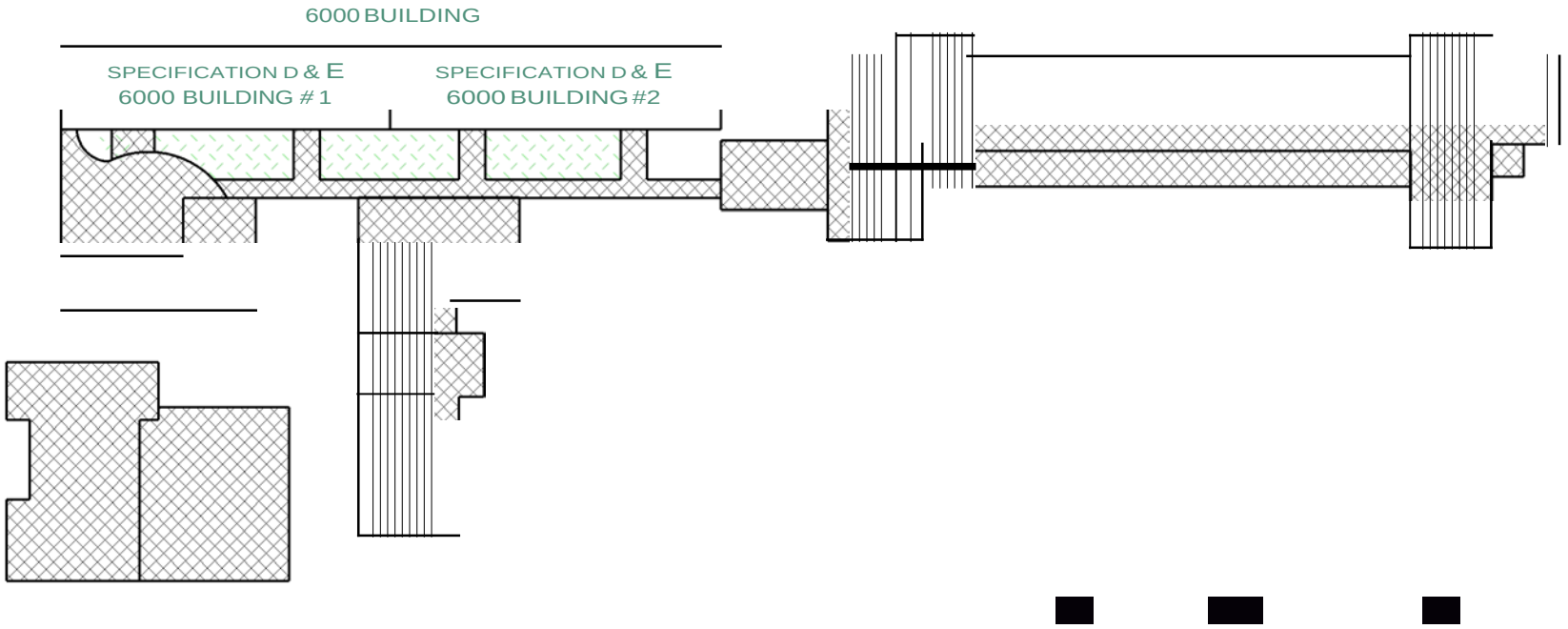
GLENDALE UNIFIED SCHOOL DISCTRICT

223 NORTH JACKSON STREET. GLENDALE. CA, 91206

JOHN C. FREMONT ELEMENTARY SCHOOL

3320 Las Palmas Ave, Glendale, CA 91208



SPECIFICATION KEY

(0) - 070 150. 19 PREPERATION FOR RE-ROOFING

(E) - 0752 16. 13 SBS MODIFIED BITUMINOUS MEMBRANE ROOFING, COLD-APPLEID

- **Specification D & E - John C. Fremont Elementary School - Classrooms #14 - 15**
    1. Roof system is removed and insulation removed down to the decking. Loosely lay one course course of sheathing paper.
    2. BURmastic Composite Ply HT base sheet with laps fastened 9” for the perimeter sheet and 18” for the field sheet.
    3. Replace insulation with polyisocyanurate insulation boards matching existing thickness. Install tapered insulation plan per designers outline.
    4. 1/4” Gypsum cover board mechanically fastened with a minimum of 6 fasteners per board (more as required in waterways, transitions, and where needed to provide a secure substrate)
    5. Two BURmastic Composite Ply HT ply sheets adhered in POWERply Standard Cold at waterways, ridges, hips, curbs, walls, stripping, and over crickets.
    6. POWERply Standard FR GT24W cap sheet adhered in POWERply Standard Cold.
    7. 45 mil TPA flashing system at all curbs, parapets, and base flashings.
    8. *Alternate - match existing style, size, and attachment for both the gutters and downspouts

SECTION 012300 - ALTERNATES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for alternates.

1.2 DEFINITIONS

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

1. Alternates described in this Section are part of the Work only if enumerated in the Agreement.

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

1.3 PROCEDURES

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

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

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

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

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

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

A. Alternate No. 1: New Gutter System: Reroofing of Gymnasium

1. Base Bid: Includes removing and replacing existing gutter system and downspouts where designated.

2. Alternate: Provide amount to add to Base Bid amount for new gutter system, with identical preparation and roofing system requirements as indicated for Base Bid.

END OF SECTION 012300

SECTION 070150.19 - PREPARATION FOR RE-ROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Roof replacement preparation consisting of full roof tear-off of entire roof system.
2. Removal of flashings and counterflashings.
3. Removal and reinstallation of indicated components, accessories, and equipment.
4. Recycling of non-hazardous demolition and construction waste.

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

1.2 DESCRIPTION OF WORK

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

1. Preparation for Roof Area: 6000 Building #1:
   a. Preparation for: Roof replacement.
   b. Roof and insulation tear-off down to the decking.
   c. Temporary roof membrane.
2. Preparation for Roof Area: 6000 Building #2:
   a. Preparation for: Roof replacement.
   b. Roof and insulation tear-off down to the decking.
   c. Temporary roof membrane.

