this Section is affected by unit prices specified in Division 01 Section "Unit Prices."
- D. Alternates: Work of this Section is affected by alternates specified in Division 01 Section "Alternates."

#### **1.2 ACTION SUBMITTALS**

- A. Product Data: For each type of product indicated.
- B. Design Data: Submit design mix when Proportion specification of ASTM C270 is to be used, required environmental conditions, and admixture limitations.
- C. Samples: Submit two samples of mortar, illustrating mortar color and color range.

#### **1.3 INFORMATIONAL SUBMITTALS**

- A. Test Reports: Submit reports on mortar indicating conformance of component mortar materials to requirements of ASTM C270 and test and evaluation reports to ASTM C780 for aggregate ratio and water content, air content, consistency and compressive strength.
- B. Manufacturer's Installation Instructions: Submit premix mortar manufacturer's installation instructions.

#### **1.4 QUALITY ASSURANCE**

- A. Perform Work in accordance with Masonry Standards Joint Committee (MSJC): Building Code Requirements and Specification for Masonry Structures (TMS 402/ACI 530/ASCE 5, TMS 602/ACI 530.1/ASCE 6).

## 1.5 PROJECT / FIELD CONDITIONS

- A. Cold Weather Requirements: In accordance with MSJC Code and Specification when ambient temperature or temperature of masonry units is less than 40 degrees F (4 degrees C).
- B. Hot Weather Requirements: In accordance with MSJC Code and Specification when ambient temperature is greater than 100 degrees F (38 degrees C) or ambient temperature is greater than 90 degrees F (32 degrees C) with wind velocity greater than 8 mph (13 km/h).

## PART 2 - PRODUCTS

### 2.1 MORTAR MATERIALS

- A. Portland Cement: ASTM C 150, Type I or Type II, white or gray or both where required for color matching of exposed mortar.
- B. Hydrated Lime: ASTM C 207, Type S.
- C. Mortar Sand: ASTM C 144 unless otherwise indicated.
  - 1. Color: Provide natural sand or ground marble, granite, or other sound stone of color necessary to produce required mortar color.
  - 2. Match size, texture, and gradation of existing mortar sand as closely as possible. Blend several sands if necessary to achieve suitable match.
- D. Mortar Pigments: Natural and synthetic iron oxides, compounded for mortar mixes. Use only pigments with a record of satisfactory performance in masonry mortars.
- E. Water: Potable.

### 2.2 MORTAR MIXES

- A. Measurement and Mixing: Measure cementitious materials and sand in a dry condition by volume or equivalent weight. Do not measure by shovel; use known measure. Mix materials in a clean, mechanical batch mixer.
  - 1. Mixing Pointing Mortar: Mix mortar ingredients in accordance with ASTM C270 in quantities needed for immediate use.
    - a. Thoroughly mix cementitious materials and sand together before adding any water. Then mix again adding only enough water to produce a damp, unworkable mix that will retain its form when pressed into a ball. Maintain mortar in this dampened condition for 15 to 30 minutes. Add remaining water in small portions until mortar reaches desired consistency. Use mortar within one hour of final mixing; do not retemper or use partially hardened material.
- B. Colored Mortar: Produce mortar of color required by using specified ingredients. Do not alter specified proportions without Architect's approval.

1. Mortar Pigments: Where mortar pigments are indicated, do not exceed a pigment-to-cement ratio of 1:10 by weight.
- C. Do not use admixtures in pointing mortar unless otherwise indicated.
- D. Mortar Proportions for Brick Pointing Mortar: ASTM C270, Type N, using Proportion specification.
  1. Add mortar pigments to produce mortar colors required.

### **PART 3 - EXECUTION**

#### **3.1 INSTALLATION, GENERAL**

- A. Install mortar in accordance with MSJC Specification for Masonry Structures.

#### **3.2 REPOINTING MASONRY**

- A. Rake out and repoint joints to the following extent:
  1. All joints in areas indicated – 100%.
- B. Rake out joints as follows, according to procedures demonstrated in approved mockup:
  1. Remove mortar from joints to depth of 2 times joint width, but not less than 1/2 inch or not less than that required to expose sound, un-weathered mortar.
  2. Remove mortar from masonry surfaces within raked-out joints to provide reveals with square backs and to expose masonry for contact with pointing mortar. Brush, vacuum, or flush joints to remove dirt and loose debris.
  3. Do not spall edges of masonry units or widen joints. Replace or patch damaged masonry units as directed by Architect.
- C. Pointing with Mortar:
  1. Rinse joint surfaces with water to remove dust and mortar particles. Time rinsing application so, at time of pointing, joint surfaces are damp but free of standing water. If rinse water dries, dampen joint surfaces before pointing.
  2. Apply pointing mortar first to areas where existing mortar was removed to depths greater than surrounding areas. Apply in layers not greater than 3/8 inch until a uniform depth is formed. Fully compact each layer thoroughly and allow it to become thumbprint hard before applying next layer.
  3. After low areas have been filled to same depth as remaining joints, point all joints by placing mortar in layers not greater than 3/8 inch. Fully compact each layer and allow to become thumbprint hard before applying next layer. Where existing masonry units have worn or rounded edges, slightly recess finished mortar surface below face of masonry to avoid widened joint faces. Take care not to spread mortar beyond joint edges onto exposed masonry surfaces or to featheredge the mortar.

4. When mortar is thumbprint hard, tool joints to match original appearance of joints as demonstrated in approved mockup. Remove excess mortar from edge of joint by brushing.
5. Cure mortar by maintaining in thoroughly damp condition for at least 72 consecutive hours including weekends and holidays.

### 3.3 FINAL CLEANING

- A. After mortar has fully hardened, thoroughly clean exposed masonry surfaces of excess mortar and foreign matter; use wood scrapers, stiff-nylon or -fiber brushes, and clean water, spray applied at low pressure.
- B. Uniformity: Exercise care to see that materials are consistent throughout the job and produce uniform color. Where new mortar does not match color of the approved samples, cut out and repoint with mortar of approved color.

**END OF SECTION 040121**

## **SECTION 070150.19 - PREPARATION FOR RE-ROOFING**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

**A. Section Includes:**

1. Roof rehabilitation preparation of roof system at designated roof areas.
2. Removal and reinstallation of indicated components, accessories, and equipment.

**B. Related Information:**

1. Division 00 Document "Existing Condition Information" for related Project information not part of the Contract Documents.
2. Division 01 Section "Summary" for use of the premises and phasing requirements, and for restrictions on use of the premises due to Owner or tenant occupancy.
3. Division 01 Section "Temporary Facilities and Controls" for temporary construction and environmental protection measures.
4. Division 07 Section "Rehabilitation of Single Ply Roofing " for roof rehabilitation requirements.
5. Division 07 Section "Roof Specialties" for manufactured roof edge/fascia systems.

**C. Alternates:** Refer to Division 01 Section "Alternates" for description of Work in this Section affected by alternates.

**D. Unit Prices:** Refer to Division 01 Section "Unit Prices" for description of Work in this Section affected by unit prices.

#### **1.2 DESCRIPTION OF WORK**

**A. Re-roofing preparation Work consists of the following:**

1. Preparation for Roof Area "A", "B" and "D":
  - a. Preparation for: Roof rehabilitation.
  - b. Existing Roof Type: Mechanically attached single ply.
  - c. Existing Deck Type: Cementitious wood fiber deck.
  - d. Partial roof tear-off- Removal of wet or damaged areas of insulation as indicated to multi-ply built-up roof / vapor retarder to remain.

- e. Infill of areas of wet or damaged insulation with new polyisocyanurate, tapered and flat stock insulation, to align with existing to remain.
  - f. Removal and replacement of PVC membrane in areas of wet or damaged insulation, to match and flash into existing PVC membrane to remain.
  - g. Removal and reinstallation of indicated components, accessories, and equipment.
2. Preparation for Roof Area "C" and "H":
- a. Preparation for: Roof rehabilitation.
  - b. Existing Roof Type: Mechanically attached single ply.
  - c. Existing Deck Type: Metal deck.
  - d. Partial roof tear-off- Removal of wet or damaged areas of insulation as indicated to multi-ply built-up roof / vapor retarder to remain.
  - e. Infill of areas of wet or damaged insulation with new polyisocyanurate, tapered and flat stock insulation, to align with existing to remain.
  - f. Removal and replacement of PVC membrane in areas of wet or damaged insulation, to match and flash into existing PVC membrane to remain.
  - g. Removal and reinstallation of indicated components, accessories, and equipment.
  - h. Removal and replacement of two cast iron drains and tapered sumps with new 8'x8' tapered sump and adjustable height cast iron roof drain to match existing at Roof H.
3. Preparation for Roof Area "E", "F", "G", "I" and "J":
- a. Preparation for: Roof rehabilitation.
  - b. Existing Roof Type: Mechanically attached single ply.
  - c. Existing Deck Type: Metal deck and Cementitious wood fiber deck.
  - d. Existing mechanically attached PVC or EPDM membrane and underlying thermal insulation and roof construction to remain. No wet or damaged areas of insulation detected.
  - e. Removal and reinstallation of indicated components, accessories, and equipment.

### 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.

#### 1.4 DEFINITIONS

- A. Roofing Terminology: Refer to ASTM D1079 "Standard Terminology Relating to Roofing and Waterproofing" and glossary in applicable edition of NRCA's "The NRCA Roofing Manual: Membrane Roof Systems" for definition of terms related to roofing work in this Section.
- B. Existing Roofing System: Roofing system identified above, including roof covering/membrane, roof insulation, surfacing, and components and accessories between deck and roof covering/membrane.
- C. Full Roof Tear-Off: Removal of existing membrane roofing system from deck.
- D. Partial Roof Tear-Off: Removal of a portion of existing membrane roofing system from deck or removal of selected components and accessories from existing membrane roofing system.
- E. Roof Re-Cover Preparation: Existing roofing that is to remain and be prepared for installation of new roofing system over existing system.
- F. Roof Rehabilitation Preparation: Existing roofing membrane that is to remain and be prepared for rehabilitation.
- G. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and reinstalled.
- H. Existing to Remain: Existing items of construction that are not indicated to be removed.
- I. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
- J. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.
- K. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.
- L. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.
- M. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.
- N. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

#### 1.5 PREINSTALLATION MEETINGS

- A. Preliminary Roofing Conference: Before starting removal Work, conduct conference at Project site.

