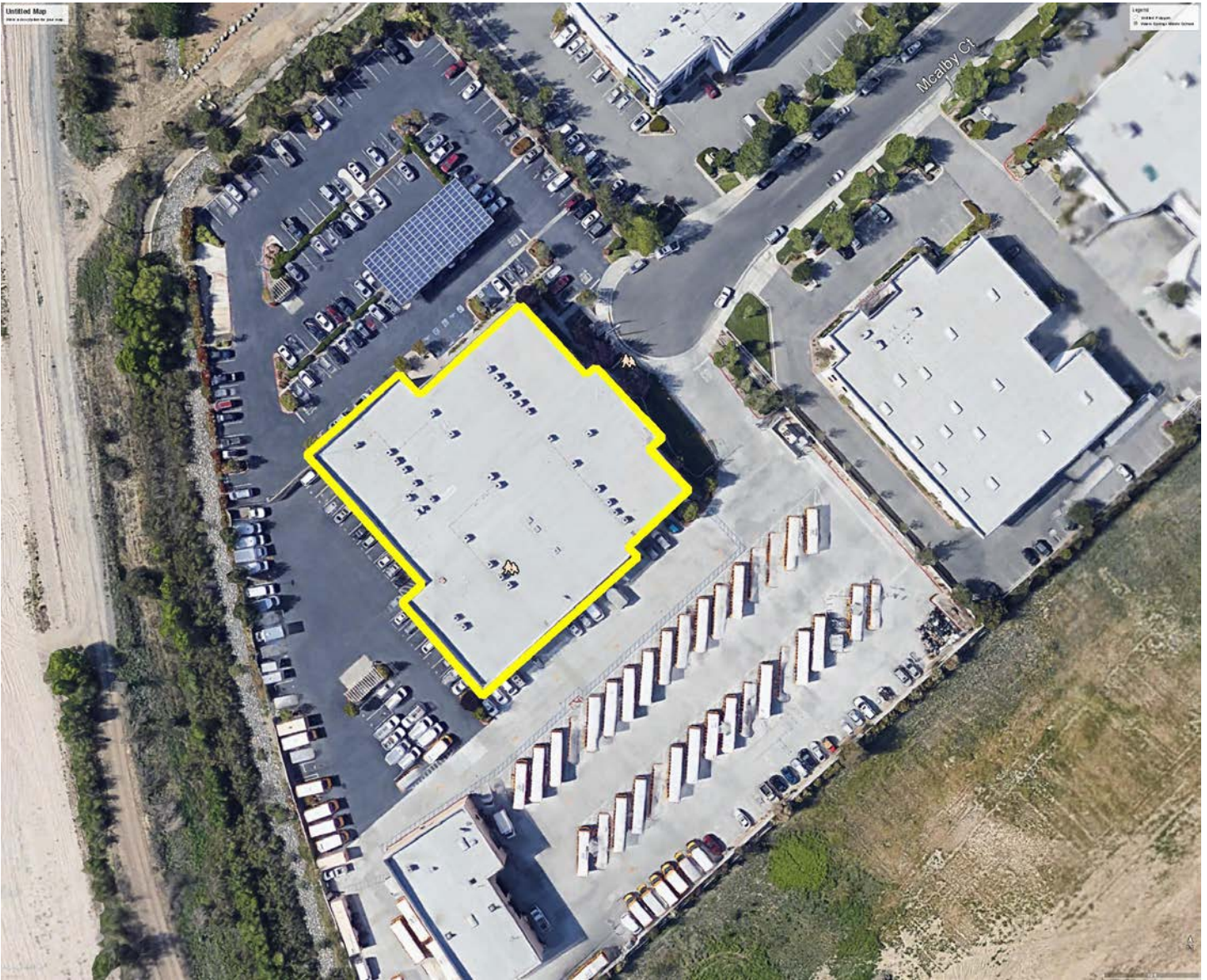


DISTRICT OFFICE SITE MAP



Color Legend:

Yellow – Roof Restoration. Specification Section 070150.73A

AVAXAT ELEMENTARY SCHOOL SITE MAP



Color Legend:

Red – Roof Replacement. Specification Section 075113.11

Yellow – Roof Coating. Specification Section 070150.71

RAIL RANCH ES SITE MAP



Color Legend:

Red – Roof Replacement. Specification Section 075113.11

Yellow – Roof Coating. Specification Section 070150.71

TOVASHAL ES SITE MAP



Color Legend:

Yellow – Roof Coating. Specification Section 070150.71

WARM SPRINGS MS SITE MAP



Color Legend:

Yellow – Roof Restoration. Specification Section 070150.73A

VISTA MURRIETA HS SITE MAP



Color Legend:

Red – Roof Replacement. Specification Section 075113.11

Yellow – Roof Restoration. Specification Section 070150.73A

DIVISION 07 - THERMAL AND MOISTURE PROTECTION

075113.11 Built-up Asphalt Roofing, Hot-applied, Cold Applied

SECTION 075113.11 - BUILT-UP ASPHALT ROOFING, HOT-APPLIED, COLD APPLIED

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Hot/cold applied asphalt roofing system with Modified Bitumen Surfacing on metal and wood decks.
 - a. Insulation.
 - b. Roof membrane and membrane flashings.
 - c. Roof surfacing consisting of modified bitumen cap sheet and acrylic coating.

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

- C. Allowances: Refer to Division 01 Section "Allowances" for description of Work in this Section affected by allowances.

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

1.3 DEFINITIONS

- A. Roofing Terminology: See ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" for definition of terms related to built-up roofing.

- B. Hot Roofing Asphalt: Roofing asphalt heated to its equiviscous temperature, the temperature at which its viscosity is 125 centipoise for mop-applied roofing asphalt and 75 centipoise for mechanical spreader-applied roofing asphalt, within a range of plus or minus 25 deg F((14 deg C)), measured at the mop cart or mechanical spreader immediately before application.

1.4 ACTION SUBMITTALS

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

- B. **Shop Drawings:** For roofing system. Include plans, elevations, sections, details, and attachments to other work. Provide roof plan showing orientation and types of roof deck, orientation of membrane roofing, and fastening spacings and patterns for mechanically fastened components.
 - 1. **Base flashings and built-up terminations.**
 - a. **Indicate details meet requirements of NRCA required by this Section.**
 - 2. **Tapered insulation, including slopes.**
 - 3. **Crickets, saddles, and tapered edge strips, including slopes.**
 - 4. **Insulation fastening patterns for corner, perimeter, and field-of-roof locations.**
- C. **Samples for Verification:** For the following products:
 - 1. **Sheet roofing materials, of color specified for exposed material.**
 - 2. **1 quart of acrylic coating.**
 - 3. **Walkway material.**

1.5 INFORMATIONAL SUBMITTALS

- A. **Qualification Data:** For Installer, Manufacturer, and Roofing Inspector. Include letter from Manufacturer written for this Project indicating approval.
 - 1. **Include letter from Manufacturer written for this Project indicating approval of Installer.**
- B. **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.
- C. **Manufacturer Certificates:** Signed by roofing manufacturer certifying that built-up roofing complies with requirements specified in "Performance Requirements" Article.
 - 1. **Submit evidence of compliance with performance requirements, including UL listing certificate, roofing membrane system load/strain properties certification and energy performance for roofing systems identical to those proposed for this Project.**
 - 2. **Indicate that proposed system components are compatible.**
- D. **Product Test Reports:** Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for components of built-up roofing.
- E. **Warranties:** Unexecuted sample copies of special warranties.
- F. **Field Quality Reports:** Daily reports of Roofing Inspector. Include weather conditions, description of work performed, tests performed, defective work observed, and corrective actions taken to correct defective work.

1.6 CLOSEOUT SUBMITTALS

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

1.7 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 five years' experience installing similar work, able to communicate verbally with Contractor, Architect, and employees, and qualified by the manufacturer to furnish warranty of type specified.
- B. Manufacturer Qualifications: Approved manufacturer with UL listed and FM Approvals approved roofing systems comparable to those 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.
 - 1. Approval of Comparable Products: Submit the following in accordance with project substitution requirements, within time allowed for substitution review:
 - a. Product data, including certified independent test data indicating compliance with requirements.
 - b. Samples of each component.
 - c. Sample submittal from similar project.
 - d. Project references: Minimum of five installations of specified products not less than five years old, with Owner and Architect contact information.
 - e. Sample warranty.
 - 2. Substitutions following award of contract are not allowed except as stipulated in Division 01 General Requirements.
 - 3. Approved manufacturers must meet separate requirements of Submittals Article.
- 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, or manufacturer's subsidiary.
 - 2. Employed by a company registered with the California Department of Industrial Relations.