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 D 1079 "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. Full Roof Tear-Off: Removal of existing membrane roofing system from deck.

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

D. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.

E. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.

F. 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.

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. Reroofing preparation, including roofing system manufacturer's written instructions.

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. Asbestos removal and discovery of asbestos-containing materials.

k. Governing regulations and requirements for insurance and certificates if applicable.

l. Existing conditions that may require Owner notification before proceeding.

1.6 ACTION SUBMITTALS

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

1.7 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer including certificate that Installer is licensed to perform asbestos abatement.

B. 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.

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

D. 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. Coordination of Owner's continuing occupancy of portions of existing building.

1.8 QUALITY ASSURANCE

A. Regulatory Requirements:

1. Comply with governing EPA notification regulations before beginning membrane roofing removal.

2. Comply with hauling and disposal regulations of authorities having jurisdiction.

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

1. Hazardous materials will be removed by Owner before start of the Work. Existing roof will be left no less watertight than before removal.

2. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Owner.

a. Hazardous materials will be removed by Owner under a separate contract.

1.10 WARRANTY (EXISTING)

PART 2 - PRODUCTS

2.1 DECK REPAIR/REPLACEMENT MATERIALS

A. Wood Components:

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.

2.2 TEMPORARY ROOFING MATERIALS

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

2.3 TEMPORARY ROOF DRAINAGE

A. Design and selection of materials for temporary roof drainage are responsibilities of the Contractor.

PART 3 - EXECUTION

3.1 PREPARATION, GENERAL

A. 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.

B. 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.

C. 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. 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.

B. Roof Drainage: Remove roof drainage items indicated for removal.

C. Roof Tear-Off: Remove existing roofing membrane and other membrane roofing system components down to the deck.

1. Remove roof insulation, substrate boards and base sheets.

2. Remove fasteners from deck.

D. Roof Edge Specialties: Replace existing perimeter metal systems with new perimeter metal systems.

E. 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.

3.3 DECK PREPARATION

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

B. Repair existing deck to provide smooth working surface for installation of roof system.

1. Replace deck that cannot be repaired to sound condition.

C. Verify that deck is sound and dry.

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.

