

SECTION 071413 FLUID MEMBRANE WATERPROOFING

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. The Work of this Section includes all labor, materials, equipment, and services necessary to complete the waterproofing as shown on the drawings and/or specified herein, including, but not limited to, the following:
 - 1. Preparation of surfaces to receive fluid applied waterproofing.
 - 2. Fluid applied waterproofing system on structural concrete deck below Plaza.
 - 3. Precast concrete pavers and pedestals.
 - 4. Installation of rigid insulation.
 - 5. Sealant work in conjunction with fluid applied waterproofing.
 - 6. Water testing of fluid applied waterproofing.
 - 7. Temporary protection of fluid applied waterproofing systems until covered by work of this Section.
 - 8. Supervision of installation of fluid applied waterproofing system by manufacturer's representative of fluid applied waterproofing material.
 - 9. Warranty of fluid applied waterproofing system.

1.3 RELATED SECTIONS

- A. Concrete deck - Section 033000.
- B. Pavers - Section 077600.
- C. Drains - Division 22.
- D. Excavation - Division 31.

1.4 SUBMITTALS

- A. Shop Drawings - submit for: Typical installation details, showing details at drains, at reinforcing flashings, at terminations, at joints in structure below, at intersection of horizontal and vertical surfaces, at penetrations in membrane systems.
- B. Samples - Submit:
 - 1. Fluid applied membrane, cured sample.
 - 2. Insulation material, 12" x 12".
 - 3. Flashing material, 12" x 12".
 - 4. Drainage layer, 12" x 12".
 - 5. Protection sheet, 12" x 12".
 - 6. Reinforcing sheet, 12" x 12".

- C. Manufacturer's Literature: Submit manufacturer's technical and installation literature for all materials of this Section.
- D. Submit certification from an independent testing laboratory that the rubberized asphalt waterproofing material conforms to the CGSB 37-GP-50 Standard.
- E. Submit certification from the manufacturer showing full time quality control of rubberized asphalt production facilities and that each batch is tested to insure conformance with published physical properties.
- F. Submit certification from membrane manufacturer that all components of assembly are compatible and shall be covered by a single source warranty.
- G. Contractor's Certification: Submit per Article 1.8.
- H. Subcontractor's Qualifications: Submit per Article 1.9.

1.5 PRODUCT HANDLING

- A. Deliver materials in original unopened containers or packaging clearly labeled with manufacturer's name, brand name, instruction for use, all identifying numbers, and UL labels.
- B. Materials shall be stored in a neat, safe manner, not to exceed the allowable structural capacity of the storage area.
- C. Store materials in a clean, dry area protected from water and direct sunlight.
- D. Store all adhesives at temperatures between 60 degrees F. and 80 degrees F. If exposed to lower temperatures, restore materials to 60 degrees F. minimum temperature before using.
- E. Do not use materials damaged in handling or storage.

1.6 JOB CONDITIONS

- A. Application of the membrane shall not commence nor proceed during inclement weather. All surfaces to receive the membrane shall be free of water, dew, frost, snow and ice.
- B. Application of membrane shall not commence nor proceed when the ambient temperature is below 0 degrees F.
- C. Preparation and application of membrane must be conducted in well ventilated areas.
- D. Over its service life, do not expose membrane or accessories to a constant temperature in excess of 180 degrees F. (i.e. hot pipes and vents or direct steam venting, etc.)
- E. Adhesives contain petroleum distillates and are extremely flammable. Do not breathe vapors or use near an open fire. Do not use in confined areas without adequate ventilation. Consult container or packaging labels and Material Safety Data Sheets (MSDS) for specific safety information (available from Hydrotech).
- F. Do not allow waste products (petroleum, grease, oil, solvents, vegetable or mineral oil, animal fat, etc.) to come in contact with the PRM (Protected Roof Membrane). Any exposure to foreign

materials or chemical discharges must be presented to membrane manufacturer for evaluation to determine any impact on the roof membrane assembly performance.