- D. Source Limitations: Obtain roofing system components from or approved in writing by roofing system manufacturer.
- E. Pre-installation Roofing Conference: Conduct conference at Project site.
 - 1. Meet with Owner, roofing Installer, roofing manufacturer's representative, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
 - 2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
 - 3. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - 4. Examine substrate conditions and finishes for compliance with requirements, including flatness and fastening.
 - 5. Review structural loading limitations of roof deck during and after roofing.
 - 6. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing.
 - 7. Review governing regulations and requirements for insurance and certificates if applicable.
 - 8. Review temporary protection requirements for roofing during and after installation.
 - 9. Review roof observation and repair procedures after roofing installation.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.
- B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing manufacturer. Protect stored liquid material from direct sunlight.
 - 1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.
- C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.
- D. Handle and store roofing materials and place equipment in a manner to avoid permanent deflection of deck.

1.9 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing to be installed according to manufacturer's written instructions and warranty requirements.
- B. 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.
 - 1. Provide tie-offs at end of each day's work to cover exposed roofing and insulation with a course of roofing sheet securely in place with joints and edges sealed.
 - 2. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing.
 - 3. Remove temporary plugs from roof drains at end of each day.
 - 4. Remove and discard temporary seals before beginning work on adjoining roofing.

1.10 WARRANTY

- A. Warranty, General: Warranties specified shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
- B. Manufacturer's Warranty: Manufacturer's standard or customized form in which manufacturer agrees to repair or replace components of built-up roofing that fail in materials or workmanship within specified warranty period. Failure includes roof leaks. Warranty for all projects covered under this scope must be provided by one manufacturer.
 - 1. Manufacturer's warranty includes roofing membrane, base flashings, fasteners, roofing membrane accessories and other components of roofing system specified in this Section.
 - 2. Warranty Period: 20 years from date of Substantial Completion.
- C. Installer's Warranty: Submit roofing Installer's warranty, on warranty form at end of this Section, signed by Installer, covering the Work of this Section and related Sections indicated above, including all components of built-up roofing such as built-up roofing membrane, base flashing, roof insulation, fasteners, cover boards, substrate boards, vapor retarders, roof pavers, and walkway products, for the following warranty period:
 - 1. Warranty Period: Two years from date of Substantial Completion.
- D. Extended Roof System Warranty: Warranties specified in this Section include the following components and systems specified in other sections supplied by the roofing system Manufacturer, and installed by the roofing system Installer:
 - 1. Sheet metal flashing and trim, including roof penetration flashings.

2. Manufactured copings, roof edge, counterflashings, and reglets.
 3. Roof curbs, hatches, and penetration flashings.
 4. Roof and parapet expansion joint assemblies.
- E. **Manufacturer Inspection and Preventive Maintenance Requirement:** By manufacturer's technical representative, to report maintenance responsibilities to Owner necessary for preservation of Owner's warranty rights. The cost of manufacturer's annual inspections and preventive maintenance is included in the Contract Sum. Inspections to occur in Years 2, 5, 10 and 15 following completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. **Basis of Design:** Materials, manufacturer's product designations, and/or manufacturer's names specified herein shall be regarded as the minimum standard of quality required for work of this Section. All products are also 'or equal'. Comply with all manufacturer and contractor/fabricator quality and performance criteria specified in Part 1 and performance requirements in Part 2.
- B. Any materials substituted must be done 7 days prior to bid to allow for all contractors to bid substituted product. All substitutions must be submitted to the City and must include product data sheets, warranty and submittal information highlighting comparability.

2.2 PERFORMANCE REQUIREMENTS

- A. **General Performance:** Roofing shall withstand exposure to weather without failure or leaks due to defective manufacture or installation.
1. **Accelerated Weathering:** Roofing system shall withstand 2000 hours of exposure when tested according to ASTM G 152, ASTM G 154, or ASTM G 155.
- B. **Material Compatibility:** Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by built-up roofing manufacturer based on testing and field experience.
- C. **Flashings and Fastening:** Comply with requirements of Division 07 Sections "Sheet Metal Flashing and Trim" and "Roof Specialties." Provide base flashings, perimeter flashings, detail flashings and component materials and installation techniques that comply with requirements and recommendations of the following:
1. NRCA Roofing Manual (Sixth Edition) for construction details and recommendations.
 2. SMACNA Architectural Sheet Metal Manual (Seventh Edition) for construction details.
- D. **Exterior Fire-Test Exposure:** ASTM E 108, Class A; for application and roof slopes indicated, as determined by testing identical membrane roofing materials by a qualified testing agency. Materials shall be identified with appropriate markings of applicable testing agency.

- E. Fire-Resistance Ratings: Where indicated, provide fire-resistance-rated roof assemblies identical to those of assemblies tested for fire resistance per ASTM E 119 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
- F. Solar Reflectance Index: Not less than 78 when calculated according to ASTM E 1980, based on testing identical products by a qualified testing agency.
- G. Energy Star Listing: Roofing system shall be listed on the DOE's ENERGY STAR "Roof Products Qualified Product List" for low-slope roof products.
- H. Energy Performance: Roofing system shall have an initial solar reflectance index of not less than 0.70 and an emissivity of not less than 0.75 when tested according to CRRC-1.

2.3 BASE-SHEET MATERIALS

- A. Sheathing Paper: Red-rosin type, minimum 3 lb/100 sq. ft. (0.16 kg/sq. m).
- B. Base Sheet: SBS-modified, asphalt-coated base sheet reinforced with a composite glass fiber mat / glass fiber scrim / polyester mat and dusted with fine mineral surfacing on both sides which meets the following properties:
 - 1. Burmastic Composite Ply HT Base Sheet.
 - 2. Tensile Strength at 77 deg. F (25 deg. C), minimum, ASTM D 5147: machine direction, 165 lbf/in; cross machine direction, 150 lbf/in.
 - 3. Tear Strength at 77 deg. F, minimum, ASTM D 5147: machine direction, 210 lbf; cross-machine direction, 185 lbf.
 - 4. Thickness, minimum, ASTM D 5147: 0.060 inch (1.5 mm).

2.4 ROOFING MEMBRANE PLY SHEETS

- A. Ply Sheet: ASTM D 2178, Type IV, asphalt-impregnated, glass-fiber felt, with the following properties:
 - 1. Thermglass IV ply sheet.
 - 2. Breaking Strength, minimum, ASTM D 146: machine direction, 44 lbf/in (10.5 kN/m); cross machine direction, 44 lbf/in (7.8 kN/m).
- B. Stripping/Target Ply Sheet: Non-woven, heat resistant, polyester sheet, with the following properties:
 - 1. Polytherm Stripping Ply.
 - 2. Breaking Load at 77 deg. F (25 deg. C), minimum, ASTM D 4830: machine direction, 150 lbf (667 N); cross-machine direction, 130 lbf (40.3 kN/m).
 - 3. Trapezoid Tearing Strength, minimum, ASTM D 4830: machine direction, 60 lbf (267 N); cross-machine direction, 60 lbf (1.7 kN).
 - 4. Elongation at 77 deg. F (25 deg. C), minimum, ASTM D 4830: machine direction, 30 percent; cross-machine direction, 30 percent.
 - 5. Thickness, minimum, ASTM D 1777: 0.035 inch (1.2 mm).

6. Weight, minimum, ASTM D 3776: 5.5 oz./sq. ft (1.4 kg/sq. m.).

2.5 ROOFING MEMBRANE CAP SHEETS

- A. Roofing Membrane Cap Sheet: ASTM D 6163, Grade G, Type I, glass-fiber-reinforced, SBS-modified asphalt sheet; granular surfaced; suitable for application method specified, and as follows:
 1. Powerply Standard FR.
 2. Exterior Fire-Test Exposure, ASTM E 108: Class A.
 3. Tensile Strength at 73 deg. F (23 deg. C), minimum, ASTM D 5147: machine direction 80.0 lbf/in (14.0 kN/m); cross machine direction 70.0 lbf/in (12.0 kN/m).
 4. Tear Strength at 73 deg. F (23 deg. C), minimum, ASTM D 5147: machine direction, 100 lbf (440 N); cross machine direction 100 lbf (440 N).
 5. Elongation at 73 deg. F (23 deg. C), minimum, ASTM D 5147: machine direction 7.5 percent; cross machine direction 7.5 percent.
 6. Low Temperature Flex, maximum, ASTM D 5147: -15 deg. F (-26 deg. C).
 7. Thickness, minimum, ASTM D 5147: 0.120 inch (3 mm).