1. Coordinate with roofing preinstallation meetings specified in Division 07 roofing section(s).
2. Review methods and procedures related to roofing tear-off, including, but not limited to, the following:
  - a. Temporary protection requirements for existing roofing system components that are to remain.
  - b. Existing roof drains and roof drainage during each stage of reroofing, and roof-drain plugging and plug removal.
  - c. Construction schedule and availability of materials, Installer's personnel, equipment, and facilities needed to avoid delays.
  - d. Existing roof deck conditions requiring Owner notification.
  - e. Existing roof 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 roof deck during reroofing.
  - h. Base flashings, special roofing details, drainage, penetrations, equipment curbs, and condition of other construction that affect reroofing.
  - i. HVAC shutdown and sealing of air intakes.
  - j. Shutdown of fire-suppression, -protection, and -alarm and -detection systems.
  - k. Asbestos removal and discovery of asbestos-containing materials.
  - l. Governing regulations and requirements for insurance and certificates if applicable.

#### 1.6 ACTION SUBMITTALS

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

#### 1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer for refrigerant recovery technician.
- B. Field Test Reports:
  1. Fastener pull-out test report.
- C. Digital Images or Videos: Show existing conditions of adjoining construction and site improvements, including exterior and interior finish surfaces, which might be misconstrued as having been damaged by reroofing operations. Submit before Work begins.

- D. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property for environmental protection and for dust control. Indicate proposed locations and construction of barriers.
- E. Schedule of Re-Roofing Preparation Activities: Indicate the following:
  - 1. Detailed sequence of re-roofing preparation work, with starting and ending dates for each activity. Ensure occupants' on-site operations are uninterrupted.
  - 2. Interruption of utility services. Indicate how long utility services will be interrupted.
  - 3. Coordination for shutoff, capping, and continuation of utility services.
  - 4. Use of elevator and stairs.
  - 5. Coordination of Owner's continuing occupancy of portions of existing building.
- F. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

#### 1.8 QUALITY ASSURANCE

- A. Installer Qualifications: Installer of new PVC membrane roofing system.
  - 1. Approved by manufacturer of new PVC membrane roof system for tie-in to existing PVC.
- B. Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.

#### 1.9 PROJECT / FIELD CONDITIONS

- A. Owner will occupy portions of building immediately below reroofing area.
  - 1. Conduct reroofing so Owner's operations will not be disrupted.
  - 2. Provide Owner with not less than 48 hours' written notice of activities that may affect Owner's operations.
  - 3. Coordinate work activities daily with Owner so Owner can place protective dust or water leakage covers over sensitive equipment or furnishings, shut down HVAC and fire-alarm or -detection equipment if needed, and evacuate occupants from below the work area.
  - 4. Before working over structurally impaired areas of deck, notify Owner to evacuate occupants from below the affected area.
    - a. 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 operations.
- C. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities.
- D. Limit construction loads on roof to rooftop equipment wheel loads and uniformly distributed loads not exceeding recommendations of Contractor's professional engineer based upon site inspection and analysis.
- 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.
  - 1. Remove only as much roofing in one day as can be made watertight in the same day.
- F. Daily Protection: Coordinate installation of roofing so insulation and other components of roofing system not permanently exposed are not subjected to precipitation or left uncovered at the end of the workday or when rain is forecast.
- G. 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 Owner.
    - a. Obtain direction from Owner before proceeding with work in the affected area.

## **PART 2 - PRODUCTS**

### **2.1 TEMPORARY PROTECTION MATERIALS**

- A. EPS Insulation: Molded (expanded) polystyrene, ASTM C578.
- B. Plywood: NIST DOC PS 1, Grade CD, Exposure 1.
- C. Oriented Strand Board (OSB): NIST DOC PS 2, Exposure 1.

### **2.2 DECK REPAIR/REPLACEMENT MATERIALS**

- A. Metal Deck Repair Materials:
  - 1. Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 31, and with the following:
    - a. Gage, rib depth, rib configuration to match existing; three span; lapped and stitched joints.
    - b. Sheet Steel: ASTM A653/A653M, Grade A structural quality; with G90 coating (galvanized).

2. Fasteners:
  - a. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.
  - b. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 (4.8 mm) minimum diameter.
3. Accessories: Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.

B. Cementitious Wood Fiber Deck Repair Materials:

1. Cementitious Deck Panels: Aspen wood fibers bonded with inorganic hydraulic cement.
  - a. Acceptable Manufacturer: Tectum, Inc.
  - b. Panel Thickness: Match existing panels.
2. Sub-Purlins: Bulb Tees produced from prime billet steel, ASTM A499.
3. Grout: Gypsum cement grout, ready for mixing with potable water.
4. Fasteners: Material: Steel, 14 ga. (2.1 mm) Dekfast screw with 2-inch (50-mm) diameter washer.

2.3 ROOFING INFILL, PATCHING AND REPLACEMENT MATERIALS

- A. Use roofing infill materials matching existing membrane roofing system materials unless otherwise indicated.
- B. Wood Blocking, Curbs, Cants and Nailers:
  1. Reuse existing wood components that exhibit no signs of deterioration or other conditions detrimental to securement of new roofing system in conformance with specified requirements.
  2. Replace any damaged wood blocking with new preservative treated wood blocking to match existing sizes, and as follows:
  3. Provide dressed lumber, S4S, unless otherwise indicated, of a minimum of Construction or No. 2 grade lumber of any species.
  4. Preservative Treatment by Pressure Process: AWWA U1; Use Category UC2.
    - a. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
  5. 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. Fasteners: Factory-coated steel fasteners with metal or plastic plates listed in FM Approvals' RoofNav, and acceptable to new roofing system manufacturer.

#### 2.4 TEMPORARY ROOFING MATERIALS

- A. Design and selection of materials for temporary roofing are responsibilities of Contractor.

#### 2.5 ROOF DRAINAGE

- A. Design and selection of materials for temporary roof drainage are responsibilities of the Contractor. Maintain all existing roof drainage systems as indicated.
- B. Where indicated, provide new cast iron roof drains with adjustable height bowl and related mounting kit, strainer and clamping ring to match existing roof drain size.
  - 1. New roof drain Basis of Design: ZURN Z121-EB-84 12" roof drain. Dura-Coated cast iron body with membrane flashing clamp, adjustable height top-set® deck plate, low silhouette cast iron dome, or approved equivalent product. Contractor to verify existing drain size prior to order of drain assembly.

#### 2.6 AUXILIARY RE-ROOFING MATERIALS

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

### **PART 3 - EXECUTION**

#### 3.1 PREPARATION, GENERAL

- A. Protection of In-Place Conditions: Protect existing roofing system that is indicated not to be reroofed.
  - 1. Loosely lay 1-inch- (25-mm-) minimum thick, molded expanded polystyrene (EPS) insulation over the roofing membrane in areas indicated.
    - a. Loosely lay 15/32-inch (12-mm) plywood or OSB panels over EPS. Extend EPS past edges of plywood or OSB panels a minimum of 1 inch (25 mm).
  - 2. Limit traffic and material storage to areas of existing roofing membrane that have been protected.
  - 3. Maintain temporary protection and leave in place until replacement roofing has been completed. Remove temporary protection on completion of reroofing.
- B. Seal or isolate windows that may be exposed to airborne substances created in removal of existing materials.
- C. Shut off rooftop utilities and service piping before beginning the Work.
- D. Test existing roof drains to verify that they are not blocked or restricted.

1. Immediately notify Owner of any blockages or restrictions.
- E. Coordinate with Owner to shut down air-intake equipment in the vicinity of the Work.
1. Cover air-intake louvers before proceeding with reroofing work that could affect indoor air quality or activate smoke detectors in the ductwork.
- F. Pollution Control: Comply with environmental regulations of authorities having jurisdiction. Limit spread of dust and debris.
1. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
  2. Remove debris from building roof by chute, hoist, or other device that will convey debris to grade level.
- G. Refrigerant: Before starting re-roofing preparation, remove refrigerant from mechanical equipment to be removed and reinstalled, according to 40 CFR 82 and regulations of authorities having jurisdiction.
- H. Temporary Weather Protection: During removal operations, have sufficient and suitable materials on-site to facilitate rapid installation of temporary protection in the event of unexpected rain.
- I. Roof Drain Protection: Maintain roof drains in functioning condition to ensure roof drainage at end of each workday.
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.
  2. Prevent debris from entering or blocking roof drains and conductors.
    - a. Use roof-drain plugs specifically designed for this purpose.
    - b. Remove roof-drain plugs at end of each workday, when no work is taking place, or when rain is forecast.
  3. 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.
    - a. Do not permit water to enter into or under existing membrane roofing system components that are to remain.
- 3.2 ROOF TEAR-OFF
- A. Notify Owner each day of extent of roof tear-off proposed for that day and obtain authorization to proceed.

- B. Lower removed roofing materials to ground and onto lower roof levels, using dust-tight chutes or other acceptable means of removing materials from roof areas.
- C. Remove pavers and accessories from roofing membrane.
- D. Roof Drainage: Remove roof drainage items indicated for removal.
- E. Partial Roof Tear-Off: Where indicated on Drawings, remove existing roofing membrane and other membrane roofing system components down to the deck.
  - 1. Remove roof insulation.
  - 2. Bitumen and felts that are firmly bonded to concrete decks are permitted to remain if felts are dry. Remove unadhered bitumen and felts and wet felts.
  - 3. Remove fasteners from deck or cut fasteners off slightly above deck surface.
- F. Roof Edge Specialties: Reuse existing perimeter metal systems, except where indicated otherwise; refasten and repair existing fascia and coping covers to remain.
  - 1. New perimeter metal systems (drip-edge, gutters, downspouts and overflow scuppers, where indicated) are specified in Division 07 Section "Roof Specialties."
- G. Inspect wood blocking, curbs, and nailers for deterioration and damage.
  - 1. Replace existing wood components that exhibit signs of deterioration or other conditions detrimental to securement of roofing system components, including roof edge flashings.
    - a. Refer to Unit costs for damaged wood blocking replacement.
  - 2. Reuse of Existing Wood Nailers: Permitted where type, size and securement are in accordance with Factory Mutual Loss Prevention Data Bulletin 1-49; and existing wood nailers exhibit no signs of deterioration or other conditions detrimental to securement of new roofing system in conformance with specified requirements.