3.5 BASE FLASHING REMOVAL

A. Remove existing base flashings around parapets, curbs, walls, and penetrations.

1. Clean substrates of contaminants, such as asphalt, sheet materials, dirt, and debris.

B. Do not damage metal counterflashings that are to remain.

3.6 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.

3.7 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 075216.13 - SBS MODIFIED BITUMINOUS MEMBRANE ROOFING, COLD-APPLIED

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Styrene-butadiene-styrene (SBS) modified bituminous membrane roofing system on wood deck, including but not limited to:, including but not limited to:

a. Sheathing Paper.

b. Base Sheet.

c. Roof insulation.

d. Roof insulation cover board.

e. SBS-modified bituminous membrane roofing.

f. Granule-surfaced SBS-modified bituminous membrane cap sheet.

B. Related Sections:

1. Division 07 Section "Preparation for Re-Roofing" for recover board beneath new membrane roofing.

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

1.2 DEFINITIONS

A. Roofing Terminology: Refer to ASTM D 1079 "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.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Roofing Conference: Conduct conference at Project site

1. Meet with Owner, Owner's insurer if applicable, testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, deck Installer, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.

2. Review drawings and specifications.

3. Review methods and procedures related to roofing installation, including manufacturer's written instructions.

4. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.

5. Examine substrate conditions and finishes for compliance with requirements, including flatness and fastening.

6. Review structural loading limitations of roof deck during and after roofing.

7. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing system.

8. Review temporary protection requirements for roofing system during and after installation.

9. Review roof observation and repair procedures after roofing installation.

1.4 ACTION SUBMITTALS

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

1. Product Test Reports for Solar Reflectance: For roof materials, indicating that roof materials comply with Solar Reflectance Index requirement.

2. Product Data and Laboratory Test Reports: For adhesives and sealants, indicating compliance with requirements for low-VOC/low-emitting materials.

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 and FMG required by this Section.

2. Crickets, saddles, and tapered edge strips, including slopes.

3. Insulation fastening patterns for corner, perimeter, and field-of-roof locations.

C. Samples for Verification: For the following products:

1. Sheet roofing materials.

1.5 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.

B. Qualification Data: For Installer, Manufacturer, and Roofing Inspector.

1. Include letter from Manufacturer written for this Project indicating approval of Installer.

C. Manufacturer Certificates: Signed by roofing manufacturer certifying that roofing system complies with requirements specified in "Performance Requirements" Article.

1. Submit evidence of compliance with performance requirements, including UL listing certificate.

2. Product Compatibility: Indicate manufacturer has verified compatibility of roofing system components, including but not limited to: Roofing membrane, flashing sheets, adhesives and sealants.

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 Control 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 reports within 24 hours after inspection.

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 products comparable to those specified, able to communicate verbally with Contractor, Architect, and employees, and 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.

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 not less than five years old, with Owner and Architect contact information.

    e. Sample daily inspection report

    f. Qualifications for roof inspector completing daily inspections..

    g. Sample warranty.

2. Substitutions following award of contract are not allowed.

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.

D. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products.

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 system 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 / FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system 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. 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, 15 following completion.

C. Installer Warranty: Installer's warranty signed by Installer, as follows.

1. Form of Warranty: Form included in Project Manual.

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, Incorporated. Provide specified products or preapproved equivalent products.

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

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.

2. Impact Resistance: Roof membrane shall resist impact damage when tested according to ASTM D3746/D3746M, ASTM D4272/D4272M, or the "Resistance to Foot Traffic Test" in FM Approvals 4470.

B. Flashings and Fastening: 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.

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. 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 MATERIALS, GENERAL

A. Material Compatibility: Roofing materials shall be compatible with one another and adjacent materials under conditions of service and application required, as demonstrated by roof membrane manufacturer based on testing and field experience.