2.6 BASE FLASHING SHEET MATERIALS

- A. Base Flashing Sheet: ASTM D 4434, Type IV, internally fabric reinforced, uniform, flexible TPA sheet, CRRC listed and California Title 24 Energy Code compliant.
 1. TPA Flashing Sheet.
 2. Tensile Strength at 0 deg. F (-18 deg. C), minimum, ASTM D 6509: 300 lbf/in (52 kN/m).
 3. Tear Strength at 77 deg. F (25 deg. C), minimum, ASTM D 6509: 100 lbf (0.44 kN).
 4. Elongation at 0 deg. F (-18 deg. C), minimum at fabric break, ASTM D 6509: machine direction, 25 percent; cross machine direction, 25 percent.
 5. Thickness: 45 mils, nominal.
 6. Exposed Face Color: White.
 7. Reflectance, ASTM C 1549: 86 percent.
 8. Thermal Emittance, ASTM C 1371: .86.
 9. Solar Reflectance Index (SRI), ASTM E 1980: 108
- B. Glass-Fiber Fabric: Woven glass-fiber cloth, treated with asphalt, complying with ASTM D 1668, Type I.
- B. Flashing Membrane Bonding Adhesive, Low VOC: Elastomeric, low-VOC solvent-based contact-type adhesive for bonding TPA fleece-backed single ply membranes and flashings to substrates.
 1. TPA LV Bonding Adhesive.
 2. Asbestos Content, EPA/600/R-93/116: None.

3. Density at 77 deg. F (25 deg. C), minimum, ASTM D 1475: 7.0 lb/gal (0.84 kg/L).
 4. Percent solids: 25 percent minimum.
 5. VOC, maximum, ASTM D 3960: 200 g/L.
- C. Water-Based Asphalt Primer: Water-based, polymer modified, asphalt primer with the following physical properties:
1. Tremprime WB.
 2. Asbestos Content, EPA 600/R13/116: None.
 3. Non-Volatile Content, minimum, ASTM D 2823: 30 percent.
 4. Volatile Organic Compounds (VOC), maximum, ASTM D 3960: 2 g/L.
- D. Asphalt Roofing Mastic: ASTM D 4586, Type II, Class 1, one-part, asbestos-free, cold-applied mastic specially formulated for compatibility and use with specified roofing membranes and flashings, with the following properties:
1. ELS.
 2. Asbestos Content, ASTM D 276: None.
 3. Volatile Organic Compounds (VOC), maximum, ASTM D 6511: 234 g/L.
 4. Nonvolatile Matter, minimum, ASTM D 4586: 85 percent.
 5. Density at 77 deg. F (25 deg. C), ASTM D 1475: 9.5 lb/gal (1.15 kg/L).
 6. Resistance to Sag, maximum, ASTM D 4586: 1/8 inch (3.1 mm).
 7. Viscosity at 77 deg. F (25 deg. C), ASTM D 2196: 480,000 to 1,000,000 cP (480 to 1,000 Pa*s).
 8. Moisture Vapor Transmission, ASTM E 398: 0.25 g/100 sq. in./24 hr at 0.020 in. thickness, average.
- E. Flashing Sheet Stripping Adhesive: One-part, white, highly reflective polymeric, surfacing adhesive, CRRC listed and California Title 24 Energy Code compliant when combined with selected white marble aggregate, with following physical properties:
1. Rock-It Adhesive.
 2. Asbestos Content, EPA 600 R-93/116: None.
 3. Volatile Organic Compounds (VOC), maximum, ASTM D 6511: 250 g/L.
 4. Nonvolatile Matter, minimum ASTM D 6511: 54 percent.
 5. Flash Point, minimum, ASTM D 93: 120 deg. F (49 deg. C).
 6. Reflectance (adhesive plus aggregate), ASTM C 1549: 71 percent.
 7. Thermal emittance (adhesive plus aggregate), ASTM C 1371: 0.85.
- F. Solvent-Free Elastomeric Roofing Mastic: One-part, solvent-free, asbestos-free, low-odor elastomeric roof mastic specially formulated for compatibility and use with specified roofing membranes and flashings, with the following properties:

1. Tremco, Polyroof SF.
 2. Asbestos Content, EPA 600/R13/116: None.
 3. Nonvolatile Matter, minimum, ASTM D 4586: 70 percent.
 4. Elongation at 77 deg. F (25 deg. C), minimum, ASTM D 412: 1000 percent.
 5. Recovery from 500 percent Elongation, minimum, ASTM D 412: 500 percent.
 6. Flexibility at -40 deg. F (-40 deg. C), ASTM D 3111: No cracking.
- G. TF Tape: manufacturer's term bar sealant.
- H. General purpose sealant: Solvent free, low odor urethane sealant.
1. Tremseal Pitch Pocket Sealer.
- I. Urethane sealant: manufacturer's gun grade, moisture cured, one component polyurethane sealant.
1. Tremseal Pro.
 2. Hardness (Shore A), ASTM C 920-02: 40.
 3. Bond Durability, ASTM C 920-02: Pass.
 4. Stain and Color Change, ASTM C 920-02: None.
 5. Accelerated Weathering, ASTM C 920-02: Pass.
 6. VOC, ASTM D 3960-02: 85 g/L.
- J. Silicone sealant: manufacturer's low modulus, high performance, one part moisture curing silicone joint sealant.
1. Tremseal S.
 2. Tensile Strength at maximum elongation, ASTM D 412-87: 200 psi.
 3. Tear Resistance (Die C), ASTM D 624-86: 40 pli.
 4. Stain and Color Change, ASTM C 510-77: None.
 5. UV Resistance, ASTM C794-80: Excellent.
 6. VOC, ASTM D 3960-02:0 g/L (less water, less exempt solvent)
- K. Urethane Sealant Primer: One part, resin-based primer formulated to prepare concrete and masonry surfaces for the application of urethane sealants, with the following physical properties:
1. Primer #1.
 2. Non-Volatile Content, minimum, ASTM D 2369: 30 percent.
 3. Flash Point, minimum, ASTM D 93: 80 deg. F (27 deg. C).
 4. Volatile Organic Compounds (VOC), maximum, ASTM D 3960: 670 g/L.
 5. Density at 77 deg. F (25 deg. C), minimum, ASTM D 1875: 8.25 lb/gal (988 g/L).

2.7 ASPHALT MATERIALS

- A. General: Adhesive and sealant materials recommended by roofing system manufacturer for intended use and compatible with roofing membrane.
 - 1. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.

- B. Insulation Adhesive: ASTM D 312, Type IV, hot-melt asphalt.
 - 1. Premium IV asphalt.

- A. Hot Applied Ply and Hot Applied Stripping Ply Adhesive: ASTM D 312, Type IV, hot-melt asphalt, with the following physical properties:
 - 1. Premium IV Asphalt.
 - 2. Softening Point, min/max, ASTM D 36: 215-225 deg. F (102-107 deg. C).
 - 3. Penetration at 77 deg. F (25 deg. C), min/max, ASTM D 5: 15-30 dmm.
 - 4. Flash point, minimum, ASTM D 92: 525 deg. F (274 deg. C).
 - 5. Ductility at 77 deg. F (25 deg. C), minimum, ASTM D 113: 2.5 cm.

- B. Cap Sheet Adhesive: One-part, asbestos-free, low-volatile, cold-applied adhesive specially formulated for compatibility and use with specified roofing membranes and flashings, with the following physical properties:
 - 1. Powerply Standard Cold Adhesive LV.
 - 2. Asbestos Content, EPA 600 R-93/116: None.
 - 3. Volatile Organic Compounds (VOC), maximum, ASTM D 6511: <250 g/L.
 - 4. Nonvolatile Content, minimum, ASTM D 6511: 75 percent.
 - 5. Flash Point, minimum, ASTM D 93: 100 deg. F (38 deg. C).
 - 6. Density at 77 deg. F (25 deg. C), ASTM D 6511: 8.0 lb/gal (950 g/L).
 - 7. Uniformity and Consistency, ASTM D 6511: Pass.
 - 8. Asphalt Content, minimum, ASTM D 6511: 40 percent.

2.8 AUXILIARY BUILT-UP ROOFING MATERIALS

- A. General: Auxiliary materials recommended by roofing manufacturer for intended use and compatible with built-up roofing.
 - 1. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.

2. Adhesives and sealants that are not on the exterior side of weather barrier shall comply with the testing and product requirements of the California Department of Public Health's (formerly, the California Department of Health Services') "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- B. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required by roofing manufacturer for application.
 - C. Mastic Sealant: Polyisobutylene, plain or modified bitumen, nonhardening, nonmigrating, nonskinning, and nondrying.
 - D. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening built-up roofing components to substrate, tested by manufacturer for required pullout strength, and acceptable to roofing manufacturer.
 - E. Miscellaneous Accessories: Provide miscellaneous accessories recommended by built-up roofing manufacturer.
- 2.9 ROOF INSULATION
- A. General: Preformed roof insulation boards manufactured or approved by roofing manufacturer, selected from manufacturer's standard sizes suitable for application, of thicknesses indicated
 - C. Polyisocyanurate Board Insulation: ASTM C 1289, Type II, Class 1, Grade 2, HCFC-free with felt or glass-fiber mat facer on both major surfaces.
 1. Thickness: Match existing thicknesses. No individual piece greater than 3 inches.
 - B. Wood Fiber Cover board: ASTM C208, Type II, Grade 2, Cellulosic-fiber and water resistant binders, asphalt coated on all six sides and chemically treated for deterioration.
 1. Thickness: ½"
 - C. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes for sloping to drain and at transitions. Include on the high side of all curbs.
 1. 1/4:12 inch slope min.
 2. Polyisocyanurate cricket material.
 - D. Cricket System Cover board:
 1. ½ inch wood fiber board.
 - E. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.

