
PART 1 GENERAL**1.1 RELATED DOCUMENTS**

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

1.2 SUMMARY

- A. This Section includes:
1. Rubberized-asphalt waterproofing membrane reinforced.
 2. Molded-sheet drainage panels.
 3. Insulation.
- B. Related Requirements:
1. Division 1 Section "Sustainable Design Requirements" for additional LEED requirements.
 2. Division 7 Section "Joint Sealants" for joint sealants, joint fillers, and joint preparation.
 3. Division 7 Section "Sheet Metal Flashing and Trim"
 4. Division 32 Section "Sand Set Stone Pavings".
 5. Division 32 Section "Planting Soil Preparation".
 6. Division 32 Section "Geosynthetic Fill".

1.3 QUALITY ASSURANCE

- A. The work of this section shall be performed by a company which specializes in the type of hot fluid-applied rubberized asphalt waterproofing work required for this Project, with a minimum of 5 years of documented successful experience and shall be performed by skilled workmen thoroughly experienced in the necessary crafts.
1. Work shall be performed in compliance with Owner's insurance underwriters' requirements and UL approvals and testing for materials, assemblies and procedures.
- B. Manufacturer shall specialize in manufacturing the type of hot fluid-applied rubberized asphalt waterproofing specified in this section, with a minimum of 5 years of documented successful experience, and have the facilities capable of meeting all requirements of Contract Documents as a single-source responsibility and warranty.
- C. Installer Qualifications: A firm that is approved or licensed by manufacturer for installation of waterproofing required for this Project and is eligible to receive special warranties specified. The Installer shall maintain a full time supervisor/foreman who is on job site during times that waterproofing work is in progress and who is experienced in installing waterproofing systems similar to type and scope required for this project.
- D. Source Limitations: Obtain waterproofing materials sheet flashings, protection course, molded-sheet drainage panels, insulation, pavers and paver supports from single source from single manufacturer.
- E. Curing compounds and form release agents shall be chemically compatible with materials used in the work of this section.
1. This must be evaluated before pouring concrete.
 2. Only utilize a sodium silicate type curing compound on concrete.
- F. Regulatory Requirements: Comply with applicable rules of the pollution-control regulatory agency having jurisdiction in the Project locale regarding volatile organic compounds (VOC) and use of hydrocarbon solvents.
- G. Mockups: Install waterproofing to 100 sq. ft. (9.3 sq. m) of deck to demonstrate surface preparation, crack and joint treatment, corner treatment, thickness, texture, and execution quality. Install pavers and paver supports to demonstrate aesthetic effects, and set quality standards for materials and execution.
1. If Architect determines mockups do not comply with requirements, reapply waterproofing and reinstall overlaying construction until mockups are approved.
 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

- H. Preinstallation Conference: Conduct conference at Project site.
 - 1. To include Owner's Representative, Architect, Consultant, Contractor, Installer, Manufacturer's Authorized Technical Representative and all sub-contractors whose work will interface with or is associated with the waterproofing installation.
 - 2. Review waterproofing requirements including surface preparation, substrate condition and pretreatment, minimum curing period, forecasted weather conditions, special details and sheet flashings, installation procedures, testing and inspection procedures, and protection and repairs.
- I. Manufacturer's identification tags or marks are not acceptable on surfaces which will remain exposed to view after installation.
 - 1. Evidence of "patching" after removal of tags or marks is not acceptable.

1.4 ACTION SUBMITTALS

- A. Submit the following according to Conditions of the Construction Contract and Division 1 Specification Sections.
- B. Product Data: For each type of product. Include manufacturer's written instructions for evaluating, preparing, and treating substrate, technical data, and tested physical and performance properties of waterproofing.
 - 1. MR 4 – List of Proposed materials with recycled content: Indicate projected materials cost, projected post-industrial (pre-consumer) recycled content, and projected post-consumer recycled content for each product projected to have recycled content.
 - 2. MR 5 – Product Certificates for Credit: For products and materials required to comply with requirements for regional materials, certificates indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating distance to Project, cost for each regional material, and fraction by weight that is considered regional.
- C. Shop Drawings: Show locations and extent of waterproofing. Include details for substrate joints and cracks, sheet flashings, penetrations, inside and outside corners, tie-ins to adjoining waterproofing, and other termination conditions.
 - 1. Where this material and adjacent waterproofing materials are flashed to each other, provide coordinated shop drawings clearly noting "tie-in" details and including all adjacent materials and substrates.
- D. Samples: For the following products in manufacturer's standard sizes unless otherwise indicated:
 - 1. Flashing sheet.
 - 2. Membrane-reinforcing fabric.
 - 3. Insulation.
 - 4. Drainage panel.
- E. Certifications:
 - 1. Certification from manufacturer that membrane material is produced at facility having full time quality control, with each batch of material tested to assure conformance with published physical properties.
 - 2. Certification from manufacturer that all waterproofing components are being supplied by a single-source manufacturer.
 - 3. Certification from manufacturer and installer that they have reviewed and approved all waterproofing material systems and specific materials for this project and that they are in agreement that the proposed materials are appropriate for each surface and condition.
- F. Hazardous Materials Notification: In the event no product or material is available that does not contain asbestos, PCB or other hazardous materials as determined by the Owner, a "Material Safety Data Sheet" (MSDS) equivalent to OSHA Form 20 shall be submitted for that proposed product or material prior to installation.
- G. Asbestos and PCB Certification: After completion of installation, but prior to Substantial Completion, Contractor shall certify in writing that products and materials installed, and processes used, do not contain asbestos or polychlorinated biphenyls (PCB), using format in Article 3 of General Conditions.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and testing agency.
- B. Product Test Reports: For waterproofing, based on evaluation of comprehensive tests performed by a qualified testing agency.