2.4 ROOFING MEMBRANE MATERIALS

A. Sheathing Paper: Red-rosin type, minimum 3 lb./100 sq. ft. (0.16 kg/sq. m).

B. Base Sheet & SBS Modified Bituminous Membrane Smooth-Surfaced Sheets:

1. SBS-modified asphalt coated composite polyester / fiberglass/fiberglass mat reinforced high tensile strength base sheet, ASTM D4601 Type II.

a. Basis of design product: BURmastic Composite Ply HT.

b. Tensile Strength at 77 deg. F (25 deg. C), minimum, ASTM D5147: Machine direction, 165 lbf/in (725 N); Cross machine direction, 150 lbf/in (660 N).

c. Tear Strength at 77 deg. F (25 deg. C), minimum, ASTM D5147: Machine direction, 260 lbf (1150 N); Cross machine direction, 230 lbf (1120 N).

d. Thickness, minimum, ASTM D5147: 0.060 inch (1.5 mm).

C. SBS Modified Bituminous Membrane Granular-Surfaced Cap Sheet:

1. SBS-modified asphalt-coated glass-fiber-reinforced sheet, granular surfaced with a factory applied white reflective granule; CRRC listed and California Title 24 Energy Code compliant, ASTM D6163 Type I Grade G .

a. Basis of design product: POWERply Standard FR GT24W.

b. Exterior Fire-Test Exposure, ASTM E108: Class A.

c. Tensile Strength at 77 deg. F (25 deg. C), minimum, ASTM D5147: Machine direction 70 lbf/in (12 kN/m); Cross machine direction 50 lbf/in (8 kN/m).

d. Tear Strength at 77 deg. F (25 deg. C), minimum, ASTM D5147: Machine direction, 100 lbf (445 N); Cross machine direction 90 lbf (400 N).

e. Elongation at 77 deg. F (25 deg. C), minimum, ASTM D5147: Machine direction 4 percent; Cross machine direction 4 percent.

f. Low Temperature Flex, maximum, ASTM D5147: -10 deg. F (-23 deg. C).

g. Thickness, minimum, ASTM D5147: 0.157 inch (4 mm).

h. Solar Reflectance Index (SRI), ASTM E1980: 88.

D. Flashing Sheet:

1. Thermoplastic PVC/TPA sheet, internally fabric reinforced, Energy Star qualified, CRRC listed, and California Title 24 Energy Code compliant, ASTM D4434 Type IV.

a. Basis of design product: TPA Single Ply Roof Membrane.

b. Tensile Strength at 0 deg. F (-18 deg. C), minimum, ASTM D751: 300 lbf/in (1330 N).

c. Tear Strength at 77 deg. F (25 deg. C), minimum, ASTM D751: 100 lbf (440 N).

d. Elongation at 0 deg. F (-18 deg. C), minimum at fabric break, ASTM D751: 25 percent machine direction, 25 percent cross-machine direction.

e. Minimum Thickness, nominal, ASTM D751: 0.045 in (1.1 mm).

f. Color: White.

g. Solar Reflectance Index (SRI), ASTM E1980: 108 (White, initial) 84 (White, 3-year aged).

h. Recycled Content, minimum: 25 percent pre-consumer.

2.5 COLD-APPLIED ADHESIVE 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. Modified Bituminous Interply and Cap Sheet Adhesive:

1. Cold-applied roofing adhesive and surfacer, one-part, formulated for compatibility and use with specified roofing membranes and flashings.

a. Basis of design product: POWERply Standard Cold Adhesive.

b. Volatile Organic Compounds (VOC), maximum, ASTM D6511: 250 g/L.

c. Nonvolatile Content, minimum, ASTM D6511: 72 percent.

d. Flash Point, minimum, ASTM D93: 100 deg F (38 deg C).

C. Flashing Sheet Adhesive:

1. Bonding and Flashing Adhesive, SEBS/SIS modified asphalt, for elastomeric flashing membranes.

a. Basis of design product: Sheeting Bond.

b. VOC, maximum, ASTM D3960: 250 g/L.

c. Adhesion in peel, minimum, ASTM D1876: 3 lbf/in (0.5 N/mm).

d. Lap shear adhesion, minimum, ASTM D816: 18 psi (124 kPa).

e. Color: White.