2.10 INSULATION ACCESSORIES

- A. General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatible with built-up roofing.
- B. Fasteners: Factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provisions in FM Approvals 4470, designed for fastening roof insulation to substrate and acceptable to roofing manufacturer.
- C. Insulation Adhesive:
 - 1. Premium IV asphalt.
- D. Insulation Cant Strips: ASTM C 208, Type II, Grade 1, cellulosic-fiber insulation board.
- E. Wood Cant Strips: Comply with requirements in Division 06 carpentry section
- F. Tapered Edge Strips: ASTM C 208, Type II, Grade 1, cellulosic-fiber insulation board.
- G. Substrate Joint Tape: 6- or 8-inch- (150- or 200-mm-) wide, coated, glass fiber.

2.1 MODIFIED BITUMEN CAP SHEET COATING

- A. White Roof Coating Primer:
 - 1. Tremco SP Primer
- B. White Roof Coating: Elastomeric acrylic roof coating.
 - 1. Solar Guard 6083 Base and Finish Coat.

2.2 WALKWAYS

- A. Walkway Pads: Mineral-granule-surfaced, reinforced asphaltic composition, slip-resisting pads, manufactured as a traffic pad for foot traffic and acceptable to roofing system manufacturer, 1/2 inch thick, minimum, with the following physical properties:
 - 1. Trem-Tred.
 - 2. Flexural Strength at max. load, minimum, ASTM C 203: 218 psi (1.5 kPa).
 - 3. Granule adhesion (weight loss), maximum, ASTM D 4977: 1.1 gram.
 - 4. Impact Resistance at 77 deg. F (25 deg. C), ASTM D 3746: No Damage to Roof.
- B. Rubber Blocks: 100% rubber blocks with steel channels and reflective strips designed for supporting conduit.
 - 1. Dura-Blok or equal.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with the following requirements and other conditions affecting performance of roofing system:
 - 1. Verify that roof openings and penetrations are in place and curbs are set and braced and that roof drain bodies are securely clamped in place.
 - 2. Verify that, blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.
 - 3. Steel Roof Deck:
 - a. Verify that deck is securely fastened with no projecting fasteners and with no adjacent units in excess of 1/16 inch (1.6 mm) out of plane relative to adjoining deck.
 - 4. Wood Roof Deck: Verify that wood deck is securely fastened with no projecting fasteners and with no adjacent units in excess of 1/16 inch (1.6 mm) out of plane relative to adjoining deck.
 - 5. Verify that existing substrate is sound and dry.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing manufacturer's written instructions. Remove sharp projections.
- B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.

3.3 INSTALLATION, GENERAL

- A. Install roofing system in accordance with manufacturer's recommendations.
- B. Install wood cants, blocking, curbs, and nailers in accordance with requirements of Division 06 carpentry section.
- C. Install roofing membrane, base flashings, wood cants, blocking, curbs, and nailers, and component materials in compliance with requirements in FMG 4470 as part of a membrane roofing system as listed in FMG's "Approval Guide" for fire/windstorm classification indicated. Comply with recommendations in FMG Loss Prevention Data Sheet 1-49.
- D. Install roofing system in accordance with the following NRCA Manual Plates and NRCA recommendations; modify as required to comply with requirements of FMG references above:
 - 1. Metal Parapet Cap (Coping) and Base Flashing: Plates BUR-1 and BUR-1S.

2. Surface-Mounted Counterflashing for Concrete Walls (at Parapet Wall): Plates BUR-4 and BUR-4S.
3. Base Flashing for Wall-supported Deck: Plates BUR-5 and BUR-5S.
4. Base and Surface-mounted Counterflashing: Plates BUR-4 and BUR-4S.
5. Raised Perimeter Edge with Metal Flashing (Fascia Cap): Plates BUR-2 and BUR-2S.
6. Embedded Edge Metal Flashing Edge (Gravel-stop): Plates BUR-3 and BUR-3S.
7. Scupper Through Raised Perimeter Edge: Plates BUR-21 and BUR-21S.
8. Gutter at Draining Edge: Plates BUR-22 and BUR-22S.
9. Expansion Joint with Metal Cover: Plates BUR-7 and BUR-7S and Division 07 Section "Sheet Metal Flashing and Trim."
10. Expansion Joint with Premanufactured Cover: Plates BUR-7A and BUR-7AS and Division 07 Section "Roof Expansion Assemblies."
11. Equipment Support Curb: Plates BUR-9 and BUR-9S.
12. Equipment Support Stand: Plates BUR-10.
13. Equipment Support Stand and Typical Rain Collar Penetration Detail: Plates BUR-11 and BUR-11S.
14. Raised Curb Detail at Rooftop HVAC Units, Premanufactured: Plates BUR-12 and BUR-12S and Division 7 Section "Roof Accessories."
15. Raised Curb Detail at Rooftop HVAC Units (Job site constructed wood curb): Plates BUR-13 and BUR-13S and Division 06 Section "Miscellaneous Rough Carpentry."
16. Skylight, Scuttle (Roof Hatch), and Smoke Vents: Plates BUR-14 and BUR-14S and Division 07 Section "Roof Accessories."
17. Penetration, Structural Member through Roof Deck: Plates BUR-15 and BUR-15S.
18. Penetration, Sheet Metal Enclosure for Piping Through Roof Deck: Plates BUR-16 and BUR-16S
19. Penetration, Isolated Stack Flashing: Plates BUR-17 and BUR-17S.
20. Penetration, Isolated Stack Flashing: Plates BUR-17A and BUR-17AS.
21. Penetration, Plumbing Vent: Plates BUR-18 and BUR-18S.
22. Roof Drain: Plates BUR-20 and BUR-20S.
23. Roof Drain: Plates BUR-20A and BUR-20AS.

- 24. Guide for Clearances between Pipes / Walls / Curbs - Table 4
- 25. Guide for Crickets and Saddles - Table 5
- 26. Guide for Edge Scuppers with Tapered Saddles - Table 6

3.4 INSULATION INSTALLATION

- A. Comply with built-up roofing manufacturer's written instructions for installing roof insulation.
- B. Cant Strips: Install and secure preformed 45-degree cant strips at junctures of built-up roofing with vertical surfaces or angle changes greater than 45 degrees.
- C. Install tapered insulation under area of roofing to conform to slopes indicated.
- D. Install insulation with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4 inch (6 mm) with insulation.
 - 1. Cut and fit insulation within 1/4 inch (6 mm) of nailers, projections, and penetrations.
- E. Install insulation under area of roofing to achieve required thickness. Where overall insulation thickness is 2.7 inches (68 mm) or greater, install two or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches (150 mm) in each direction.
 - 1. Install insulation matching the existing thicknesses.
- F. Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water.
- G. Install tapered edge strips at perimeter edges of roof that do not terminate at vertical surfaces.
- H. Mechanically Fastened and Adhered Insulation: Install first layer of insulation to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.
 - 1. Fasten first layer of insulation according to requirements in FM Global's "RoofNav" for specified Windstorm Resistance Classification.
 - 2. Fasten first layer of insulation to resist uplift pressure at corners, perimeter, and field of roof.
 - 3. Set each subsequent layer of insulation in a solid mopping of hot roofing asphalt, applied within plus or minus 25 deg F (14 deg C) of equiviscous temperature.
- I. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Offset joints of insulation below a minimum of 6 inches (150 mm) in each direction. Loosely butt cover boards together. Tape joints if required by roofing manufacturer.
 - 1. Apply hot roofing asphalt to substrate and immediately bond cover board to substrate.