- C. Field quality-control reports.
- D. Sample Warranties: For special warranties.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Comply with General Conditions and Division 1 Section "Product Requirements".
- B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by waterproofing manufacturer.
- C. Remove and replace liquid materials that cannot be applied within their stated shelf life.
- D. Protect stored materials from direct sunlight.

1.7 FIELD CONDITIONS

- A. Weather Limitations: Apply waterproofing within the range of ambient and substrate temperatures recommended by waterproofing manufacturer. Do not apply waterproofing to a damp or wet substrate, or when temperature is below zero deg F (minus 18 deg C).
 - 1. Do not apply waterproofing in snow, rain, fog, or mist.
- B. Concrete substrates shall be completely cured and free of all moisture detrimental to the placing of waterproofing. Drying required due to wetting of substrate by inclement weather and/or adjacent wet construction shall be in accordance with waterproofing manufacturer's recommendations
- C. Maintain adequate ventilation during application and curing of waterproofing materials.
- D. Substrate: Proceed with waterproofing operations only after substrate construction and penetrating work have been completed. Placing of waterproofing shall constitute acceptance of substrate conditions, including curing agents, if any.

1.8 WARRANTY

- A. Comply with General Conditions and Division 1 Section "Product Requirements".
- B. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace waterproofing and sheet flashings that do not comply with requirements or that fail to remain watertight within specified warranty period.
 - 1. Warranty includes removing and reinstalling protection board, drainage panels, and insulation.
 - 2. Warranty insulation retains 80 percent of original published thermal value.
 - 3. Warranty Period: 10 years from date of Substantial Completion.
- C. Special Installer's Warranty: Specified form, signed by Installer, covering work of this section, for warranty period of two years.

PART 2 PRODUCTS

2.1 UNAUTHORIZED MATERIALS

- A. Materials and products required for work of this section shall not contain asbestos, polychlorinated biphenyls (PCB) or other hazardous materials identified by the Owner.

2.2 ACCEPTABLE MANUFACTURERS

- A. Products: Subject to compliance with requirements, provide the following:
 - 1. American Hydrotech, Inc.; Monolithic Membrane 6125.
 - 2. Cetco, Strataseal HR.
- B. Substitutions: Comply with General Conditions using form in Division 1 Section "Substitution Request Form".
- C. Recycled Content: For materials containing post-industrial (pre-consumer) and/or post-consumer recycled content, contractor shall document the cost and percentage (by weight) of each material broken out by post-industrial (pre-consumer) and post-consumer content.

- D. Regional Content: For material that is extracted, harvested or recovered as well as manufactured within 500 miles of the project site – 101 First Street, San Francisco, CA, contractor shall document the cost and percentage (by weight) of each material that is regional.

2.3 WATERPROOFING MEMBRANE

- A. Single-component; 100% solids; hot fluid-applied, rubberized asphalt with the following properties measured per applicable test methods in CAN/CGSB-37.50:
1. Flash Point: Not less than 260°C or not less than 25°C above manufacturer's maximum recommended application temperature.
 2. Cone Penetration: 110 mm maximum at 25°C, and 200 mm maximum at 50°C.
 3. Flow: 3 mm maximum at 60°C.
 4. Toughness: Not less than 5.5 J
 5. Ratio of Toughness to Peak Load: Not less than 0.040.
 6. Adhesion Rating: Pass.
 7. Water-Vapor Permeance: 1.7 ng/Pa x s x sq. m.
 8. Water Absorption: 0.35-g maximum mass gain, or 0.18-g maximum mass loss.
 9. Pinholing: Not more than one pinhole.
 10. Low-Temperature Flexibility: No cracking.
 11. Crack Bridging Capability: No cracking, splitting, or loss of adhesion.
 12. Heat Stability: Comply with requirements for penetration, flow, low-temperature flexibility, and viscosity when heated for five hours at manufacturer's recommended application temperature.
 13. Viscosity Test: 2 to 15 seconds.