2.6 AUXILIARY ROOFING MATERIALS

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

B. Cement-Based Mastic:

1. Roof Cement, Asphalt-Based: ASTM D4586, Type II, Class I, fibrated roof cement formulated for use in installation and repair of asphalt ply and modified bitumen roofing plies and flashings; UL-classified for fire resistance.

a. Basis of design product: ELS.

b. Volatile Organic Compounds (VOC), maximum, ASTM D3960: 190 g/L.

c. Non-Volatile Matter, ASTM D4586: 85 percent.

d. Resistance to sag ASTM D4586: 1/8 in. (3 mm).

C. Elastomeric Mastic:

1. Roofing Mastic, Low-Volatile: Modified asphalt elastomeric roof mastic, one-part, trowel-grade, formulated for compatibility and use with specified roofing membranes and flashings.

a. Basis of design product: POLYroof LV.

b. Volatile Organic Compounds (VOC), maximum, ASTM D3960: 300 g/L.

c. Elongation at -30 deg. F (-34 deg. C), minimum, ASTM D412: 100 percent.

d. Tensile strength at 77 deg F (25 deg C), ASTM D412: 30 psi (207 kPa).

e. Flexibility at -40 deg. F (-40 deg. C), ASTM D3111: No cracking.

f. Nonvolatile matter, ASTM D4586 : 70 percent.

D. Stripping Adhesive / Sealer:

1. Cold-applied roofing surfacing adhesive, one-part white solar reflective low-volatile polymeric, formulated for compatibility and use with specified roofing membranes and flashings.

    a. Basis of design product: Rock-It Adhesive.

    b. Volatile Organic Compounds (VOC), maximum, ASTM D6511: 250 g/L.

    c. Nonvolatile content, minimum ASTM D6511: 70 percent.

E. Stripping Reinforcing Fabric:

1. Woven Glass Fiber Mesh, Vinyl-Coated: Non-shrinking, non-rotting, vinyl-coated woven glass mesh for reinforcing flashing seams, membrane laps, and other roof system detailing.

    a. Basis of design product: BURmesh.

    b. Tensile strength, 70 deg. F, min ASTM D146: Warp, 65 lbf/in (285 N); fill, 75 lbf/in (310 N).

    c. Color: Aqua green.

F. Joint Sealant: Elastomeric joint sealant compatible with roofing materials, 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: 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: White.

G. Drain: Basis of Design, Zurn Z100 cast iron 15” diameter roof drain.

1. Match existing outlet direction and size.

2. Cast iron drain screens.

H. Metal Flashings:

1. Edger Metal: 24-gauge bonderized metal.

    a. 22-gauge galvanized cleat.

    b. Rise on draining edge: ¼”.

    c. Rise on non-draining edge: ½”.

    d. Fascia: ½” longer than existing.

2. Counterflashing: 24-gauge galvanized metal.

3. Gutter Metal (alternate): Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, Class AZ50 coating designation, Grade 50 (Class AZM150 coating designation, Grade 340) pre-painted by the coil-coating process to comply with ASTM A 755/A 755M; structural quality.

    a. Thickness: 0.0236-inch/24 ga.(0.60-mm) minimum thickness.

    b. Color to be selected by Owner.

    c. 10-gauge powder coated brackets and 16-gauge galvanized straps.

4. Downspouts (alternate): 16-gauge power coated steel. Color and shape to be selected by Owner.

I. Fasteners: Factory-coated steel fasteners and metal plates meeting corrosion-resistance provisions in FMG 4470, designed for fastening roofing components to substrate, tested by manufacturer for required pullout strength, and acceptable to roofing system manufacturer.

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

2.7 ROOF INSULATION MATERIALS

A. Roof Insulation, General: Preformed roof insulation boards manufactured or approved by roofing manufacturer, selected from manufacturer's standard sizes suitable for application, of thicknesses indicated.

1. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated, not less than two times the roof slope.

B. Roof Insulation:

1. Board Insulation, Polyisocyanurate: CFC- and HCFC- free, with recycled content glass-fiber mat facer on both major surfaces, ASTM C1289 Type II Class 1.

    a. Basis of design product: Trisotech Insulation.

b. Compressive Strength, ASTM D1621: Grade 2: 20 psi (138 kPa).

c. Conditioned Thermal Resistance at 75 deg. F (24 deg. C): 14.4 at 2.5 inches (50.8 mm) thick.