3.5 HOT-APPLIED BUILT-UP ROOFING INSTALLATION, GENERAL

- A. Install roofing membrane according to roofing manufacturer's written instructions and applicable recommendations of ARMA/NRCA's "Quality Control Guidelines for the Application of Built-up Roofing" and as follows:
 - 1. Location: Avaxat Elementary School and Rail Ranch Elementary School – Identified Sections
 - 2. Deck Type: Wood deck
 - 3. Base Sheet: One, installed over sheathing paper.
 - a. Attachment Method: Mechanically-fastened.
 - 4. Number of Asphalt Ply Sheets: Two.
 - a. Adhering Method: Mopped.
 - 5. Surfacing Type: Cap Sheet.
- B. Install roofing membrane according to roofing manufacturer's written instructions and applicable recommendations of ARMA/NRCA's "Quality Control Guidelines for the Application of Built-up Roofing" and as follows:
 - 1. Location: Vista Murrieta High School – Identified Sections
 - 2. Deck Type: Metal deck
 - 3. Insulation: Polyisocyanurate with Wood Fiber Coverboard.
 - a. Thickness: Match Existing
 - b. First Layer Attachment Method: Mechanically-fastened.
 - c. Succeeding Layers Adhering Method: Mopped
 - 4. Base Sheet: One.
 - a. Adhering Method: Mopped.
 - 5. Number of Asphalt Ply Sheets: Two.
 - a. Adhering Method: Mopped.
 - 6. Surfacing Type: Cap Sheet.
- C. Start installation of built-up roofing in presence of manufacturer's technical personnel.
- D. Cooperate with testing agencies and personnel engaged or required to perform services for installing roofing.

- E. Coordinate installation of roofing system so insulation and other components of the roofing membrane system not permanently exposed are not subjected to precipitation or left uncovered at the end of the workday or when rain is forecast.
 - 1. Provide tie-offs at end of each day's work configured as recommended by NRCA Roofing Manual Appendix: Quality Control Guidelines - Insulation to protect new.
 - 2. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing.
 - 3. Remove temporary plugs from roof drains at end of each day.
 - 4. Remove and discard temporary seals before beginning work on adjoining roofing.
- F. Hot Roofing Asphalt Heating: Heat asphalt to its equiviscous temperature, measured at the mop cart or mechanical spreader immediately before application. Circulate asphalt during heating. Do not raise asphalt temperature above equiviscous temperature range more than one hour before time of application. Do not exceed asphalt manufacturer's recommended temperature limits during asphalt heating. Do not heat asphalt within 25 deg F of flash point. Discard asphalt maintained at a temperature exceeding finished blowing temperature for more than four hours.
 - 1. Apply hot roofing asphalt within plus or minus 25 deg F of equiviscous temperature and adhere components to asphalt heated to not less than 425 deg F.
- G. Hot Roofing Asphalt Heating, SEBS-Modified Asphalt: Heat and apply SEBS-modified elastomeric roofing asphalt according to roofing system manufacturer's written instructions.
- H. Substrate-Joint Penetrations: Prevent roofing asphalt and adhesives from penetrating substrate joints, entering building, or damaging built-up roofing components or adjacent building construction.

3.6 ROOFING MEMBRANE INSTALLATION

- A. Loosely lay one course of, lapping edges and ends a minimum of sheathing paper 2 inches (50 mm) and 6 inches (150 mm), respectively.
- B. Install lapped base sheet course, extending sheet over and terminating beyond cants. Attach base sheet as follows:
 - 1. Mechanically fasten to wood decks.
 - 2. Adhere to substrate in a solid mopping of hot roofing asphalt over installed insulation on metal decks.
- C. Install ply sheets starting at low point of roofing. Align ply sheets without stretching. Shingle side laps of ply sheets uniformly to achieve required number of plies throughout thickness of roofing membrane. Shingle in direction to shed water. Extend ply sheets over and terminate beyond cants.
 - 1. Embed each ply sheet in a solid mopping of hot roofing asphalt applied at rate required by roofing manufacturer, to form a uniform membrane without ply sheets touching.

3.7 SBS-MODIFIED BITUMINOUS MEMBRANE INSTALLATION

- A. Install modified bituminous roofing membrane cap sheet according to roofing manufacturer's written instructions, starting at low point of roofing system. Extend roofing membrane sheets over and terminate beyond cants, installing as follows:
 - 1. Unroll roofing membrane sheets and allow them to relax for minimum time period required by manufacturer.
 - 2. Embed each ply sheet in cold-applied membrane adhesive applied at rate required by roofing manufacturer.
- B. Laps: Accurately align roofing membrane sheets, without stretching, and maintain uniform side and end laps. Stagger end laps. Install roofing membrane sheets so side and end laps shed water. Completely bond and seal laps, leaving no voids.
 - 1. Repair tears and voids in laps and lapped seams not completely sealed.
 - 2. Apply roofing granules to cover exuded bead at laps.

3.8 FLASHING AND STRIPPING INSTALLATION

- A. Install base flashing over cant strips and other sloping and vertical surfaces, at roof edges, and at penetrations through roof, and secure to substrates according to built-up roofing manufacturer's written instructions and as follows:
 - 1. Prime substrates with primer if required by built-up roofing manufacturer.
 - 2. Flashing Sheet Application: Adhere flashing sheet to substrate in cold-applied adhesive at rate required by roofing manufacturer.
- B. Extend base flashing up walls or parapets a minimum of 12 inches (300 mm) above built-up roofing and 6 inches (150 mm) onto field of built-up roofing.
- C. Mechanically fasten top of base flashing securely at terminations and perimeter of roofing.
 - 1. Seal top termination of base flashing with a metal termination bar.
- D. Install stripping, according to roofing manufacturer's written instructions, where metal flanges and edgings are set on built-up roofing.
 - 1. Flashing-Sheet Stripping: Install flashing-sheet stripping in a solid moping of hot asphalt and extend onto roofing membrane.
- E. Roof Drains: Set [30-by-30-inch (760-by-760-mm)] metal flashing in bed of asphalt roofing cement on completed built-up roofing. Cover metal flashing with built-up roofing cap-sheet stripping and extend a minimum of 6 inches (150 mm) beyond edge of metal flashing onto field of built-up roofing. Clamp built-up roofing, metal flashing, and stripping into roof-drain clamping ring.
 - 1. Install flashing sheet stripping according to roofing manufacturer's written instructions.

3.9 COATING INSTALLATION

- A. Apply acrylic coating to roofing membrane cap sheet according to manufacturer's written instructions, by spray, roller, or other suitable application method to provide a total coverage rate of 3 gallons per 100 sq.ft.

3.10 WALKWAY AND RUBBER BLOCKING INSTALLATION

- A. Walkway Pads: Install walkway pads using units of size indicated or, if not indicated, of manufacturer's standard size according to walkway pad manufacturer's written instructions.
 - 1. Set walkway pads in. cold-applied adhesive
- B. Pipe Supports: Replace all existing pipe supports at spacing required by manufacturer.

3.11 FIELD QUALITY CONTROL

- A. Roofing Inspector: Owner will engage a qualified roofing inspector to perform roof tests and inspections and to prepare test reports.
- B. Roofing Inspector: Contractor shall engage a qualified roofing inspector for a minimum of 20 full-time days on site 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 ARMA/NRCA's "Quality Control Guidelines for the Application of Built-up Roofing."
- C. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation at commencement and upon completion.
 - 1. Notify Architect and Owner 48 hours in advance of date and time of inspection.
- D. Repair or remove and replace components of built-up roofing where test results or inspections indicate that they do not comply with specified requirements.
 - 1. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.12 PROTECTING AND CLEANING

- A. Protect built-up roofing from damage and wear during remainder of construction period. When remaining construction will not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.
- B. Correct deficiencies in or remove built-up roofing that does not comply with requirements, repair substrates, and repair or reinstall roofing to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.
- C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

3.13 ROOFING INSTALLER'S WARRANTY

- A. WHEREAS _____ of _____, herein called the "Roofing Installer," has performed roofing and associated work ("work") on the following project:
1. Owner:
 2. Address:
 3. Building Name/Type:
 4. Address:
 5. Area of Work:
 6. Acceptance Date:
 7. Warranty Period:
 8. Expiration Date:
- B. AND WHEREAS Roofing Installer has contracted (either directly with Owner or indirectly as a subcontractor) to warrant said work against leaks and faulty or defective materials and workmanship for designated Warranty Period,
- C. NOW THEREFORE Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period he will, at his own cost and expense, make or cause to be made such repairs to or replacements of said work as are necessary to correct faulty and defective work and as are necessary to maintain said work in a watertight condition.
- D. This Warranty is made subject to the following terms and conditions:
1. Specifically excluded from this Warranty are damages to work and other parts of the building, and to building contents, caused by:
 - a. lightning;
 - b. peak gust wind speed exceeding 74 mph (33 m/s);
 - c. fire;
 - d. failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;
 - e. faulty construction of parapet walls, copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of the work;
 - f. vapor condensation on bottom of roofing; and

- g. activity on roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner.
2. When work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Roofing Installer and until cost and expense thereof have been paid by Owner or by another responsible party so designated.
3. Roofing Installer is responsible for damage to work covered by this Warranty but is not liable for consequential damages to building or building contents resulting from leaks or faults or defects of work.
4. During Warranty Period, if Owner allows alteration of work by anyone other than Roofing Installer, including cutting, patching, and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty shall become null and void on date of said alterations, but only to the extent said alterations affect work covered by this Warranty. If Owner engages Roofing Installer to perform said alterations, Warranty shall not become null and void unless Roofing Installer, before starting said work, shall have notified Owner in writing, showing reasonable cause for claim, that said alterations would likely damage or deteriorate work, thereby reasonably justifying a limitation or termination of this Warranty.
5. During Warranty Period, if original use of roof is changed and it becomes used for, but was not originally specified for, a promenade, work deck, spray-cooled surface, flooded basin, or other use or service more severe than originally specified, this Warranty shall become null and void on date of said change, but only to the extent said change affects work covered by this Warranty.
6. Owner shall promptly notify Roofing Installer of observed, known, or suspected leaks, defects, or deterioration and shall afford reasonable opportunity for Roofing Installer to inspect work and to examine evidence of such leaks, defects, or deterioration.
7. This Warranty is recognized to be the only warranty of Roofing Installer on said work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Installer of responsibility for performance of original work according to requirements of the Contract Documents, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's General Contractor.