2.4 AUXILIARY MATERIALS

- A. General: Auxiliary materials recommended by waterproofing manufacturer for intended use and compatible with waterproofing.
- B. Primer/Surface Conditioner: ASTM D41/D 41M, asphaltic primer.
- C. Elastomeric Flashing Sheet: 60-mil- (1.5-mm-) minimum, uncured sheet neoprene with manufacturer's recommended contact adhesives as follows:
1. Tensile Strength: 1400 psi (9.6 MPa) minimum; ASTM D412, Die C.
 2. Elongation: 300 percent minimum; ASTM D412.
 3. Tear Resistance: 125 psi (860 kPa) minimum; ASTM D624, Die C.
 4. Brittleness: Does not break at minus 30 deg F (34 deg C); ASTM D2137.
- D. Metal Termination Bars: Manufacturer's standard, predrilled stainless-steel termination bars; approximately 1 by 1/8 inch (25 by 3 mm) thick; with stainless-steel anchors.
- E. Sealants and Accessories: Manufacturer's recommended sealants and accessories.
- F. Reinforcing Fabric: Manufacturer's recommended, spun-bonded polyester fabric.
- G. Protection Course: ASTM D6506, semirigid sheets of fiberglass or mineral-reinforced-asphaltic core, pressure laminated between two asphalt-saturated fibrous liners and as follows:
1. Thickness: 1/4 inch (6 mm), nominal.
 2. Adhesive: Rubber-based solvent type recommended by waterproofing manufacturer for type of protection course.
 3. Type: American Hydrotech's "Hydroflex 30".
- H. Root Stop/Protection Course:
1. 4 mm thick polyester reinforced, modified asphalt sheet with granular surface and root inhibiting additive.
 - a. American Hydrotech "Hydroflex RB II".
- I. Filter Fabric: Non-woven polymeric, geotextile fabric.
1. American Hydrotech "Systemfilter".
- J. Sheet Metal Accessories:
1. Counterflashings and Reglets: Stainless steel; refer to Division 7 Section "Sheet Metal Flashing and Trim".

2. Termination Bars: Type 302 or 304 stainless steel, 1/8 inch thick minimum, predrilled or punched 8 inches o.c. for mechanical fastener attachment to substrate.
3. Flashing Pipe Clamping Rings: Waterproofing membrane manufacturer approved, stainless steel adjustable wormgear pipe clamping rings; size appropriate to installation.
4. Inspection Chambers:
 - a. Aluminum and stainless steel over drain chambers perforated to allow water flow as shown on plans and details.
 - 1) American Hydrotech, Inc., GardenHatch® Inspection Chambers; size as noted on plans and details.

2.5 MOLDED-SHEET DRAINAGE PANELS

- A. Nonwoven-Geotextile-Faced, Molded-Sheet Drainage Panel: Manufactured composite subsurface drainage panels consisting of a nonwoven, needle-punched geotextile facing with an apparent opening size not exceeding No. 70 (0.21-mm) sieve, laminated to one side with a polymeric film bonded to the other side of a studded, nonbiodegradable, molded-plastic-sheet drainage core, with a vertical flow rate of 9 to 15 gpm/ft. (112 to 188 L/min. per m).
 1. Type: American Hydrotech's "Hydrodrain 300" with compressive strength of 30,000 psf in accordance with ASTM D-1621.
- B. Drainage/Water Retention Component: Three-dimensional, molded panels of recycled polyethylene with drainage channels top and bottom sides and water retention reservoirs top side.
 1. American Hydrotech "Gardendrain GR30".