1.7 PROTECTION

- A. Against Loads: Protect work of this Section against concentrated loads and any other loads or equipment that would damage the materials or work. Use boards or other approved means to safely distribute the loads.
- B. Against Traffic: Do not permit traffic on work of this Section except for workmen doing the work, during the installation and after the installation, until covered with protective boards or with the specified protection of finish materials. Take necessary preventive measures to protect work of this Section from damage during and after application, until traffic is permitted.
- C. Rejection of Damaged Work
 - 1. Damaged materials or work will be rejected.
 - 2. Rejected materials or work must be immediately removed and replaced with new materials, at the Contractor's expense.

1.8 MANUFACTURER'S REPRESENTATIVE

- A. Contractor shall require representative of the manufacturer of the fluid applied waterproofing material to provide field instructions and supervision for the installation of the complete fluid applied waterproofing system at the start of the work of this Section.
- B. Contractor shall require the manufacturer's representative to make sure that the Subcontractor's workmen are fully instructed and trained in the handling and application of all the materials, and shall see that the materials are correctly installed.
- C. Upon completion of the installation, the Contractor shall submit to the Architect written certification that the representative of the manufacturer of the fluid applied waterproofing material has supervised the work of this Section and that all materials were correctly installed.

1.9 QUALIFICATIONS OF SUBCONTRACTORS

- A. Subcontractors: All work of this Section shall be performed by an Installer who is approved by the manufacturer of the fluid applied waterproofing materials.
- B. Qualifications of Installers: Installers shall submit evidence of being bona fide waterproofing subcontractors and that they are approved by the manufacturer of the fluid applied waterproofing material for the installation of their material and in accordance with the requirements of this Section. Installer shall submit letter from manufacturer of fluid applied waterproofing material stating that subcontractor is approved by the manufacturer for the application of the fluid applied waterproofing system specified for the Project. Letter shall certify that the Installer has satisfactorily applied the fluid applied waterproofing system specified herein under the manufacturer's supervision. Letter shall be on manufacturer's letterhead and shall be signed by an officer of the company.

1.10 WARRANTY

- A. Waterproofing Contractor: 2 years.

- B. Waterproofing System Manufacturer: 20 year Material Warranty.
- C. Waterproofing System Manufacturer: 10 Year Single Source Watertight Warranty on waterproofing areas including removal and replacement of separation sheet, drainage material, insulation and flashing. Warranty shall state:
 - 1. The membrane and flashing will remain watertight for ten years.
 - 2. Both material and workmanship problems are covered.
 - 3. The insulation will retain at least 80% of its thermal value.
 - 4. In the event that the waterproofing fails to perform, manufacturer/supplier shall make repairs to the waterproofing to enable it to perform as warranted.
 - 5. Removal and replacement of overburden is covered under this warranty.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations for Waterproofing System: Obtain waterproofing materials, protection course and drainage panels from single source from single manufacturer.
- B. Source Limitations for Plaza-Deck Paving: Obtain plaza-deck pavers from single source from single manufacturer.

2.2 MATERIALS

- A. Membrane: Membrane shall be a hot, fluid applied, fabric reinforced rubberized asphalt membrane equal to American Hydrotech Liquid Membrane 6125 FR, or approved equal made by Carlisle or Tremco or approved equal, meeting the following physical properties:

<u>Properties</u>	<u>Test Method</u>	<u>Requirements</u>
Flash point	ASTM-D-92, CGSB 37- GP-50M	500 degrees F (260 degrees C)*
Low temperature crack bridging capability	CGSB 37-GP-50M	No cracking, adhesion loss, or splitting
Water vapor permeability	ASTM-E-96, PROCEDURE E, CGSB 37-GP-50M	1.7 ng/Pa(s)m2 max (0.027 perm)
Water resistance (5 days/50 degrees C)	CGSB 37-GP-50M	No delamination, blistering, emulsification, or deterioration.
Water absorption	CGSB 37-GP-50M	Gain in weight 0.35 g max loss in weight 0.18 g max
Elasticity/Ratio of Toughness to Peak Load	CGSB 37-GP-50M	Min. toughness of 5.5 joules (48.67 in pound)/.04
Viscosity	CGSB 37-GP-50M	2 - 15 seconds
Heat Stability	CGSB 37-GP-50M	No change in viscosity, penetration, flow or low temperature flexibility
Low temperature flexibility (-25 deg.C)	CGSB 37-GP-50M	No delamination, adhesion loss, or cracking
Penetration	ASTM-D-1191, CGSB- 37-GP-50M	77 degrees F (25 degrees C) max 110, 122 degrees F (50 degrees C) max 200
Flow	ASTM-D-1191 CGSB 37-GP-50M	140 degrees F (60 degrees C) 3.0 mm-max
Softening point	ASTM-D-36	180 degrees F (82 degrees C)
Elongation	ASTM D-1191	1000% min.
Resiliency	ASTM-D-3407	40% min.
Bond to Concrete (0 degrees F, -18 degrees C)	ASTM-D-3408	Pass
Acid Resistance	ASTM-D-896-84, Procedure 7.1, Note 8	Pass-Nitric Acid Sulfuric Acid
Solids Content		100% - no solvents
Shelf Life		6 years (sealed containers)
Specific gravity		1.25

- B. Flashing/Reinforcing
 - 1. 60 mil thick, red lead catalyst, uncured neoprene flashing/reinforcing sheet equal to American Hydrotech Flex Flash UN.
 - 2. Spunbonded polyester fabric reinforcing sheet equal to American Hydrotech Flex Flash F.
- C. Surface Conditioner: An asphalt based primer for concrete surfaces meeting ASTM D41-85 and/or CGSB 5M equal to American Hydrotech Surface Conditioner.
- D. Adhesives
 - 1. Contact adhesive used to bond Flashing to an approved substrate shall be American Hydrotech Surface conditioner.
 - 2. Contact Adhesive used to bond Flashing together shall be American Hydrotech Splicing Cement.
- E. Sealant
 - 1. Sealant used to seal laps of neoprene flashing shall be American Hydrotech Lap Sealant.
 - 2. Sealant used to adhere American Hydrotech Hypalon shall be as follows:
 - a. Hypalon to Substrate: American Hydrotech bonding adhesive.
 - b. Hypalon to Hypalon: Heat weld or use American Hydrotech bonding adhesive.
 - c. Visible Seams and Joints: American Hydrotech standard white lap sealant.
- F. Protection Sheet: A heavy duty fiberglass reinforced, rubberized asphalt sheet on horizontals and verticals equal to American Hydrotech Hydroflex 30.
- G. Fabricated Drainage Layer (where noted): A high-density polyethylene drainage core bonded to a calendered non-woven geotextile with a minimum compressive strength of 30,000 psf shall be American Hydrotech Hydrodrain.
- H. Insulation: Extruded polystyrene board insulation equal to "Styrofoam Highload 100" manufactured by Dow Chemical Co., or approved equal; as furnished under Section 072100.

2.3 PLAZA DECK PAVERS AND PEDESTALS

- A. Refer to Section 077600.

PART 3 - EXECUTION

3.1 INSPECTION - WATERPROOFING CONTRACTOR

- A. Examine all surfaces to receive the waterproofing materials to assure a proper installation. Verify the following:
 - 1. Type, strength, density, and cure time of concrete.
 - 2. Wood float finish, free from defects.
 - 3. Structural limitations of deck.
 - 4. Proper drains and other flashing details.
 - 5. Proper slab slope.
- B. Do not proceed with waterproofing application until all defects are repaired.

3.2 PREPARATION

- A. All surfaces must be dry, smooth, rigid, clean, frost free and free of voids, sharp protrusions or other defects or contaminants, including unapproved curing compounds and form release agents.
 - 1. Poured in Place concrete decks shall be smooth, monolithic, and free of voids, spalled areas, honeycombs, loose aggregate and sharp protrusions. Normal Weight concrete (minimum 2500 psi compressive strength and 135 pcf density) shall be cured a minimum of 14 days.