### 3.3 DECK PREPARATION

- A. Inspect deck after partial tear-off of membrane roofing system.
- B. Verify that deck is sound and dry.
- C. If broken or loose fasteners that secure deck panels to one another or to structure are observed or if deck appears or feels inadequately attached, immediately notify Owner. Do not proceed with installation until directed by Owner.
- D. Unsuitable Deck: If deck surface is not suitable for receiving new roofing or if structural integrity of deck is suspect, immediately notify Owner. Do not proceed with installation until directed by Owner.

### 3.4 DECK REPAIR/REPLACEMENT

- A. Repair existing deck to provide smooth working surface for installation of roof system.
  - 1. Replace deck that cannot be repaired to sound condition.
    - a. Refer to Unit Costs for additional work.
- B. Metal Deck Reattachment:
  - 1. Mechanically reattach loose sections of deck to steel support members 12 inches (300 mm) on center (at every other rib) and 6 inches (150 mm) on center (at every rib) in roof corner and roof perimeter areas.
  - 2. Side Laps: Mechanically fasten 18 inches (450 mm) on center.
  - 3. Mechanically fasten steel deck to supporting member at each deck side lap, regardless of spacing.
  - 4. Overlap steel deck end laps minimum 2 inches (50 mm); mechanically attach at the above listed factors.
- C. Metal Deck Replacement:
  - 1. Remove defective metal decking and examine supports; if supports are unsound, notify Owner and obtain direction before proceeding with deck replacement.
  - 2. Install new metal decking in accordance with SDI, Design Manual for Composite Decks, Form Decks, Roof Decks
- D. Cementitious Wood Fiber Deck Replacement
  - 1. Remove damaged or deteriorated cementitious wood fiber deck panels.
    - a. Refer to Unit Costs for additional work.
  - 2. Repair or replace damaged or deteriorated subpurlin tees.
  - 3. Comply with manufacturer's written instructions for installing cementitious wood-fiber deck and fastenings.
    - a. Install fastenings according to manufacturer's written instructions unless otherwise indicated.
  - 4. Deck Interruptions: Provide barrier seals or blocking at overhangs to form wind seals and at partitions and walls to form sound seals unless otherwise indicated.
  - 5. Install deck panels progressively with long dimension perpendicular to supports and with end joints in alternate rows, staggered and centered over supports unless otherwise indicated. Tightly nest tongue-and-groove edges and tightly butt end joints.

- a. Place panels with not less than 1 inch (25 mm) bearing.
  - b. Cut panels to provide starter units, and around penetration and openings.
  - c. Continuously support panel edges and ends at perimeter of building and at openings in deck.
    - 1) Support panels by bent steel plates at roof transitions, including but not limited to ridges, valleys, perimeter and panel direction change.
  - d. Secure panels to supports and perimeter members in accordance with manufacturer's instructions.
    - 1) Adhere and mechanically fasten panels at transitions.
  - e. Fill voids with gypsum concrete grout where edge joints meet subpurlins. Strike grout flush with top of plank and feather uneven top surfaces to a plane.
6. Do not allow foot traffic on planks until after screws are installed.

### 3.5 ROOFING INFILL, PATCHING AND REPLACEMENT MATERIALS INSTALLATION

- A. Immediately after removal of selected portions of existing membrane roofing system, and inspection and repair, if needed, of deck, fill in the tear-off areas to match existing membrane roofing system construction.
- B. Remove any loose or damaged built-up roof membrane / vapor retarder and replace with new manufacturer's approved cold process reinforced asphaltic sheet vapor retarder to flash into existing to remain. Refer to Unit Costs for additional work.
- C. Install new flat stock and tapered polyisocyanurate insulation to align with existing insulation to remain and secure with new approved fasteners and insulation plates.
  1. Fasten insulation to wood deck to resist uplift pressure at corners, perimeter, and field of roof according to membrane roofing system manufacturers' written instructions.
    - a. 16 fasteners per 4'x8' board in Field Zone 1, 24 fasteners per 4'x8' board in Perimeter Zone 2, and 32 fasteners per board at Corner Zone 3, unless otherwise required by the manufacturer.
- D. Secure existing mechanically attached PVC membrane to remain around the perimeter of new infill materials, and fully-adhere new 60 mil, PVC membrane, and flash into existing PVC roof to remain per PVC manufacturer's installation specifications.

### 3.6 EQUIPMENT REMOVAL AND REINSTALLATION

- A. General: Remove, store, protect and reinstall rooftop equipment as required to accommodate roof tear-off and subsequent roofing work.

1. Raise roof curbs, equipment mountings and other roof penetration flashings as required to accommodate additional insulation thickness and maintain base flashing height of not less than 8 inches (200 mm), unless otherwise indicated.
    - a. Provide wood assemblies and additional support with miscellaneous galvanized steel angles, as required to rebuild or raise existing roof curbs.
    - b. Extend vent and soil stacks and other roof penetrations, using matching materials, as required to accommodate additional insulation thickness.
  2. Extend existing ductwork inside existing roof curbs to accommodate extension of curb.
    - a. Use materials matching existing ductwork; minimum of 20 ga. (0.9 mm) galvanized duct with Pittsburgh folded seam slip joints-typical.
- B. Rooftop Equipment, Electrical: Engage a qualified electrician to perform electrical disconnection and reconnection.
1. Disconnect, reroute, extend and reconnect existing power feeders and control circuits (conduit and wiring) feeding the existing roof mounted equipment which is indicated to be raised and/or relocated to a new elevation/location and as required by the Contract.
  2. Provide weatherproof exterior junction boxes, when required.
  3. Make connections to mechanical equipment by using a maximum 18-inch (450-mm) length of liquid-tight flexible steel conduit.
    - a. Rigid connections to mechanical equipment are not permitted.
  4. Relocate and reconnect existing disconnect switches presently installed on existing roof mounted equipment indicated to be raised and/or relocated.
- C. Prevent discharge of refrigerant. Verify that refrigerant has been properly recovered from equipment to be removed.
- D. Reinstall designated equipment.
1. Make electrical reconnections in accordance with applicable code and authorities having jurisdiction.
  2. Recharge HVAC equipment with refrigerant required by equipment manufacturer.
  3. Coordinate with Owner to test equipment and verify proper operation.
- E. Remove and dispose of designated abandoned equipment. Infill openings in deck with matching materials. Infill roofing system with materials of same type as existing, adjacent roofing system.
- 3.7 ROOF REHABILITATION PREPARATION
- A. Prepare existing roofing as specified Division 07 Section "Rehabilitation of Single Ply Roofing".

- B. See Bid Form, Alternates for related phased roof restoration work.

3.8 FASTENER PULL-OUT TESTING

- A. Fastener Testing: Perform fastener pullout tests according to SPRI FX-1, and submit test report prior to installing new roofing system.

3.9 BASE FLASHING REMOVAL

- A. Remove existing base flashings where indicated on Drawings.
  - 1. Clean substrates of contaminants, such as asphalt, sheet materials, dirt, and debris.
- B. Do not damage metal counterflashings that are to remain.
  - 1. Replace metal counterflashings damaged during removal with counterflashings of same metal, weight or thickness, and finish.

3.10 DISPOSAL

- A. Collect demolished materials and place in containers. Promptly dispose of demolished materials. Do not allow demolished materials to accumulate on-site.
  - 1. Storage or sale of demolished items or materials on-site is not permitted.
- B. Transport and legally dispose of demolished materials off Owner's property.

3.11 CLEANING

- A. Clean adjacent structures and improvements of dust, dirt, and debris caused by preparation for re-roofing operations. Return adjacent areas to condition existing before operations began.

**END OF SECTION 070150.19**

## **SECTION 070150.74 - REHABILITATION OF SINGLE PLY ROOFING**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

A. This Section includes the following:

1. Roof membrane coating preparation.
2. Application of reinforced fluid-applied roof membrane and flashings over existing mechanically attached and fully adhered PVC and EPDM membrane roofs.
3. See Bid Alternates for related phased roof restoration work.

B. Related Information:

1. Division 00 Document "Existing Condition Information" for related Project information not part of the Contract Documents.
2. Division 01 Section "Summary" for use of the premises and phasing requirements, and for restrictions on use of the premises due to Owner or tenant occupancy.
3. Division 07 Section "Preparation for Re-Roofing" for existing roofing partial tear-off, patching, and substrate preparation for rehabilitation of roofing membrane.
4. Division 07 Section "Roof Specialties" for manufactured metal drip-edge, gutters, downspouts and overflow scuppers where indicated.

C. Alternates: Refer to Division 01 Section "Alternates" for description of Work in this Section affected by alternates.

#### **1.2 ROOFING CONFERENCES**

A. Roofing Rehabilitation Preinstallation Conference: Conduct conference at Project site to review methods and procedures related to roofing system.

1. Meet with Owner; roofing coating materials manufacturer's representative; roofing rehabilitation Installer including project manager and foreman; and installers whose work interfaces with or affects rehabilitation including installers of roof accessories and roof-mounted equipment requiring removal and replacement as part of the Work.
2. Review temporary protection requirements for existing roofing system that is to remain uncoated, during and after installation.
3. Review methods and procedures related to re-coating preparation, including coating manufacturer's written instructions.

4. Review roof drainage during each stage of coating and review roof drain plugging and plug removal procedures.
5. Review and finalize construction schedule, and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
6. Review base flashings, special roofing details, drainage, penetrations, equipment curbs, and condition of other construction that will affect coating.
7. Review HVAC shutdown and sealing of air intakes.
8. Review shutdown of fire-suppression, -protection, and -alarm and -detection systems.
9. Review procedures for asbestos removal or unexpected discovery of asbestos-containing materials.
10. Review governing regulations and requirements for insurance and certificates if applicable.
11. Review existing conditions that may require notification of Owner before proceeding.