2.6 INSULATION

- * A. Board Insulation: Extruded-polystyrene board insulation complying with ASTM C578, Type VI, 3-lb/cu. ft. (48 kg/w.m.) minimum density and 40-psi (276-kPa) minimum compressive resistance, square edged.
 - * 1. Drawing Designation: Insulation Type 5.
 2. Thickness: 3" or as shown on drawings.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
 1. Verify that concrete has cured and aged for minimum time period recommended by waterproofing manufacturer.
 2. Verify that substrate is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D4263.
- B. Mat Test: Test shall consist of a minimum area of 12" x 12" with a clear plastic polyethylene sheet tightly taped to the concrete surface. ASTM D4263 test standard.
 1. Edges shall be tightly sealed around the perimeter of the test area with 2" wide duct tape.
 2. This test requires heat/light from either the sun or an artificial heat source such as a heat lamp.
 3. Check for moisture after a 24 hour period.
 4. If no moisture is present, properly heat up the waterproofing membrane to the proper temperature and apply a 4 square foot test area onto the concrete surface.
 5. If initial outgassing, pinholes, or blisters appear, the concrete is not sufficiently dry enough to continue and additional drying time is needed prior to retesting.
 6. If the membrane does not pinhole or blister, inspect the membrane after 24 hours for pinholes and/or blisters.
 7. If none are found, the concrete surface is cured enough to start the installation.
 - a. If blisters or pinholes are found, allow for additional curing of the concrete and retest as outlined above.
 8. Perform pull tests on membrane in the presence of manufacturer's technical representative.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean and prepare substrates according to manufacturer's written instructions. Provide clean, dust-free, and dry substrate for waterproofing application.
- B. Mask off adjoining surfaces not receiving waterproofing to prevent spillage and overspray affecting other construction.

- C. Close off deck drains and other deck penetrations to prevent spillage and migration of waterproofing fluids.
- D. Remove grease, oil, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.
 - 1. Abrasive blast clean concrete surfaces uniformly to expose top surface of fine aggregate according to ASTM D4259 with a self-contained, recirculating, blast-cleaning apparatus. Remove material to provide a sound surface free of laitance, glaze, efflorescence, curing compounds, concrete hardeners, or form-release agents. Remove remaining loose material and clean surfaces according to ASTM D4258.
- E. Remove fins, ridges, and other projections, and fill honeycomb, aggregate pockets, and other voids.

3.3 JOINTS, CRACKS, AND TERMINATIONS

- A. Prepare and treat substrates to receive waterproofing membrane, including joints and cracks, deck drains, corners, and penetrations according to manufacturer's written instructions.
 - 1. Rout and fill joints and cracks in substrate. Before filling, remove dust and dirt according to ASTM D4258.
 - 2. Adhere strip of elastomeric sheet to substrate in a layer of hot rubberized asphalt. Extend elastomeric sheet a minimum of 6 inches (150 mm) on each side of moving joints and cracks or joints and cracks exceeding 1/8 inch (3 mm) thick, and beyond deck drains and penetrations. Apply second layer of hot fluid-applied, rubberized asphalt over elastomeric sheet.
 - 3. Embed strip of reinforcing fabric into a layer of hot rubberized asphalt. Extend reinforcing fabric a minimum of 6 inches (150 mm) on each side of nonmoving joints and cracks not exceeding 1/8 inch (3 mm) thick, and beyond roof drains and penetrations.
- B. At expansion joints and discontinuous deck-to-wall or deck-to-deck joints, bridge joints with elastomeric sheet extended a minimum of 6 inches (150 mm) on each side of joints and adhere to substrates in a layer of hot rubberized asphalt. Apply second layer of hot fluid-applied, rubberized asphalt over elastomeric sheet.
 - 1. Install backer rod and two (2) layers of elastomeric flashing.

3.4 FLASHING INSTALLATION

- A. Install elastomeric sheets at terminations of waterproofing membrane according to manufacturer's written instructions.
- B. Prime substrate with asphalt primer.
- C. Install elastomeric sheet and adhere to deck and wall substrates in a layer of hot rubberized asphalt.
- D. Extend elastomeric sheet up walls or parapets a minimum of 8 inches (200 mm) above plaza-deck pavers and 6 inches (150 mm) onto deck to be waterproofed.
- E. Install termination bars and mechanically fasten to top of elastomeric flashing sheet at terminations and perimeter of waterproofing/roofing.

3.5 MEMBRANE APPLICATION

- A. Apply primer, at manufacturer's recommended rate, over prepared substrate and allow it to dry.
- B. Heat and apply rubberized asphalt according to manufacturer's written instructions.
 - 1. Heat rubberized asphalt in an oil- or air-jacketed melter with mechanical agitator specifically designed for heating rubberized asphalt.
- C. Start application with manufacturer's authorized representative present.
- D. Reinforced Membrane: Apply hot rubberized asphalt to substrates and adjoining surfaces indicated. Spread to a thickness of 90 mils (2.3 mm); embed reinforcing fabric, overlapping sheets 2 inches (50 mm); spread another 125 mil- (3.2-mm-) thick layer to provide a uniform, reinforced, seamless membrane 215 mils (5.5 mm) thick.
- E. Apply waterproofing over prepared joints and up wall terminations and vertical surfaces to heights indicated or required by manufacturer.