2.8 ROOF INSULATION ACCESSORIES

A. Insulation Cover Board:

1. Gypsum panel, glass-mat-faced, primed, ASTM C1177/C1177M.

a. Basis of design product: GP Gypsum DensDeck Prime.

b. Thickness: 1/4 inch (6 mm).

B. Insulation Cant Strips: ASTM C 208, Type II, Grade 1, cellulosic-fiber insulation board.

C. Wood Cant Strips: Comply with requirements in Division 06 rough carpentry Section

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

E. Substrate Joint Tape: 6- or 8-inch- (150- or 200-mm-) wide, coated, glass fiber.

F. Insulation Fasteners: Factory-coated steel fasteners and metal plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roof insulation and cover boards to substrate, and acceptable to roofing system manufacturer.

2.9 WALKWAYS

A. Walkway Material:

1. Walkway pads, ceramic-granule-surfaced reinforced asphaltic composition slip-resisting pads, manufactured as a traffic pad for foot traffic, 1/2 inch (13 mm) thick minimum.

a. Basis of design product: Trem-Tred.

b. Flexural Strength at max. load, minimum, ASTM C203: 218 psi (1.5 kPa).

c. Granule adhesion (weight loss), maximum, ASTM D4977: 1.1 gram.

d. Impact Resistance at 77 deg. F (25 deg. C), ASTM D3746: No Damage to Roof.

e. Pad Size: 36 by 48 inch (914 by 1220 mm).

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 wood cants, blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.

3. Wood Roof Deck: Verify that deck is securely fastened with no projecting fasteners and with no adjacent units in excess of 1/16 inch (1.6mm) out of plane relative to adjoining deck.

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 system 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 written instructions, approved shop drawings, and Contract Documents.

B. Install new treated wood nailers at all edge metal locations where insulation is installed. Nailers must match height of insulation. Coping nailers must match wall thickness and slope towards interior of buildings.

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

3.4 ROOFING INSTALLATION DETAILS

A. NRCA Installation Details: Install roofing system in accordance with applicable NRCA Manual Plates and NRCA recommendations; modify as required to comply with manufacturer's approved details and perimeter fastening requirements of FM Global references if applicable.

3.5 BASE SHEET INSTALLATION

A. Loosely lay one course of sheathing paper, lapping edges and ends a minimum of 2 inches and 6 inches (50 mm and 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 substrate.

3.6 INSULATION INSTALLATION

A. Comply with roofing manufacturer's written instructions for installing roof insulation.

B. Coordinate installing membrane roofing system components, so insulation is not exposed to precipitation or left exposed at the end of the workday

C. 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.

D. Crickets: Install tapered insulation under area of roofing to conform to slopes indicated.

1. Where crickets are indicated or required to provide positive slope to drain, make slope of crickets minimum of two times the roof slope and not less than 1/4 inch in 12 inches (1:48).

E. 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.

F. 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. Flat Insulation System on Sloped Roof Deck: Install insulation at minimum thickness as follows:

a. Minimum total thickness of Continuous Insulation: 2".

2. Insulation Drain Sumps: Tapered insulation sumps, not less than 2 by 2 feet, sloped to roof drain, with a minimum insulation thickness of not less than one inch less than the Project-stipulated continuous insulation thickness based upon code requirements.

G. Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water.

H. Install tapered edge strips at perimeter edges of roof that do not terminate at vertical surfaces.

I. Mechanically Fastened Insulation Application Method: Install each layer of insulation and secure to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.

1. Fasten insulation to resist uplift pressure at corners, perimeter, and field of roof.

J. 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. Fasten cover boards to resist uplift pressure at corners, perimeter, and field of roof.

3.7 COLD-APPLIED ROOFING MEMBRANE INSTALLATION, GENERAL

A. Install roofing membrane system according to roofing system manufacturer's written instructions and applicable recommendations in NRCA's "Quality Control and Quality-assurance Guidelines for the Application of Membrane Roofing" and as follows:

1. Number of Smooth-Surfaced SBS-Modified Asphalt Sheets: Two.

a. Adhering Method: Cold-adhesive applied.