### 1.3 MATERIALS OWNERSHIP

- A. Demolished materials shall become Contractor's property and shall be removed from Project site.

### 1.4 DEFINITIONS

- A. Roofing Terminology: Refer to ASTM D1079 "Standard Terminology Relating to Roofing and Waterproofing" and glossary in NRCA's "The NRCA Roofing Manual: Membrane Roof Systems" for definition of terms related to roofing work in this Section.
- B. Roofing Coating Preparation: Existing roofing that is to remain and be prepared to accept restorative coating application.
- C. Patching: Removal of a portion of existing membrane roofing system from deck or removal of selected components and accessories from existing membrane roofing system and replacement with similar materials.
- D. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and reinstalled.
- E. 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 specified.

### 1.6 INFORMATIONAL SUBMITTALS

- A. Contractor's Product Certificate: Submit notarized certificate, indicating products intended for Work of this Section, including product names and numbers and manufacturers' names, with

statement indicating that products to be provided meet the requirements of the Contract Documents.

1. Provide manufacturer's FM listing product approval for use as Fluid Applied Maintenance Coating System.
- B. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for components of roofing rehabilitation system.
- C. Qualification Data: For Installer, Manufacturer, and Roofing Inspector.
  1. Letter written for this Project indicating manufacturer approval of Installer to apply specified products and provide specified warranty.
- D. Warranties: Unexecuted sample copies of special warranties.
- E. Photographs or Video Recordings: Show existing conditions of adjoining construction and site improvements, including exterior and interior finish surfaces, which might be misconstrued as having been damaged by rehabilitation operations. Submit before Work begins.
- F. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property, for environmental protection, and for dust control. Indicate proposed locations and construction of barriers.
- G. Inspection Reports: Reports of Roofing Inspector. Include weather conditions, description of work performed, tests performed, defective work observed, and corrective actions required and carried out.
  1. Submit report within 48 hours after inspection.

#### 1.7 CLOSEOUT SUBMITTALS

- A. Maintenance Data: To include in maintenance manuals.
- B. Warranties: Executed copies of approved warranty forms.

#### 1.8 QUALITY ASSURANCE

- A. Installer Qualifications: An employer of workers trained and certified by manufacturer, including a full-time on-site supervisor with a minimum of three years' experience installing products similar to those specified, able to communicate verbally with Contractor, Architect, and employees, and the following:
  1. Qualified by the manufacturer to install manufacturer's product and furnish warranty of type specified.
- B. Manufacturer Qualifications: Primary product manufacturer that is FM approved as a Fluid Applied Maintenance Coating System identical to that specified for this Project with minimum five years' experience in manufacture of comparable products in successful use in similar applications, and able to furnish warranty with provisions matching specified requirements.

C. Roofing Inspector Qualifications: A technical representative of manufacturer not engaged in the sale of products and experienced in the installation and maintenance of the specified roofing system, qualified to perform roofing observation and inspection specified in Field Quality Control Article, to determine Installer's compliance with the requirements of this Project, and approved by the manufacturer to issue warranty certification. The Roofing Inspector shall be one of the following:

1. An authorized full-time technical employee of the manufacturer.
2. An independent party certified as a Registered Roof Observer by the International Institute of Building Enclosure Consultants (formerly the Roof Consultants Institute) retained by the Contractor or the Manufacturer and approved by the Manufacturer.

#### 1.9 FIELD CONDITIONS

A. Weather Limitations: Proceed with rehabilitation work only when existing and forecasted weather conditions permit Work to proceed without water entering into existing roofing system or building.

1. Store all materials prior to application at temperatures recommended by manufacturer.
2. Apply coatings within range of ambient and substrate temperatures recommended by manufacturer.
3. Do not apply roofing in snow, rain, fog, or mist.

B. Protect building to be rehabilitated, adjacent buildings, walkways, site improvements, exterior plantings, and landscaping from damage or soiling from rehabilitation operations.

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

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

E. Owner will occupy portions of building immediately below re-coating area. Conduct re-coating so Owner's operations will not be disrupted. Provide Owner with not less than 72 hours' notice of activities that may affect Owner's operations.

#### 1.10 WARRANTY

A. Manufacturer's Warranty: Roof System Manufacturer's standard form in which Manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within warranty period, as follows.

1. Form of Warranty: Manufacturer's standard warranty form.
2. Scope of Warranty: Work of this Section and including sheet metal details and termination details installed by the roof system Installer and approved by the Roof System Manufacturer.

3. Warranty Period: 20 years from date of completion.
- B. Manufacturer Inspection Services: By manufacturer's technical representative, to report maintenance responsibilities to Owner necessary for preservation of Owner's warranty rights. The cost of manufacturer's inspections is included in the Contract Sum.
  1. Inspections to occur in following years: 2, 5, 10 and 15 following completion.
- C. Installer Warranty: Installer's warranty signed by Installer, as follows.
  1. Form of Warranty: Form acceptable to Roofing Manufacturer and Owner.
  2. Scope of Warranty: Work of this Section.
  3. Warranty Period: 2 years from date of completion.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Basis of Design: The roof system specified in this Section is based upon products of Tremco CPG Inc, Beachwood, OH, (800) 562-2728, [www.tremcoroofing.com](http://www.tremcoroofing.com) that are named in other Part 2 articles. Provide specified products or comparable products of one of the following.
  1. 1. Kemper Systems, Inc. Kemperol 2K-PUR System.
  2. 2. Sika Corp. Sikalastic RoofPro 641 Low-VOC System.
- B. Source Limitations: Obtain components for roofing system from same manufacturer as membrane roofing or manufacturer approved by membrane roofing manufacturer.

### **2.2 PERFORMANCE REQUIREMENTS**

- A. General Performance: Rehabilitated roofing shall withstand exposure to weather without failure or leaks due to defective manufacture or installation.
  1. Accelerated Weathering: Roofing system shall withstand 5000 hours of exposure when tested according to ASTM G152, ASTM G154, or ASTM G155.
- 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. Exterior Fire-Test Exposure: Roofing system exterior fire-test exposure performance following application of rehabilitation coating shall be not be less than that of the prerehabilitated roof performance when tested in accordance with ASTM E108, based upon manufacturer's tests of identical applications.

## 2.3 MATERIALS, GENERAL

- A. General: Rehabilitation materials recommended by roofing system manufacturer for intended use and compatible with components of existing membrane roofing system.
- B. Infill Materials: Where required to replace test cores and to patch existing roofing, use infill materials matching existing membrane roofing system materials, unless otherwise indicated.
- C. Temporary Roof Drainage: Design and selection of materials for temporary roof drainage are responsibilities of the Contractor.

## 2.4 FLUID-APPLIED ROOFING MEMBRANE COATING

- A. Polyurethane Elastomeric Fluid-Applied System: Two-coat fluid-applied roofing membrane formulated for application over prepared existing roofing substrate.
  - 1. Polyurethane Roof Coating System Base Coat: Bio-based, low-odor low-VOC two-part, for use with a compatible top coat.
    - a. Basis of design product: Tremco, AlphaGuard BIO Base Coat.
    - b. Combustion Characteristics, UL 790: Maintains combustion characteristics of existing roof system.
    - c. Volatile Organic Compounds (VOC), maximum, ASTM D3960: 1 g/L.
    - d. Accelerated Weathering, 5000 hours, ASTM G154: Pass.
    - e. Hardness, Shore A, minimum, ASTM D2240: 80.
    - f. Solids, by volume, ASTM D2697: 100 percent.
    - g. Bio-Based Content, Minimum: 70 percent.
    - h. Minimum Thickness, Base Coat reinforced over Smooth BUR, MB, Concrete, Single-Ply: 48 mils (1.22 mm) wet.
  - 2. Polyurethane roof coating system top coat, bio-based low-odor low-VOC two-part, for application over compatible base coat.
    - a. Basis of design product: Tremco, AlphaGuard BIO Top Coat.
    - b. Combustion Characteristics, UL790: Maintains combustion characteristics of existing roof system.
    - c. Volatile Organic Compounds (VOC), maximum, ASTM D3960: 6 g/L.
    - d. Solar Reflectance Index (SRI), ASTM E1980: For white, not less than 103.
    - e. Accelerated Weathering, 5000 hours, ASTM G 154: Pass.

- f. Hardness, Shore A, minimum, ASTM D2240: 81.
- g. Solids, by volume, ASTM D2697: 100 percent.
- h. Bio-Based Content, Minimum: 60 percent.
- i. Minimum Thickness, reinforced system: 32 mils (0.81 mm) wet.
- j. Minimum Thickness, Slip-Resistant Coat: 24 mils (0.60 mm) wet.
- k. Color: White.

B. Primers:

- 1. Primer for Asphaltic and Single-Ply Membranes: Water-based, polymer-modified quick-dry low odor primer.
  - a. Basis of design product: Tremco, AlphaGuard WB Primer.
  - b. Volatile Organic Compounds (VOC), maximum, ASTM D3960: 1 g/L.
  - c. Solids, by weight: 70 percent.
- 2. Primer for Non-Porous Surfaces: Single-part, water based primer to promote adhesion of urethanes to metals, PVC and other non-porous surfaces.
  - a. Basis of design product: Tremco, AlphaGuard M-Prime.
  - b. Volatile Organic Compounds (VOC), maximum, ASTM D3960: 22 g/L.
  - c. Nonvolatile Content, minimum, ASTM D2369: 5 percent.
  - d. Density at 77 deg F (25 deg C): 8.3 lb/gal (1kg/L).
- 3. Single-component reactivating primer used to prepare aged bio-based urethane products.
  - a. Basis of design product: Tremco, BIO Prime.
  - b. Coverage Rate: 1/4 gal / 100 sq. ft. (0.1 L/m<sup>2</sup>) (4 wet mils) minimum.

C. Fluid-Applied Roofing Reinforcing Fabric:

- 1. Polyester Reinforcing Fabric: 100 percent stitch-bonded mildew-resistant polyester fabric intended for reinforcement of compatible fluid-applied membranes and flashings.
  - a. Basis of design product: Tremco, Permafab.
  - b. Tensile Strength, Minimum, ASTM D5034 (2-inch): MD - 110 lbs (49.8 kg); XMD - 60 lbs (27.2 kg) avg.