E. IN WITNESS THEREOF, this instrument has been duly executed by:

1. Authorized Signature:
2. Name:
3. Date:

END OF SECTION 075113.11

DIVISION 07 - THERMAL AND MOISTURE PROTECTION

070150.71 Rehabilitation of Metal Roofing

SECTION 070150.71 - REHABILITATION OF METAL ROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Roof coating preparation including rehabilitation of metal roof panel joints, fasteners, and flashing, and cleaning preparation for coating.
 - 2. Application of coating on metal roofing.

1.3 DEFINITIONS

- A. Roofing Terminology: Refer to glossary in NRCA's "The NRCA Roofing and Waterproofing Manual" for definition of terms related to roofing work in this Section.
- B. Existing Roofing System: Metal roofing, and components and accessories between deck and metal roofing.
- C. Roofing Coating Preparation: Existing roofing that is to remain and be prepared to accept restorative coating application.
- D. Patching: Removal of a portion of existing metal roofing system from deck or removal of selected components and accessories from existing metal roofing system and replacement with similar materials.
- E. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and reinstalled.
- F. Existing to Remain: Existing items of construction that are not indicated to be removed.
- G. Manufacturer/Roofing Manufacturer: Manufacturer of roofing rehabilitation products, unless otherwise indicated.

1.4 ROOFING CONFERENCES

- A. Roofing Rehabilitation Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." Review methods and procedures related to roofing system.

1. Meet with Owner; roofing coating materials manufacturer's representative; roofing coating 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 methods and procedures related to coating preparation, including metal roofing coating system manufacturer's written instructions.
3. Review temporary protection requirements for existing roofing system that is to remain uncoated, during and after installation.
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 shutdown of fire-suppression, -protection, and -alarm and -detection systems.
8. Review governing regulations and requirements for insurance and certificates if applicable.
9. Review existing conditions that may require notification of Owner before proceeding.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product specified.
 1. Indicate CRRC Compliance.
 2. Indicate Energy Star compliance.
- B. Sustainable Design Submittals:
 1. Product Test Reports: For roof coating, indicating that coated roof will comply with solar reflectance index requirement. Document that scope of coating meets minimum of 75 percent of building roof surface.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Manufacturer Certificates: Signed by roofing manufacturer certifying that roofing system complies with requirements specified in "Performance Requirements" Article.
 1. Indicate that proposed system components are compatible.
- C. 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.

- D. Warranties: Unexecuted sample copies of special warranties.
- E. Inspection Reports: Daily reports of Roofing Inspector. Include weather conditions, description of work performed, tests performed, defective work observed, and corrective actions required and carried out.

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 five years' experience installing products comparable to those specified, able to communicate verbally with Contractor, Architect, and employees, and the following:
 - 1. Installer shall acquire six (6) inspection service days from manufacturer.
 - 2. Qualified by the manufacturer to install manufacturer's product and furnish warranty of type specified.
- B. Manufacturer Qualifications: Approved manufacturer with UL listed roofing systems comparable to those 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.

1.9 PROJECT 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 between 60 and 90 deg. F.
 - 2. Apply coatings within range of ambient and substrate temperatures recommended by manufacturer. Do not apply materials when air temperature is below 50 or above 110 deg. F.
 - 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 for Roof Rehabilitation:** Written warranty in which Manufacturer agrees to repair roof rehabilitation installations that fail due to defects in rehabilitation materials or workmanship within specified warranty period. Warranty for all projects covered under this scope must be provided by one manufacturer.
 - 1. Failures include, but are not limited to, the following:
 - a. Rehabilitated membrane failures including rupturing or cracking due to a manufacturing defect.
 - b. Deterioration of applied rehabilitation materials beyond normal weathering.
 - 2. **Limit of Warranty Coverage for Repair of Roof Rehabilitation:** Not to exceed original purchase price of manufacturer's recoating materials, except that manufacturer may elect to apply the limit amount toward the following:
 - a. Purchase of a new replacement roof within the first five years following completion of rehabilitation work.
 - 3. **Qualified Installer Warranty Requirement:** Installer must meet requirements of Quality Assurance Article.
 - 4. **Installation Inspection Warranty Requirement:** By Roofing Inspector in accordance with requirements of Part 3 Field Quality Control Article.
 - 5. **Warranty Period:** 10years from date of completion of rehabilitation work.
- B. **Installer's Warranty:** Submit roofing Installer's warranty, on warranty form acceptable to Owner, signed by Installer, covering the Work of this Section, for the following warranty period:
 - 1. **Warranty Period:** Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. **Basis-of-Design Manufacturer/Product:** The roof system specified in this Section is based upon products of Tremco, Inc., Beachwood, OH, (800) 562-2728, www.tremcoroofing.com that are named in other Part 2 articles. Provide specified products.
1. **Contact:** Ryan Tolsma (714) 335-4739
- 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:** Provide coated metal roofing system that remains weathertight; does not permit the passage of water; and resists specified uplift pressures, thermally induced movement, and exposure to weather without failure.
- 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. **Energy Performance:** Provide roof panels with initial solar reflectance not less than 0.70 and emissivity not less than 0.75 when tested according to CRRC-1.

2.3 MATERIALS, GENERAL

- A. **General:** Rehabilitation materials recommended by roof coating manufacturer for intended use and compatible with components of existing metal roofing system.

2.4 METAL COATING MATERIALS

- A. **Metal Rehabilitation Coating:**
1. **Acrylic Roof Coating, Highly-Reflective Elastomeric:** ASTM D 6083, applied as base coat plus finish coat over prepared and primed roof surfaces.
 - a. **Basis of design product:** Tremco, Solargard 6083 Base and Top Coat.
 - b. **Solar Reflectance Index (SRI), white, ASTM E 1980:** 105 initial; 100 aged.
 - c. **Volatile Organic Compounds (VOC), maximum, ASTM D 3960:** Less than 50 g/L.
 - d. **Tensile Strength at 73 deg. F (23 deg. C), minimum, ASTM D 2370:** Not less than 250 psi (1700 kPa).
 - e. **Elongation at 73 deg. F (23 deg. C), minimum, ASTM D 2370:** Not less than 350 percent.
 - f. **Flexibility at -15 deg F (-26 deg C), ASTM D 522:** Pass 1/2 inch mandrel after 1000 hrs. accelerated weathering.

- g. Solids by weight, ASTM D 1644: Not less than 60 percent.
- h. Solids by volume, ASTM D 2697: Not less than 50 percent.
- i. Color, Base Coat: Off-White.
- j. Color, Top Coat: White.
- k. Solar Reflectance Index (SRI), Top Coat, ASTM E 1980: 105 initial; 100 aged.

B. Metal Primer:

- 1. Acrylic corrosion-resistant primer formulated for use with acrylic emulsion metal coatings.
 - a. Basis of design product: Tremco, Solargard Rust Primer WB.
 - b. Volatile Organic Compounds (VOC), maximum, ASTM D 3960: 3 g/L.
 - c. Solids, by weight: 50 percent.

2.5 AUXILIARY 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 Mastic: Waterproof seam and fastener patching material.

- 1. Acrylic Patching and Seam Sealer: White, single-component high solids acrylic sealant, low-VOC, formulated for compatibility and use with specified roofing and wall substrates..
 - a. Basis of design product: Tremco, SOLARGARD Acrylic Sealer.
 - b. Volatile Organic Compounds (VOC), maximum, ASTM D 3960: 50 g/L.
 - c. Tensile Strength, ASTM D 412: 500 psi.
 - d. Hardness, Shore A: 45.
 - e. Elongation, ASTM D 412: 260 percent.
 - f. Impact Resistance: 160 in/lb.

C. Joint Sealant: Elastomeric joint sealant compatible with applied coating, with movement capability appropriate for application.