2. Granular-Surfaced SBS-Modified Asphalt Cap Sheet:

a. Adhering Method: Cold-adhesive applied.

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

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

D. 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. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing.

2. Remove temporary plugs from roof drains at end of each day.

3. Remove and discard temporary seals before beginning work on adjoining roofing.

E. Substrate-Joint Penetrations: Prevent roofing asphalt and adhesives from penetrating substrate joints, entering building, or damaging roofing system components or adjacent building construction.

3.8 SBS-MODIFIED BITUMINOUS MEMBRANE INSTALLATION

A. Install modified bituminous roofing membrane ply sheet(s) and 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 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. Granular Cap Sheet Laps: Apply roofing granules to cover exuded bead at laps.

C. Apply sealant at gap between cap sheet and edge metal.

3.9 FLASHING AND STRIPPING INSTALLATION

A. Base Flashing Installation, General: Install base flashing over cant strips and other sloped and vertical surfaces, at roof edges, and at penetrations through roof; secure to substrates according to roofing system manufacturer's written instructions, and as follows:

1. Extend base flashing up walls or parapets a minimum of 12 inches (300 mm) above modified bituminous roofing and 6 inches (150 mm) onto field of built-up roofing.

B. Flashing Sheet Installation: Adhere flashing sheet to substrate in cold-applied adhesive. Apply cold-applied flashing sheet adhesive to back of flashing sheet if recommended by roofing manufacturer.

1. Flashing Sheet Top Termination: Mechanically fasten top of base flashing securely at terminations and perimeter of roofing.

a. Seal top termination of base flashing at walls with a metal termination bar, butyl tape, and sealant. Seal top of base flashing at curbs with a skirt metal counterflashing. Extend base flashing sheet over walls where coping is present or to be installed..

2. Flashing Sheet Bottom Termination: Adhere flashing sheet to roofing membrane in continuous bed of cold-applied adhesive.

a. Elastomeric Flashing Sheet: Heat weld vertical flashing joints. Seal bottom termination of base flashing by adhering to roofing membrane with cold-applied adhesive and sealing flashing-to-membrane joint with joint sealant.

C. Install roofing stripping plies where metal flanges and edgings are set on membrane roofing according to roofing system manufacturer's written instructions. Secure metal flanges at 3” o.c. staggered with three pan head screws and sealant at all overlaps.

D. Install stripping, according to roofing manufacturer's written instructions, where metal flanges and edgings are set on modified bituminous membrane roofing.

E. Flashing-Sheet Stripping: Install flashing-sheet stripping in a continuous coating of compatible roofing cement, mastic sealant or seam sealer, as recommended by roofing manufacturer, and extend onto roofing membrane. Apply number of courses recommended by manufacturer.

F. Roof Drains: Set 30 by 30 inch (760 by 760 mm) square metal flashing in bed of asphalt roofing cement on completed roofing membrane. Cover metal flashing with roofing membrane cap sheet stripping and extend a minimum of 6 inches (150 mm) beyond edge of metal flashing onto field of roofing membrane. Clamp roofing membrane, metal flashing, and stripping into roof-drain clamping ring.

1. Install stripping according to roofing system manufacturer's written instructions.

G. Gutter (alternate):

1. Install 18” girth gutter supported by brackets and straps at identified locations.

2. Install new outlet tubes.

3.10 WALKWAY INSTALLATION

A. Walkways, General: Install walkways according to roofing manufacturer's written instructions.

1. Install walkways at following locations:

a. Perimeter of each rooftop unit.

b. Between each rooftop unit location, creating a continuous path connecting rooftop unit locations.

c. Between each roof hatch and each rooftop unit location or path connecting rooftop unit locations.

d. Between each roof access ladder and each rooftop unit location or path connecting rooftop unit locations.

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. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation at commencement and upon completion.

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

C. 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 if replaced or additional work complies with specified requirements.

3.12 PROTECTING AND CLEANING

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

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

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

END OF SECTION 075216.13