- c. Elongation, Minimum, ASTM D5034 (1-inch): MD - 25 percent; XMD - 100 percent.
- d. Tear Strength, Minimum, ASTM D5587: MD - 20 lbs (9.0 kg) avg; XMD - 20 lbs (9.0 kg) avg.
- e. Weight: 3 oz./sq. yd (102 g/sq. m).

## 2.5 AUXILIARY ROOFING REHABILITATION MATERIALS

- A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with existing roofing system and roofing coating system.
- B. Seam Sealer: Waterproof seam and patching material compatible with applied coating.
  - 1. Seam Sealer: Aromatic polyurethane sealer, single-component, high solids, moisture curing, formulated for compatibility and use with a variety of roofing and flashing substrates.
    - a. Basis of design product: Tremco, GEOGARD Seam Sealer.
    - b. Volatile Organic Compounds (VOC), maximum, ASTM D3960: 189 g/L.
    - c. Tensile Strength, ASTM D412: 270 psi (1860 kPa).
    - d. Tear Strength, ASTM D412: 35 pli (6.13 kNm).
    - e. Elongation, ASTM D412: 220 percent.
    - f. Color: Gray.
- C. Joint Sealant: Elastomeric joint sealant compatible with applied coating, with movement capability appropriate for application.
  - 1. Joint Sealant, Polyurethane: ASTM C920, Type S, Grade NS, Class 50 single-component moisture curing sealant, formulated for compatibility and use in dynamic and static joints; paintable.
    - a. Basis of design product: Tremco, TremSEAL Pro.
    - b. Volatile Organic Compounds (VOC), maximum, ASTM D3960: 40 g/L.
    - c. Hardness, Shore A, ASTM C661: 40.
    - d. Adhesion to Concrete, ASTM C794: 35 pli.
    - e. Tensile Strength, ASTM D412: 350 psi (2410 kPa).
    - f. Color: Closest match to substrate.

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

## 2.6 WALKWAYS

- A. Slip Resistant Product for Fluid-Applied Walkways:
  - 1. Aggregate, Slip Resistant Silica Sand: Silica sand, broadcast into fluid-applied roof coating products for use as aggregate fill for slip-resistant, abrasion-resistant coating applications.
    - a. Basis of design product: Aggregate, Slip Resistant Silica Sand.
    - b. Size: 20 - 40 mesh.
    - c. Application Rate: Minimum 20 - 30 lb/100 sq ft (1 - 1.5 k/m<sup>2</sup>).

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine existing roofing substrates, with Installer present, for compliance with requirements and for other conditions affecting application and performance of roof coatings
  - 1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance.
  - 2. Verify compatibility with and suitability of substrates.
  - 3. Verify that substrates are visibly dry and free of moisture.
  - 4. Verify that roofing membrane surfaces have adequately aged to enable proper bond with base coat.
  - 5. Verify that roofing membrane is free of blisters, splits, open laps, indications of shrinkage, and puncture damage or other indications of impending roof system failure.
  - 6. Commencing application of coatings indicates acceptance of surfaces and conditions.

### 3.2 PREPARATION

- A. Protect existing roofing system that is indicated not to be rehabilitated, and adjacent portions of building and building equipment.
  - 1. Mask surfaces to be protected. Seal joints subject to infiltration by coating materials.
  - 2. Limit traffic and material storage to areas of existing roofing membrane that have been protected.
  - 3. Maintain temporary protection and leave in place until replacement roofing has been completed.

- B. Shut down air intake equipment in the vicinity of the Work in coordination with the Owner. Cover air intake louvers before proceeding with coating work that could affect indoor air quality or activate smoke detectors in the ductwork.
  - 1. Verify that rooftop utilities and service piping affected by the Work have been shut off before commencing Work.
- 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. Do not permit water to enter into or under existing membrane roofing system components that are to remain.

### 3.3 ROOFING COATING PREPARATION

- A. Roofing Partial Tear-off and Patching: Refer to requirements of Division 07 Section "Preparation for Re-roofing."
- B. Removal of Wet Insulation: Remove portions of roofing membrane with underlying wet insulation. Remove wet insulation, fill in tear-off areas to match existing insulation and membrane, and prepare patched membrane for application of roof coating as specified below.
- C. Repair of Ponding Areas: Repair areas indicated as ponding areas or areas of inadequate drainage by removing roof membrane, adding additional insulation as required to provide minimum slopes to drain required by roofing rehabilitation coating manufacturer, and replace membrane with material matching existing. Submit photographic report indicating compliance.
- D. Membrane Surface Preparation:
  - 1. Remove walkway pads and pavers from roofing membrane, and infill any damaged membrane with new PVC to tie into existing membrane to remain.
  - 2. Remove blisters, ridges, buckles, roofing membrane fastener buttons projecting above the membrane, and other substrate irregularities from existing roofing membrane that would inhibit application of uniform, waterproof coating.
  - 3. Broom clean existing substrate.
  - 4. Substrate Cleaning: Clean substrate of contaminants such as dirt, debris, oil, and grease that can affect adhesion of coating by power washing at maximum 2,000 psi (13,800 kPa).
    - a. Dispose of waste water in accordance with requirements of authorities having jurisdiction.
  - 5. Verify that existing substrate is dry before proceeding with application of coating. Spot check substrates with an electrical capacitance moisture-detection meter.
  - 6. Verify adhesion of new products.

- E. Existing Flashing and Detail Preparation: Repair flashings, gravel stops, copings, and other roof-related sheet metal and trim elements. Reseal joints, replace loose or missing fasteners, and replace components where required to leave in a watertight condition.
  - 1. Do not damage metal counterflashings that are to remain. Replace metal counterflashings damaged during removal with counterflashings of same metal, weight or thickness, and finish.
  - 2. Roof Drains: Remove drain strainer and clamping ring. Grind new or existing metal surfaces down to clean, bare, metal.
- F. Surface Priming: Prime surfaces to receive fluid-applied coating using coating manufacturer's recommended product for surface material. Apply at application rate recommended by manufacturer.
  - 1. Ensure primer does not puddle and substrate has complete coverage.
  - 2. Allow to cure completely prior to application of coating.

#### 3.4 FLUID-APPLIED FLASHING APPLICATION

- A. Fluid-Applied Flashing and Detail Base Coat Application: Complete base coat and fabric reinforcement at parapets, curbs, penetrations, and drains prior to application of field of fluid-applied membrane. Apply base coat in accordance with manufacturer's written instructions.
  - 1. Apply base coat on prepared and primed surfaces and spread coating evenly. Extend coating minimum of 8 inches (200 mm) up vertical surfaces and 4 inches (100 mm) onto horizontal surfaces.
  - 2. Back roll to achieve minimum coating thickness indicated on Part 2 product listing, unless greater thickness is recommended by manufacturer; verify thickness of base coat as work progresses.
  - 3. Reinforcing Fabric: Embed fabric reinforcement into wet base coat. Lap adjacent flashing pieces of fabric minimum 3 inches (75 mm) along edges and 6 inches (150 mm) at end laps.
    - a. Roll surface of fabric reinforcing to completely embed and saturate fabric. Leave finished base coat with fabric free of pin holes, voids, or openings.
  - 4. Roof Drains: Install base coat onto surrounding membrane surface and metal drain bowl flange. Install target piece of fabric reinforcement immediately into wet base coat and roll to fully embed and saturate fabric. Reinstall clamping ring and strainer following application of top coat. Replace broken drain ring clamping bolts.

#### 3.5 FLUID-APPLIED MEMBRANE APPLICATION

- A. Fluid-Applied Membrane Base Coat: Apply base coat to field of membrane in accordance with manufacturer's written instructions.

1. Apply base coat on prepared and primed surfaces and spread coating evenly.
  2. Back roll to achieve minimum coating thickness indicated on Part 2 product listing, unless greater thickness is recommended by manufacturer; verify thickness of base coat as work progresses.
  3. Fabric Reinforcement: Embed fabric reinforcement into wet base coat. Lap adjacent pieces of fabric minimum 3 inches (75 mm) along edges and 6 inches (150 mm) at end laps.
    - a. Roll surface of fabric reinforcing to completely embed and saturate fabric. Leave finished base coat with fabric free of pin holes, voids, or openings.
- B. Fluid-Applied Membrane Top Coat: Apply top coat to field of membrane and flashings uniformly in a complete, continuous installation.
1. Allow base coat to cure prior to application of top coat.
  2. Following curing of base coat and prior to application of top coat, sand raised or exposed edges of fabric reinforcement.
  3. Prime base coat prior to application of top coat if top coat is not applied within 72 hours of the base coat application, using manufacturer's recommended primer.
  4. Apply top coat extending coating up vertical surfaces and out onto horizontal surfaces. Install top coat over field base coat and spread coating evenly.
  5. Back roll to achieve minimum coating thickness indicated on Part 2 product listing, unless greater thickness is recommended by manufacturer; verify thickness of base coat as work progresses.
  6. Avoid foot traffic on new fluid-applied membrane for a minimum of 24 hours.

### 3.6 WALKWAY INSTALLATION

- A. Install walkways following application of coating. Locate as indicated, or as directed by Owner.
- B. Slip-Resistant Walkway Topcoat: Apply walkway second topcoat following application and curing of top coat. Locate as indicated on Drawings.
  1. Mask walkway location with tape.
  2. Prime first top coat prior to application of walkway top coat if walkway top coat is not applied within 72 hours of the first top coat application, using manufacturer's recommended primer.
  3. Apply walkway topcoat and back roll to achieve minimum coating thickness indicated on Part 2 product listing, unless greater thickness is recommended by manufacturer; verify thickness of base coat as work progresses.

4. Broadcast Slip-Resistant Top Coat Aggregate in wet top coat at rate indicated in Part 2 product listing or as otherwise recommended by coating manufacturer.
  - a. Back roll aggregate and top coat creating even dispersal of aggregate. Remove masking immediately.