- F. Cover waterproofing with protection course sheets while rubberized asphalt is still hot and before membrane is subject to traffic. Form a continuous protective layer for the waterproofing membrane. Butt edges tightly, stagger end joints, and cut to fit at all intersecting surfaces and penetrations.
1. No waterproofing membrane shall be permitted to remain exposed at the conclusion of any working day.

3.6 ROOT STOP PROTECTION COURSE INSTALLATION

- A. Separation/Protection course shall be installed as follows:
1. Embed the Hydroflex RB protection/root barrier protection course into the membrane while it is still hot to insure a good bond.
 - a. Overlap adjoining sheet edges 4 inches and seal the laps with a propane torch.
 2. Embed the Hydroflex 30 separation/protection course into the membrane while it is still hot to insure a good bond. Installation of a separation course is necessary in order to carry out the water test.
 - a. Overlap the adjoining sheet edges (dry) a minimum of 2 to 3 inches to insure complete coverage.

3.7 MOLDED-SHEET DRAINAGE PANEL INSTALLATION

- A. Place and secure molded-sheet drainage panels, with geotextile facing away from wall or deck substrate according to manufacturer's written instructions. Use methods that do not penetrate waterproofing. Lap edges and ends of geotextile to maintain continuity. Protect installed molded-sheet drainage panels during subsequent construction.
1. For vertical applications, install drainage panels against protection board before installing board insulation.

3.8 INSULATION INSTALLATION

- A. Install one or more layers of board insulation to achieve required thickness over waterproofed surfaces. Cut and fit to within 3/4 inch (19 mm) of projections and penetrations.
- B. On vertical surfaces, set insulation units into rubberized asphalt according to manufacturer's written instructions.
- C. On horizontal surfaces, loosely lay insulation units according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.

3.9 ACCESSORY INSTALLATION

- A. Drains shall be fitted with inspection/maintenance chambers and grills, built up to ensure access at growing media level as shown on plans and details.

3.10 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage an independent testing agency to observe EFVM and flood testing and examine underside of decks and terminations for evidence of leaks during flood testing.
1. Test all horizontal areas that received waterproofing via Electric Field Vector Mapping (EFVM). Those areas that cannot be EFVM should be Flood Tested per ASTM D5957.
 2. Flood Testing: Flood test each deck area for leaks, according to recommendations in ASTM D5957, after completing and protecting waterproofing but before overlaying construction is placed. Install temporary containment assemblies, plug or dam drains, and flood with potable water. Testing agency shall observe flood testing.
 - a. Flood to an average depth of 2-1/2 inches (65 mm) with a minimum depth of 1 inch (25 mm) and not exceeding a depth of 4 inches (100 mm). Maintain 2 inches (50 mm) of clearance from top of sheet flashings.
 - b. Flood each area for 48 hours.
 - c. After flood testing, repair leaks, repeat flood tests, and make further repairs until waterproofing installation is watertight.

3.11 CLEANING AND PROTECTION

- A. Protect waterproofing from damage and wear during remainder of construction period.
- B. Protect installed board insulation from damage due to UV light, harmful weather exposures, physical abuse, and other causes. Provide temporary coverings where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

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

3.12 SUBSEQUENT TOPPING MATERIAL PLACEMENT

- A. Landscape Plaza Assembly (components listed from concrete substrate to top):
 - 1. Concrete substrate.
 - 2. Primer or surface conditioner.
 - 3. Waterproofing membrane with reinforcing fabric.
 - 4. Root Stop/Protection Course:
 - 5. Board Insulation.
 - 6. Drainage/Water Retention Component:
 - 7. Filter Fabric.
 - 8a. Geosynthetic Fill (as specified in Division 32 Section "Geosynthetic Fill").
 - 8b. Growing Media (as specified in Division 32 Section "Planting Soil Preparation").
 - 9a. Vegetation (as specified in Division 32 Section "Planting Materials").
 - 9b. Stone Pavers (as specified in Division 32 Section "Sand-Set Stone Paving").
 - 10. Location: Ground level plaza.
- B. Stone Plaza Deck (components listed from concrete substrate to top):
 - 1. Concrete Substrate.
 - 2. Primer or Surface Conditioner.
 - 3. Waterproofing Membrane with Reinforcing Fabric.
 - 4. Protection Course.
 - 5. Molded Sheet Drainage Panel.
 - 6. Stone setting bed.
 - 7. Stone pavers (as specified in Division 32 Section "Sand-Set Stone Paving").
 - 8. Location: Floor 5 Porch.

END OF SECTION