- 1. Joint Sealant, Polyurethane: ASTM C 920, Type S, Grade NS, Class 25 single-component moisture curing sealant, formulated for compatibility and use in dynamic and static joints..
 - a. Basis of design product: Tremco, TremSEAL D.

- b. Volatile Organic Compounds (VOC), maximum, ASTM D 3960: 85 g/L.
 - c. Hardness, Shore A, ASTM C 661: 40.
 - d. Color: White.
- D. Fasteners: Factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provisions in FM 4470; designed for fastening metal roofing components to substrate; tested by fastener manufacturer for required pullout strength; and acceptable to roofing system manufacturer.
- E. Metal Flashing Sheet: Provide metal flashing sheet matching type, thickness, finish, and profile of existing metal flashing and trim.

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 metal roofing is free of rust affecting structural integrity of roofing, or other indications of impending metal roof system failure.
 - 5. Application of coatings indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Protect existing roofing system that is indicated not to be coated, and adjacent portions of building and building equipment.
- 1. Maintain temporary protection and leave in place until roofing rehabilitation 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 rehabilitation 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.

1. Do not permit water to enter into or under existing metal roofing system components that are to remain.

3.3 ROOFING COATING PREPARATION

A. Metal Roofing Surface Preparation:

1. Remove ridges, buckles, failed or loose roofing fasteners, and other substrate irregularities from existing metal roofing that would inhibit application of uniform, weathertight coating.
2. Remove existing sealant from fasteners and replace with primer and an application of SolarGuard Acrylic Sealer.
3. Repair metal roofing at locations where irregularities have been removed.
4. Provide replacement fasteners where required.
5. Provide additional fasteners where required to meet performance requirements.
6. Clean substrate of contaminants such as dirt, debris, oil, and grease that can affect adhesion of coating by power washing at minimum 2000 psi. Remove existing coatings if any. Allow to dry thoroughly.
7. Verify that existing substrate is dry before proceeding with application of coating.
8. Perform adhesion testing before proceeding with application of coating.

3.4 FLASHING REPAIR

- A. Repair flashings, 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.

3.5 ROOF COATING APPLICATION

- A. Primer: Spot prime cleaned rusted or bare areas with metal primer at manufacturer's recommended application rate and allow to dry.
- B. Coating: Acrylic Emulsion: Apply number of coats and thickness of coats recommended in writing by manufacturer for application. Apply minimum of two coats.
- C. Joint Sealant: Apply joint sealant at exposed movement joints, terminations, and where required for complete weathertight application.

3.6 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 070150.71

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SECTION 07 01 50.73A – REHABILITATION OF MODIFIED BITUMINOUS MEMBRANE ROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Roof re-coating preparation.
2. Application of fluid-applied roof membrane and flashings over existing modified bituminous membrane roofing.

1.2 ROOFING CONFERENCES

A. Roofing Rehabilitation Pre-installation Conference: Conduct conference at Project site. Review methods and procedures related to roofing system.

1. Meet with Owner; roofing re-coating materials manufacturer's representative; roofing re-coating Installer including project manager and foreman; and installers whose work interfaces with or affects re-coating.
2. Review methods and procedures related to re-coating preparation, including membrane roofing system manufacturer's written instructions.
3. Review temporary protection requirements for existing roofing system that is to remain, during and after installation.
4. Review roof drainage during each stage of re-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 re-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 D 1079 and glossary in NRCA's "The NRCA Roofing Manual" for definition of terms related to roofing work in this Section.
- B. Roofing Re-Coating Preparation: Existing roofing that is to remain and be prepared to accept restorative coating application.

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- 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. Indicate CRRC Compliance.
 - 2. Indicate Energy Star compliance.
- B. **LEED Submittals:**
 - 1. **Product Test Reports for LEED-EB Credit SS 6.2:** For roof coating, indicating that coated roof will comply with solar reflectance index requirement. Document that scope of coating meets minimum of 75 percent of building roof surface.

1.6 INFORMATIONAL SUBMITTALS

- A. **Contractor's Product Certificate:** Submit 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.
- B. **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.
- C. **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.
- D. **Warranties:** Unexecuted sample copies of special warranties.
- E. **Photographs or Videotape:** Show existing conditions of adjoining construction and site improvements, including exterior and interior finish surfaces, which might be misconstrued as having been damaged by re-coating operations. Submit before Work begins.
- F. **Inspection Reports:** Daily reports of Roofing Inspector. Include weather conditions, description of work performed, tests performed, defective work observed, and corrective actions required and carried out.

1.7 CLOSEOUT SUBMITTALS

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

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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 comparable to those specified, able to communicate verbally with Owner and employees, and the following:
 - 1. Qualified by the manufacturer to install manufacturer's product and furnish warranty of type specified.

- B. Manufacturer Qualifications:** Approved manufacturer listed in this Section with experience in manufacture of comparable products in successful use in similar applications.
 - 1. **Approval of Other Manufacturers and Comparable Products:** Submit the following in accordance with project substitution requirements, within time allowed for substitution review:
 - a. Product data, including certified independent test data indicating compliance with requirements.
 - b. Samples of each component.
 - c. Sample submittal from similar project.
 - d. Project references: Minimum of five installations of specified products with Owner contact information.
 - e. Sample warranty.

- 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.

1.9 PROJECT 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 between 60 and 90 deg. F.
 - 2. Apply coatings within range of ambient and substrate temperatures recommended by manufacturer. Do not apply materials when air temperature is below 50 or above 110 deg. F.
 - 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.

1.10 WARRANTY

- A. Manufacturer's Warranty for Roof Rehabilitation:** Written warranty in which Manufacturer agrees to repair roof rehabilitation installations that fail due to defects in rehabilitation materials or workmanship within specified warranty period. Warranty for all projects covered under this scope must be provided by one manufacturer.

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1. Failures include, but are not limited to, the following:
 - a. Rehabilitated membrane failures including rupturing or cracking due to a manufacturing or installation defect.
 - b. Deterioration of applied rehabilitation materials beyond normal weathering.
 2. Limit of Warranty Coverage for Repair of Roof Rehabilitation: Not to exceed original purchase price of manufacturer's recoating materials, except that manufacturer may elect to apply the limit amount toward the following:
 - a. Purchase of a new replacement roof within the first five years following completion of rehabilitation work.
 3. Qualified Installer Warranty Requirement: Installer must meet requirements of Quality Assurance Article.
 4. Installation Inspection Warranty Requirement: By Roofing Inspector in accordance with requirements of Part 3 Field Quality Control Article.
 5. Warranty Period: 15 years from date of completion of rehabilitation work.
- B. Manufacturer Inspection and Preventive Maintenance Requirement: By manufacturer's technical representative, to report maintenance responsibilities to Owner necessary for preservation of Owner's warranty rights. The cost of manufacturer's annual inspections and preventive maintenance is included in the Contract Sum. Inspections to occur in Years 2, 5, and 10 following completion.**
- C. Installer's Warranty: Submit roofing Installer's warranty, on warranty form at end of this Section, signed by Installer, covering the Work of this Section and related Sections indicated above, including all components of built-up roofing such as built-up roofing membrane, base flashing, roof insulation, fasteners, cover boards, substrate boards, vapor retarders, roof pavers, and walkway products, for the following warranty period:**
1. Warranty Period: Two years from date of Substantial Completion.
- D. Extended Roof System Warranty: Warranties specified in this Section include the following components and systems specified in other sections supplied by or approved by the roofing system Manufacturer , and installed by the roofing system Installer:**
1. Sheet metal flashing and trim, including roof penetration flashings.
 2. Manufactured copings, roof edge, counterflashings, and reglets.
 3. Roof curbs, hatches, and penetration flashings.
 4. Roof and parapet expansion joint assemblies.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Manufacturer/Product: The roof system specified in this Section is based upon products of Tremco, Inc., Beachwood, OH, www.tremcoroofing.com that are named in other Part 2 articles. Local representative - Ryan Tolsma, rtolsma@tremcoinc.com.**

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 2000 hours of exposure when tested according to ASTM G 152, ASTM G 154, or ASTM G 155.

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- 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:** ASTM E 108, Class A; for application and roof slopes indicated, as determined by testing identical membrane roofing materials by a qualified testing agency. Materials shall be identified with appropriate markings of applicable testing agency.
- D. **Solar Reflectance Index:** Solar reflectance index not less than 90 for not less than 75 percent of the roof surface, when calculated according to ASTM E 408 based on testing identical products by a qualified testing agency.
- E. **Solar Reflectance Index:** Not less than 78 when calculated according to ASTM E 1980, based on testing identical products by a qualified testing agency.
- F. **Energy Performance:** Provide rehabilitated roofing according to one of the following when tested according to CRRC-1:
 - 1. Three-year, aged solar reflectance of not less than 0.55 and emissivity of not less than 0.75.
- G. Three-year, aged solar reflectance index of not less than 64 when calculated according to ASTM E 1980.
- H. **Bio-Based Content:** Provide roofing rehabilitation coating materials meeting requirements of USDA Bio-based Affirmative Procurement Program, with not less than 20 percent bio-based content.