### 3.7 FIELD QUALITY CONTROL

- A. Roofing Inspector: Contractor shall engage a qualified roofing inspector for a minimum of 5 full-time days on site, per 40-hour crew week, to perform roof tests and inspections and to prepare start up, interim, and final reports. Roofing Inspector's quality assurance inspections shall comply with criteria established in Quality Control and Quality-assurance Guidelines for the Application of Membrane Roof Systems."
- B. Roof Inspection: Contractor shall engage roofing system manufacturer's technical personnel to inspect roofing installation, and submit report. Notify Owner 48 hours in advance of dates and times of inspections. Inspect work as follows:
  1. Upon completion of preparation of first component of work, prior to application of re-coating materials.
  2. Following application of re-coating to flashings and application of base coat to field of roof.
  3. Upon completion of re-coating but prior to re-installation of other roofing components.
- C. Repair fluid-applied membrane where test inspections indicate that they do not comply with specified requirements.
- D. Arrange for additional inspections, at Contractor's expense, to verify compliance of replaced or additional work with specified requirements.

### 3.8 PROTECTING AND CLEANING

- A. Protect roofing system from damage and wear during remainder of construction period.
- B. Correct deficiencies in or remove coating that does not comply with requirements, repair substrates, and reapply coating.
- C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

**END OF SECTION 070150.74**

## **SECTION 071900 - WATER REPELLENTS**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Section includes penetrating water-repellent treatments for the following vertical and horizontal surfaces:
  - 1. Precast concrete.
  - 2. Clay brick masonry.

#### **1.2 PREINSTALLATION MEETINGS**

- A. Preinstallation Conference: Conduct conference at Project site.

#### **1.3 ACTION SUBMITTALS**

- A. Product Data: For each type of product.
  - 1. Include manufacturer's printed statement of VOC content.
  - 2. Include manufacturer's recommended number of coats for each type of substrate and spreading rate for each separate coat.

#### **1.4 INFORMATIONAL SUBMITTALS**

- A. Qualification Data: For Applicator.

#### **1.5 QUALITY ASSURANCE**

- A. Applicator Qualifications: An employer of workers trained and approved by manufacturer.
- B. Mockups: Prepare mockups of each required water repellent on each type of substrate required to demonstrate aesthetic effects, and to set quality standards for materials and execution.
  - 1. Locate mockups in locations that enable viewing under same conditions as the completed Work.
  - 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

#### **1.6 PROJECT / FIELD CONDITIONS**

- A. Limitations: Proceed with application only when the following existing and forecasted weather and substrate conditions permit water repellents to be applied according to manufacturers' written instructions and warranty requirements:

1. Concrete surfaces and mortar have cured for not less than 28 days.
2. Building has been closed in for not less than 30 days before treating wall assemblies.
3. Ambient temperature is above 40 deg F (4.4 deg C) and below 100 deg F (37.8 deg C) and will remain so for 24 hours.
4. Substrate is not frozen and substrate-surface temperature is above 40 deg F (4.4 deg C) and below 100 deg F (37.8 deg C).
5. Rain or snow is not predicted within 24 hours.
6. Not less than 24 hours have passed since surfaces were last wet.
7. Windy conditions do not exist that might cause water repellent to be blown onto vegetation or surfaces not intended to be treated.

## **PART 2 - PRODUCTS**

### 2.1 MANUFACTURERS

- A. Basis of Design: The water repellent system specified in this Section is based upon products of Tremco CPG Inc, Beachwood, OH, (800) 562-2728, [www.tremcoroofing.com](http://www.tremcoroofing.com) that are named in other Part 2 articles. Provide specified products or comparable products of one of the following.
  1. Prosoco, Inc., Sure Klean Weather Seal, Siloxane PD System.
  2. Euclid Chemical, Inc., Chemstop, WB Heavy Duty System.

### 2.2 PERFORMANCE REQUIREMENTS

- A. Performance: Water repellents shall meet the following performance requirements as determined by testing on manufacturer's standard substrates representing those indicated for this Project.
- B. Water Absorption: Minimum 75 percent reduction of water absorption after 24 hours for treated compared to untreated specimens when tested according to the following:
  1. Cast-in-Place Concrete: ASTM C642.
  2. Precast Concrete: ASTM C642.
  3. Cast Stone: ASTM C1195.
  4. Concrete Masonry Units: ASTM C140.
  5. Clay Brick: ASTM C67.
  6. Natural Stone: ASTM C97/C97M.
  7. Portland Cement Plaster (Stucco): ASTM D6532.

C. Chloride-Ion Intrusion in Concrete: NCHRP Report 244, Series II tests.

1. Reduction of Water Absorption: 75 percent.
2. Reduction in Chloride Content: 90 percent.

### 2.3 PENETRATING WATER REPELLENTS

A. Penetrating Water Repellent: Water Based, ready to use, silane/siloxane blend, penetrating, clear water repellent sealer designed for use on concrete and masonry surfaces.

1. Basis of design product: Tremco, Hydrosled.
2. Flash Point: Less than 200 Deg F (93.3 Deg C).
3. Weight per gallon: 8.4 lbs (3.8 kg).
4. VOC: 50 g/l, maximum.
5. Viscosity: 50 cps.
6. Active Content (by weight): 10 percent.
7. Drying time at 70 Deg F (21 Deg C): 1 to 2 hours.
8. Average Depth of Penetration: 3/8 inch (9.5 mm).
9. Reduction in Water Absorption, SS-W-110C: 88 percent.
10. Permeance Rating: 1.6 percent reduction.
11. NCHRP No. 244 Reduction in Chloride Ion Content, Average, 21 days: 89 percent.
12. NCHRP No. 244 Reduction in Weight Gain, 21 days: 85 percent.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements and conditions affecting performance of the Work.

1. Verify that surfaces are clean and dry according to water-repellent manufacturer's requirements. Check moisture content in three representative locations by method recommended by manufacturer.
2. Verify that there is no efflorescence or other removable residues that would be trapped beneath the application of water repellent.
3. Verify that required repairs are complete, cured, and dry before applying water repellent.

- B. Test pH level according to water-repellent manufacturer's written instructions to ensure chemical bond to silica-containing or siliceous minerals.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. New Construction and Repairs: Allow concrete and other cementitious materials to age before application of water repellent, according to repellent manufacturer's written instructions.
  - 1. New concrete surfaces must be aged for a minimum of 3 days unless longer duration is recommended by manufacturer.
- B. Cleaning: Before application of water repellent, clean substrate of substances that could impair penetration or performance of product according to water-repellent manufacturer's written instructions.
- C. Protect adjoining work, including mortar and sealant bond surfaces, from spillage or blow-over of water repellent. Cover adjoining and nearby surfaces of aluminum and glass if there is the possibility of water repellent being deposited on surfaces. Cover live vegetation.
- D. Coordination with Mortar Joints: Do not apply water repellent until pointing mortar for joints adjacent to surfaces receiving water-repellent treatment has been installed and cured.
- E. Coordination with Sealant Joints: Do not apply water repellent until sealants for joints adjacent to surfaces receiving water-repellent treatment have been installed and cured.
  - 1. Water-repellent work may precede sealant application only if sealant adhesion and compatibility have been tested and verified using substrate, water repellent, and sealant materials identical to those required.

### 3.3 APPLICATION

- A. Apply coating of water repellent on surfaces to be treated using 15 psi- (103 kPa-) pressure spray with a fan-type spray nozzle to the point of saturation. Apply coating in dual passes of uniform, overlapping strokes. Remove excess material; do not allow material to puddle beyond saturation. Comply with manufacturer's written instructions for application procedure unless otherwise indicated.

### 3.4 FIELD QUALITY CONTROL

- A. Testing of Water-Repellent Material: Owner reserves the right to invoke the following procedure at any time and as often as Owner deems necessary during the period when water repellent is being applied:
  - 1. Owner may direct Contractor to stop applying water repellents if test results show material being used does not comply with product requirements. Contractor shall discontinue application of noncomplying material, pay for testing, and correct deficiency of surfaces treated with rejected materials.

- B. Coverage Test: In the presence of Owner, hose down a dry, repellent-treated surface to verify complete and uniform product application. A change in surface color will indicate incomplete application.
  - 1. Notify Owner seven days in advance of the dates and times when surfaces will be tested.
  - 2. Reapply water repellent until coverage test indicates complete coverage.

### 3.5 CLEANING

- A. Immediately clean water repellent from adjoining surfaces and surfaces soiled or damaged by water-repellent application as work progresses. Correct damage to work of other trades caused by water-repellent application, as approved by Owner.
- B. Comply with manufacturer's written cleaning instructions.

**END OF SECTION 071900**

## **SECTION 077100 - ROOF SPECIALTIES**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

**A. Section Includes:**

1. Manufactured roof-edge specialties (drip edges) as indicated at Roof "C".
2. Manufactured roof-edge drainage (gutters and downspouts), as indicated at Roof "C".
3. Manufactured overflow scuppers, as indicated at Roof "E".

**B. Related Information:**

1. Division 07 Section "Preparation for Re-Roofing" for protection of existing manufactured fasciae, roof edge metal and copings.

#### **1.2 PREINSTALLATION MEETINGS**

**A. Preinstallation Conference:** Conduct conference at Project site, in conjunction with roofing preinstallation conference specified in Division 07 roofing section.

1. Meet with Owner, Owner's insurer if applicable, Installer, and installers whose work interfaces with or affects roof specialties including installers of roofing materials and accessories.
2. Examine substrate conditions for compliance with requirements, including flatness and attachment to structural members.
3. Review special roof details, roof drainage, and condition of other construction that will affect roof specialties.

#### **1.3 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:** For roof specialties.

1. Include plans, elevations, expansion-joint locations, keyed details, and attachments to other work. Distinguish between plant- and field-assembled work.
2. Include details for expansion and contraction; locations of expansion joints, including direction of expansion and contraction.
3. Indicate profile and pattern of seams and layout of fasteners, cleats, clips, and other attachments.

4. Detail termination points and assemblies, including fixed points.
5. Include details of special conditions.

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

#### 1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For manufacturer.

B. Product Certificates: Provide manufacturer's certificates for roof-edge specialties indicating compliance with performance requirements including the following:

1. ANSI/SPRI/FM 4435/ES-1 compliance.

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

#### 1.5 CLOSEOUT SUBMITTALS

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

#### 1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer offering products meeting requirements that are ANSI/SPRI ES-1 tested to specified design pressure.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

A. Do not store roof specialties in contact with other materials that might cause staining, denting, or other surface damage. Store roof specialties away from uncured concrete and masonry.

B. Protect strippable protective covering on roof specialties from exposure to sunlight and high humidity, except to extent necessary for the period of roof specialties installation.

#### 1.8 PROJECT / FIELD CONDITIONS

A. Field Measurements: Verify profiles and tolerances of roof-specialty substrates by field measurements before fabrication, and indicate measurements on Shop Drawings.

B. Coordination: Coordinate roof specialties with flashing, trim, and construction of parapets, roof deck, roof and wall panels, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

#### 1.9 WARRANTY

A. Roofing-System Warranty: Roof specialties are included in warranty provisions in Division 07 roofing Section.

- B. Special Warranty on Painted Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace roof specialties that show evidence of deterioration of factory-applied finishes within specified warranty period.
  - 1. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:
    - a. Color fading more than 5 Hunter units when tested according to ASTM D2244.
    - b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
    - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
  - 2. Finish Warranty Period: 20years from date of Substantial Completion.

## **PART 2 - PRODUCTS**

### **2.1 PERFORMANCE REQUIREMENTS**

- A. General Performance: Roof specialties shall withstand exposure to weather and resist thermally induced movement without failure, rattling, leaking, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction
- B. SPRI Wind Design Standard: Manufacture and install roof-edge specialties tested according to ANSI/SPRI ES-1.
  - 1. Design Pressure: 93.0 psf.
- C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent 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 thermal movements. 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 (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

### **2.2 MANUFACTURERS**

- A. Basis of Design: The metal edge system specified in this Section is based upon products of Tremco CPG Inc, Beachwood, OH, (800) 562-2728, [www.tremcoroofing.com](http://www.tremcoroofing.com) that are named in other Part 2 articles. Provide specified products or comparable products of one of the following.
  - 1. Hickman Edge Systems.
  - 2. Metal-Era, LLC.
- B. Source Limitations: Obtain roof specialties approved by manufacturer providing roofing-system warranty specified in Division 07 roofing Section.

## 2.3 EXPOSED METALS

- A. Zinc-Coated (Galvanized) Steel Sheet: ASTM A653/A653M, G90 (Z275) coating designation.
  - 1. Surface: Smooth, flat finish as indicated.

## 2.4 CONCEALED METALS

- A. Aluminum Extrusions: ASTM B221/B221M, alloy and temper recommended by manufacturer for type of use and structural performance indicated, mill finished.
- B. Stainless-Steel Sheet: ASTM A240/A240M or ASTM A666, Type 304, dead soft, fully annealed; with smooth, flat surface.
- C. Zinc-Coated (Galvanized) Steel Sheet: ASTM A653/A653M, G90 (Z275) coating designation.

## 2.5 UNDERLAYMENT MATERIALS

- A. Self-Adhering, High-Temperature Sheet: Minimum 30 to 40 mils (0.76 to 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 D1970/D1970M; stable after testing at 240 deg F (116 deg C).
  - 2. Low-Temperature Flexibility: ASTM D1970/D1970M; passes after testing at minus 20 deg F (29 deg C).

## 2.6 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items required by manufacturer for a complete installation.
- B. Fasteners: Manufacturer's recommended fasteners, suitable for application and designed to meet performance requirements. Furnish the following unless otherwise indicated:
  - 1. Exposed Penetrating Fasteners: Gasketed screws with hex washer heads matching color of sheet metal.
  - 2. Fasteners for Aluminum: Aluminum or Series 300 stainless steel.
  - 3. Fasteners for Zinc-Coated (Galvanized) Steel Sheet: Series 300 stainless steel or hot-dip zinc-coated steel according to ASTM A153/A153M or ASTM F2329.
- C. Elastomeric Sealant: ASTM C920, elastomeric silicone polymer sealant of type, grade, class, and use classifications required by roofing-specialty manufacturer for each application.

## 2.7 MANUFACTURED ROOF-EDGE SPECIALTIES

- A. Drip Edges:

1. Description: Manufactured two-piece roof-edge specialty systems consisting of metal fascia covers, in section lengths not exceeding 12 feet (3.6 m), with a formed cleat to engage and secure fascia cover, and concealed splice plates. Provide matching prefabricated continuously welded corner units.
  - a. Roof-Edge Fasciae Unit Profile: As indicated on Drawings.
2. Drip-Edge: Flashed-in fascia with flush-to-roof profile and canted drip on face, with continuous galvanized concealed cleat and concealed splice plates. Provide matching prefabricated continuously welded corner units.
  - a. Basis-of-Design Product: Tremco, TremLock Eco Drip Edge S.
  - b. Fascia Cover Securement Method: Snap on cleat at front; fastener at roof.
  - c. Roofing System: Single-ply.
  - d. Fascia Cover Material: Zinc-coated steel, nominal 24 ga.; 0.028-inch (0.71-mm) thickness.
    - 1) Finish: High-performance organic (PVDF) coating.
    - 2) Color: As selected by Owner from manufacturer's full range.

- B. Drip Edge Accessories: Provide accessories fabricated from the same materials and for compatibility with roof edge system; provide the following accessories:
  1. Overflow scuppers.

## 2.8 MANUFACTURED ROOF-EDGE DRAINAGE SPECIALTIES

- A. Gutters: Manufactured in uniform section lengths not exceeding 12 feet (3.6 m), with matching corner units, ends, outlet tubes, and other accessories. Elevate back edge at least 1 inch (25 mm) above front edge. Furnish flat-stock gutter straps, gutter brackets, expansion joints, and expansion-joint covers fabricated from same metal as gutters.
  1. Basis-of-Design Product: Tremco, TremLock Gutter IGG-2.
  2. Material: Zinc-coated steel, nominal 24 ga.; 0.028-inch (0.71-mm) thickness.
    - a. Finish: High-performance organic (PVDF) coating.
    - b. Color: As selected by Owner from manufacturer's full range.
  3. Corners: Factory mitered and continuously welded.
  4. Gutter Supports: Gutter brackets with finish matching the gutters.
- B. Downspouts: Closed-face rectangular complete with elbows, manufactured from the following exposed metal. Furnish with metal hangers, from same material as downspouts, and anchors.

1. Fabricate downspouts from the same material, thickness and finish as indicated for gutters.
2. Material: Zinc-coated steel, nominal 24 ga.; 0.028-inch (0.71-mm) thickness.
  - a. Finish: High-performance organic (PVDF) coating.
  - b. Color: As selected by Owner from manufacturer's full range.
- C. Splash Blocks: Precast concrete type, sizes and profiles indicated; minimum 3,000 psi (21 MPa) at 28 days, with minimum 5 percent air entrainment.

## 2.9 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: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- D. High-Performance Organic (PVDF) Coating: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with ASTM A755/A755M and coating and resin manufacturers' written instructions.
  1. Galvanized Steel Coil Coating Finishes: Two-Coat or Three-Coat Fluoropolymer: AAMA 621 and as additionally required to meet specified finish performance and warranty requirements. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
- E. Concealed Surface Finish: Apply pretreatment and manufacturer's standard acrylic or polyester backer finish consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil (0.013 mm).
- F. Mill Finish: As manufactured.

## 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 the Work.
- B. Examine walls, roof edges, and parapets for suitable conditions for roof specialties.
- C. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.

- D. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION OF UNDERLAYMENT

- A. Self-Adhering Sheet Underlayment: Install wrinkle free. Apply primer if required by underlayment manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation; use primer rather than nails for installing underlayment at low temperatures. Apply in shingle fashion to shed water. Overlap edges not less than 3-1/2 inches (90 mm). Roll laps with roller. Cover underlayment within 14 days.

### 3.3 INSTALLATION, GENERAL

- A. General: Install roof specialties according to manufacturer's written instructions. Anchor roof specialties securely in place, with provisions for thermal and structural movement. Use fasteners, solder, protective coatings, separators, sealants, and other miscellaneous items as required to complete roof-specialty systems.
  - 1. Install roof specialties level, plumb, true to line and elevation; with limited oil-canning and without warping, jogs in alignment, buckling, or tool marks.
  - 2. Provide uniform, neat seams with minimum exposure of solder and sealant.
  - 3. Install roof specialties to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before manufacture.
  - 4. Torch cutting of roof specialties is not permitted.
  - 5. Do not use graphite pencils to mark metal surfaces.
- B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.
  - 1. Coat concealed side of uncoated aluminum roof specialties with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
  - 2. Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of self-adhering, high-temperature sheet underlayment.
  - 3. Bed flanges in thick coat of asphalt roofing cement where required by manufacturers of roof specialties for waterproof performance.
- C. Expansion Provisions: Allow for thermal expansion of exposed roof specialties.
  - 1. Space movement joints at a maximum of 12 feet (3.6 m) with no joints within 18 inches (450 mm) of corners or intersections unless otherwise shown on Drawings.
  - 2. When ambient temperature at time of installation is between 40 and 70 deg F (4 and 21 deg C), set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures.

D. Fastener Sizes:

1. Wood Blocking or Sheathing: Use fasteners of sizes that penetrate wood blocking or sheathing not less than 1-1/4 inches (32 mm) for nails and not less than 3/4 inch (19 mm) for wood screws.
2. Other Substrates: Use fasteners of sizes that penetrate substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.

E. Seal joints with elastomeric sealant as required by roofing-specialty manufacturer.

F. Seal joints as required for watertight construction. Place sealant to be completely concealed in joint. Do not install sealants at temperatures below 40 deg F (4 deg C).

3.4 INSTALLATION OF ROOF-EDGE SPECIALTIES

- A. Install clips, cleats, cants, and other anchoring and attachment accessories and devices with concealed fasteners.
- B. Anchor roof edgings with manufacturer's required devices, fasteners, and fastener spacing to meet performance requirements.