2.3 MATERIALS

- A. **General:** Re-coating materials recommended by roofing system manufacturer for intended use and compatible with components of existing membrane roofing system.

2.4 FLUID-APPLIED ROOFING MEMBRANE

- A. **Polyurethane Elastomeric Fluid-Applied System:** Two-coat reinforced fluid-applied roofing membrane formulated for application over prepared existing roofing substrate.
- B. **Bio-Based Polyurethane Roof Coating Base Coat:** ASTM D7311, Two-part catalyzed low-odor polyurethane roof base coating formulated for direct application and for use with fiber reinforcement in conjunction with a compatible top coat.
 - 1. Volatile Organic Compounds (VOC), maximum, ASTM D3960: 1 g/L.
 - 2. Combustion Characteristics, UL 790: Class A.
 - 3. Bio-Based Content: Not less than 20 percent.
 - 4. Percent solids, by volume, ASTM D 2697: 100.
 - 5. Percent solids, by weight, ASTM D 1644: 100.
- C. **Bio-Based Polyurethane Roof Coating Top Coat:** ASTM D7311, Two-part catalyzed low-odor polyurethane roof top coating formulated for direct application over compatible reinforced base coat.
 - 1. Volatile Organic Compounds (VOC), maximum, ASTM D 3960: 6 g/L.
 - 2. Combustion Characteristics, UL 790: Class A.
 - 3. Bio-Based Content: Not less than 20 percent.
 - 4. Percent solids, by volume, ASTM D 2697: 100.
 - 5. Percent solids, by weight, ASTM D 1644: 100.
 - 6. Water Vapor Transmission, ASTM E 96, Wet Cup: 0.020 perm-in (1.32 g/m²/day).

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- D. Fiberglass Reinforcing Fabric: Medium-fine fiber, rapid wetting chopped strand glass mat intended for reinforcement of compatible fluid-applied membranes and flashings.

2.5 ROOF REPAIR AND FLASHING MATERIALS

- A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with existing roofing system and fluid-applied roofing system.
- B. Fasteners: Factory-coated steel fasteners and metal plates meeting corrosion-resistance provisions in FMG 4470, designed for fastening roofing membrane components to substrate, tested by manufacturer for required pullout strength, and acceptable to roofing system manufacturer.
- C. Seam Sealer: Single component polyurethane sealer formulated to provide a tough, flexible repair for waterproofing.
- D. Polyester fabric: 100% stitchbonded polyester fabric used in conjunction with restoration coatings for repairing torn flashings, seams, and minor surface breaks.
- E. Metal Surface Primer: Single-component, water based primer to promote adhesion of base coat to metal surfaces.
1. Volatile Organic Compounds (VOC), maximum, ASTM D 3960: 25 g/L.
- F. Asphaltic Surfaces Primer: Single-component, multi-substrate primer to promote adhesion of base coat to surfaces recommended by manufacturer.
1. Volatile Organic Compounds (VOC), maximum, ASTM D 3960: 1 g/L.
- G. Aggregate: For finish coat slip resistance: Silica sand, 20 – 40 mesh.
- H. Metal Coating: ASTM D 6083, solar-reflective acrylic elastomer emulsion coating.
1. Solar Reflectance Index (SRI), white, ASTM E 1980: 105 initial; 100 aged.
 2. Volatile Organic Compounds (VOC), maximum, ASTM D 3960: Less than 50 g/L.
 3. Tensile Strength at 73 deg. F (23 deg. C), minimum, ASTM D 2370: Greater than 250 psi (1700 kPa).
 4. Elongation at 73 deg. F (23 deg. C), minimum, ASTM D 2370: Greater than 350 percent.
 5. Flexibility at -15 deg F (-26 deg C), ASTM D 522: Pass 1/2 inch mandrel after 1000 hrs. accelerated weathering.
- I. Metal Primer: Water based acrylic metal primer that provides a tough, flexible film for the protection of steel against corrosion. Must be VOC compliant.
- J. Acrylic Mastic: Elastomeric acrylic-based compound providing a highly flexible seal.
1. Asbestos Content, EPA/600/R-93/116: None.
 2. Tensile strength, ASTM D 2370: 148 psi.
 3. Elongation, ASTM D 2370: 430%.
- K. Butyl Tape: manufacturer's term bar sealant.
- L. General purpose sealant: Two component (1:1 ratio), solvent free, low odor urethane sealant that is asbestos free, extremely low in odor, quick setting, and does not contain any VOC's.
- M. Urethane sealant: manufacturer's gun grade, moisture cured, one component polyurethane sealant.

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- N. Urethane Sealant Primer: One part, resin-based primer formulated to prepare concrete and masonry surfaces for the application of urethane sealants.
- O. Urethane Sealant Primer: One part primer formulated to prepare metal and plastic surfaces for the application of urethane sealants.

2.6 METAL FLASHINGS

- A. Piping through roof box and T-tops:
 - 1. Galvanized Steel: ASTM A 526-85, sheet steel with 1.25 oz./sq. (3.82 g/m²) Galvwash surfacing.
 - a. Gauge: Twenty-four (24).
 - b. Solder: ASTM B32-89, alloy grade 50A. Neutralize flux after soldering.
 - 2. T-Tops must be a minimum of 8" high and have sides and screens.
- B. Work shall be in accordance with Architectural Sheet Metal Manual, as issued by Sheet Metal and Air Conditioning Contractors' National Association, Inc., (SMACNA).

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 of approved re-coating system 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 re-coating system base coat.
 - 5. Verify that existing 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 fluid-applied re-coating membrane 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. 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.

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- B. Fluid-Applied Flashing and Detail Top Coat Application: Apply top coat uniformly in a complete installation to flashings.**
1. 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.
 2. Apply top coat to flashings extending coating up vertical surfaces and out onto horizontal surfaces 4 inches. Install top coat over field base coat and spread coating evenly.
 3. Back roll to achieve wet mil thickness of 32 mils unless otherwise recommended by manufacturer.
 4. Avoid foot traffic on new fluid-applied membrane for a minimum of 24 hours.

3.5 FLUID-APPLIED MEMBRANE APPLICATION

- A. 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 wet mil coating thickness of 64 mils unless otherwise recommended by manufacturer; verify thickness of base coat as work progresses.
 3. Apply additional base coat in waterways and around drain points.
 4. Allow base coat to cure prior to application of top coat.
 5. Following curing of base coat and prior to application of top coat, sand raised or exposed edges of fabric reinforcement.
- B. Top Coat: Apply top coat to field of membrane and flashings uniformly in a complete, continuous installation.**
1. 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.
 2. Apply top coat extending coating up vertical surfaces and out onto horizontal surfaces. Install top coat over field base coat and spread coating evenly.
 3. Back roll to achieve wet mil thickness of 32 mils unless otherwise recommended by manufacturer.
 4. Avoid foot traffic on new fluid-applied membrane for a minimum of 24 hours.
- C. Slip-Resistant Walkway Topcoat: Apply walkway second topcoat following application and curing of top coat. Match original walkpad layout.**
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. Back roll to achieve wet mil thickness of 20 mils unless otherwise recommended by manufacturer.
 4. Broadcast 20 to 30 lbs. per 100 sq. ft. of Slip-Resistant Top Coat Aggregate in wet top coat.
 5. Back roll sand and top coat creating even dispersal of sand. Remove masking immediately.

3.6 FLASHINGS

- A. Reuse existing coping and counterflashings. Remove to install new restoration system and reinstall upon completion. Install new self-adhering HT membrane over wall prior to reinstalling coping. Reseal all joints with polyurethane sealant matching color of metal. Top of existing base flashing at walls must be completely sealed.**
- B. Install skirt metal counterflashing at units where restoration system cannot be installed a minimum of 1" behind pan/counterflashing.**
- C. Install new Pelican Hoods where multiple penetrations, insulated lines, and/or flexible lines penetrate the roof system.**
1. Install per NRCA detail MB-15.

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2. Use SBS torch applied membranes to flash in newly constructed wood curb.
- D. Restore all duct work, metal pans, new and existing metal vents, and drain components with metal coating systems. Prime with metal primer prior to application. Remove prior repairs and seal all seams and holes with acrylic mastic and polyester reinforcement.

3.7 FIELD QUALITY CONTROL

- A. Roof Inspection: Contractor shall engage roofing system manufacturer's technical personnel to inspect roofing installation, and submit report to the Architect. Notify Architect or 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.
- B. Repair fluid-applied membrane where test inspections indicate that they do not comply with specified requirements.
- C. 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