3.5 INSTALLATION OF ROOF-EDGE DRAINAGE-SYSTEM

- A. Install components to produce a complete roof-edge drainage system according to manufacturer's written instructions. Coordinate installation of roof perimeter flashing with installation of roof-edge drainage system.
- B. Gutters: Join and seal gutter lengths. Allow for thermal expansion. Attach gutters to firmly anchored gutter supports spaced not more than 24 inches (600 mm) apart. Attach ends with rivets and seal with sealant to make watertight. Slope to downspouts at 1/16 inch per 12 inches (1:192).
  1. Install gutter with expansion joints at locations indicated but not exceeding 50 feet (15.2 m) apart. Install expansion-joint caps.
- C. Downspouts: Join sections with manufacturer's standard telescoping joints. Provide hangers with fasteners designed to hold downspouts securely to walls and 1 inch (25 mm) away from walls; locate fasteners at top and bottom and at approximately 60 inches (1500 mm) inches o.c.
  1. Connect downspouts to boots and connect boots to storm sewer system. Seal connection watertight.
- D. Precast Concrete Splash Pads: Install where downspouts discharge at grade.
  1. For discharge onto low-slope roofing, set splash pads on additional layer of protection, as recommended by low slope roofing manufacturer; refer to Division 07 roofing section.
- E. Conductor Heads: Anchor securely to wall with elevation of conductor top edge 1 inch (25 mm) below scupper discharge.

3.6 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces.
- B. Clean off excess sealants.
- C. Clean and neutralize flux materials. Clean off excess solder.
- D. Remove temporary protective coverings and strippable films as roof specialties are installed. On completion of installation, clean finished surfaces including removing unused fasteners, metal filings, pop rivet stems, and pieces of flashing. Maintain roof specialties in a clean condition during construction.
- E. Replace roof specialties that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

**END OF SECTION 077100**

## **SECTION 112429 - FACILITY FALL PROTECTION, NON-PENETRATING**

### **PART 1 - GENERAL**

#### **1.1 SECTION INCLUDES**

- A. Non-penetrating fall protection systems, including:
  - 1. Roof edge rail systems.
  - 2. Roof hatch rail systems.

#### **1.2 REFERENCES**

- A. General: Applicable edition of references cited in this Section is current edition published on date of issue of Project specifications, unless otherwise required by building code in force.
- B. American National Standards Institute (ANSI):
  - 1. A21.1 - Safety Requirements for Floor and Wall Openings, Railings and Toe Boards.
  - 2. A58.1 - Minimum Design Loads in Buildings and Other Structures.
  - 3. A117.1 - Accessible and Usable Buildings and Facilities.
- C. Code of Federal Regulations (CFR):
  - 1. 29 CFR 1910.28 - Duty to have fall protection and falling object protection.
  - 2. 29 CFR 1910.29 - Fall protection systems and falling object protection - criteria and practices.
- D. Association for Materials Protection and Performance (AMPP):
  - 1. SSPC PAINT 20: Organic Zinc Rich Primer, Type II.
  - 2. SSPC PA 1: Shop, Field, and Maintenance Coating of Metals.

#### **1.3 COORDINATION**

- A. Coordinate selection of fall protection and fall restraint devices and attachment provisions with Owner's safety program and Owner-provided personal protection equipment.
- B. Coordinate layout and location of facility fall protection with Owner.

#### **1.4 ACTION SUBMITTALS**

- A. Product Data: For each type of fall protection and accessory, including brackets and fasteners.

1. Submit manufacturer's published literature including structural properties data, corrosion resistance, certificates of compliance, and test reports as applicable.

B. Shop Drawings: Show locations and layout of fall protection components; include dimensioned plans, elevations, sections, and details of installation.

#### 1.5 INFORMATION SUBMITTALS

A. Qualification Data: For Installer.

B. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, according to ASTM E894 and ASTM E935.

#### 1.6 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

B. Executed copies of warranty.

#### 1.7 QUALITY ASSURANCE

A. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

#### 1.8 PRODUCT DELIVERY AND STORAGE

A. Deliver manufactured materials in original, unbroken pallets, packages, containers, or bundles bearing the label of the manufacturer.

B. Store and handle materials carefully to prevent abrasion, cracking, chipping, twisting, other deformations, and other types of damage.

#### 1.9 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to repair or replace components that fail in materials within specified warranty period.

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

### **PART 2 - PRODUCTS**

#### 2.1 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide facility fall protection components by Tremco CPG Inc, Beachwood, OH, (800) 562-2728. Provide specified products or comparable products by one of the following:

1. Kee Safety, Inc..

2. BlueWater by Tractel.
3. Manufacturer of comparable products, approved by the Owner.

B. Single Source: Provide fall protection components from a single manufacturer through a single source, unless otherwise indicated.

## 2.2 PERFORMANCE REQUIREMENTS

A. Occupational Safety and Health Standards: Provide fall protection components complying with requirements of 29 CFR 1910.28 and 1910.29 including structural performance.

B. Structural Performance: Railings, including attachment to building construction, shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Handrails and Top Rails of Guards:
  - a. Uniform load of 50 lbf/ ft. (0.73 kN/m) applied in any direction.
  - b. Concentrated load of 200 lbf (0.89 kN) applied in any direction.
  - c. Uniform and concentrated loads need not be assumed to act concurrently.
2. Infill of Guards and Bottom Rails:
  - a. Concentrated load of 50 lbf (0.22 kN) applied horizontally on an area of 1 sq. ft. (0.093 sq. m).
  - b. Infill load and other loads need not be assumed to act concurrently.

## 2.3 RAIL SYSTEMS, NON-PENETRATING

A. Fall Protection Rail Systems: Freestanding counterweighted fall protection safety railing system including pipe or tubing, fittings, and accessories complying with requirements of authorities having jurisdiction.

1. Basis of Design Product: Tremco, TremSafe Guardrail S Fall Protection System.
2. Configuration/System:
  - a. Roof edge protection: TremSafe Guardrail.
  - b. Roof hatch protection: TremSafe Hatch Guard.
3. Application: Flat or low slope roof.
  - a. Maximum Slope without Parapet: 3.6 degrees (0.75:12).

- b. Maximum Slope with Parapet: 5 degrees (1:12); where parapet has a height of not less than 3 inches (75 mm).
4. Uprights: 42-inch (1067-mm) by 1.5625-inch (41-mm) steel pipe factory assembled with manufacturer's standard clamp fittings accepting railings, adjustable up to 11 deg. from vertical.
5. Mounting Bases: Class 30 gray iron material cast with four receiver posts, with anti-skid rubber pad base. Provide toe board receivers at open conditions.
  - a. Receiver Posts: Shall have a positive locking system into slots that allow rails to be mounted in any direction. Friction locking systems are not allowed. Receiver posts shall have drain holes.
6. Railings: 1-5/8-inch (41-mm) OD, hot-rolled, pickled, electric weld tubing, free of sharp edges and snag points.
7. Upright and Railing Finish: Galvanized, exposed.
8. Accessories: Provide manufacturer's standard accessories, with clamping hardware, pre-formed corners, and splice kits, in finish to match railings
  - a. Self-Closing Safety Gate: Tremco, TremSafe Self-Closing Safety Gate; fully assembled gate shall be capable of swinging in either direction by inverting installation position. Gate size shall be laterally adjusted from minus 1-1/4 inch (32 mm) to plus 2-1/2 inch (64 mm).
    - 1) Width: As selected from manufacturer's standard range.
    - 2) Top Rail: 42 inches (1067 mm), minimum.
    - 3) Bottom Rail: (533 mm) 21 inches, minimum.
    - 4) Hardware: Provide the following:
      - a) Gate Hardware: U-Bolts.
      - b) Universal Hinge Assembly: Fits railing types up to 2 inches (51 mm) OD or flat surface mounting.
      - c) Railing adapter kit.
      - d) Self-Closing Springs: Two stainless steel torsion springs.
    - 5) Finish: Hot Dipped Galvanized w/ Powder Coat.
      - a) Color: Safety yellow.
  - b. Toe Board Brackets: Provide brackets and friction knobs.

- 1) Toe Boards: Manufacturer's standard, with clamping hardware, pre-formed corners, and splice kits, in finish to match railings.

## 2.4 MISCELLANEOUS MATERIALS

- A. Hardware: Manufacturer's standard hardware as required for a complete installation; corrosion resistant, and identical to hardware utilized in tested assemblies meeting performance requirements.
- B. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

## 2.5 FABRICATION

- A. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm) unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- B. Form work true to line and level with accurate angles and surfaces.
- C. Nonwelded Connections: Connect members with concealed mechanical fasteners and fittings. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.
- D. Form changes in direction by inserting prefabricated elbow fittings.
- E. Close exposed ends of railing members with prefabricated end fittings.
- F. Brackets, Flanges, Fittings, and Anchors: Provide brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.

## 2.6 STEEL AND IRON FINISHES

- A. Comply with ASTM A123/A123M for hot-dip galvanized railings.
- B. Comply with ASTM A153/A153M for hot-dip galvanized hardware.
- C. Powder-Coat Finish: Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

## **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 the Work.
- B. Verify that roof assembly is sound, dry, smooth, clean, sloped for drainage, securely anchored and ready for placement of fall protection.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Prepare surfaces using the methods recommended by the manufacturer for the substrate, under the project conditions.

### 3.3 INSTALLATION OF NON-PENETRATING FALL PROTECTION DEVICES

- A. Install fall protection to comply with requirements of 29 CFR 1910.28 and 1910.29, and authorities having jurisdiction.
- B. Install fall protection in accordance with manufacturer's written instructions.
- C. Set fall protection components accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.
  - 1. Do not weld, cut, or abrade surfaces of components that are coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
  - 2. Set components plumb within a tolerance of 1/8 inch in 3 feet (4 mm in 1 m).
  - 3. Align horizontal members so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet (6 mm in 3.5 m).
- D. Test action of operable components of facility fall protection equipment. Adjust for proper operation.
- E. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

### 3.4 REPAIR AND CLEANING

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.
  - 1. Touchup Painting: Immediately after erection, clean bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop painting to comply with SSPC-PA 1 requirements for touching up shop-painted surfaces.
  - 2. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas, and repair galvanizing to comply with ASTM A780/A780M.
  - 3. Replace components that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

**END OF SECTION 112429**