3.3 INSTALLATION: GENERAL REQUIREMENTS

- A. Final Substrate Cleaning
 - 1. Thoroughly sweep the substrate which is to receive membrane.
 - 2. The substrate must also be blown clean using an air compressor to remove any remaining loose debris.
- B. Surface Conditioner Application (Concrete Surfaces)
 - 1. Apply the surface conditioner to the substrate using a hand held sprayer, or a short nap roller, evenly at a rate of 300 to 600 square feet per gallon (depending on surface texture). Surface conditioner shall "tan" the concrete surface, not blacken it.
 - 2. Allow sufficient time for the surface conditioner to thoroughly dry prior to the membrane application. Membrane will not bond to surface conditioner which has not dried.
 - 3. Do not spray surface conditioner onto previously installed membrane.
- C. Membrane Preparation
 - 1. The membrane shall be heated in a double jacketed, oil bath melter with mechanical agitation, specifically designed for the preparation of hot-applied, asphalt materials.
 - 2. Heat membrane until the material can be drawn-free flowing at a temperature range between 350 degrees and 425 degrees F.

3.4 REINFORCING FLASHING

- A. General: See Article 3.3 for application of surface conditioner for hot applied waterproofing membrane material prior to application of reinforcing flashing. Reinforcing flashing (rubber flashing sheet) shall be installed in long lengths with min. number of splices. Splices in reinforcing flashing shall be made by lapping reinforcing flashing 4" min. and sealing lap with adhesive specified herein. Make splices prior to installing reinforcing flashing. Reinforcing flashing shall be embedded in waterproofing membrane coating while still warm and tacky, and then covered with waterproofing membrane on the same day as the embedment of the reinforcing flashing.
- B. Cracks and Non-working Joints: To cracks, concrete construction joints, concrete pour joints, and other non-working joints up to and not exceeding 1/8" in width, apply a 6" wide strip of spunbonded polyester fabric reinforcement. Center the strip over the crack or joint. Roll strip into a 1/8" coating of waterproofing membrane, and apply a second coat of waterproofing membrane over the strip extending a min. of 6" beyond strip edges.
- C. Control Joints and Expansion Joints Up To 1/2" Wide: Joints 1/2" and smaller shall first be sealed by backing joint with oakum (place oakum in a joint to a depth of 1/2"), then fill joint with fluid applied membrane. Embed a 24" wide strip of 60 mil uncured neoprene centered over

the joint 1/8" coating of waterproofing membrane. Apply a second coat of membrane over strip extending a minimum of 12" beyond strip edges. For expansion joints from 1/2" to 1" in width, the 60 mil uncured neoprene sheet shall be looped down into the joint between 1-1/2" and 1-3/4" from the horizontal concrete surface and otherwise embedded and coated in the same manner as for cracks and non-working joints, except that the sheet shall be supplied wide enough to extend at least 6" on either side of the expansion joint.

- D. Corners, Joints Between Horizontal and Vertical Surfaces, Non-monolithic Changes in Place, and Membrane Penetrations:
1. For external and internal corners, construction joints and expansion joints between horizontal and vertical surfaces, non-monolithic changes in place, and penetrations in membrane surface, the same procedures as specified above under paragraphs A, B, and C of this Article shall apply. Carry rubber flashing sheet min. of 3" up the vertical surface and 3" out onto the horizontal surface, unless otherwise indicated.
- E. Drains: At drains, use 60 mil uncured neoprene flashing sheet, carefully cut to suit openings of drain and to extend onto entire surface of drain flange and at least 6" beyond edge of drain flange. Embed rubber flashing sheet into 1/8" coating of waterproofing membrane, and apply a second coat of waterproofing membrane onto the rubber flashing sheet and extending a min. of 6" beyond outer edge of flashing sheet. Drains shall be as recommended by membrane material manufacturer. The drain flange shall be slightly below the membrane level. The waterproofed surface must be allowed to drain at the membrane surface level. Drain collar shall have a sufficient number of weep holes to provide adequate drainage. Contractor shall coordinate drain requirements with his roofing subcontractor and with the plumbing contractor.
- F. Flashing: At parapets, curbs, wall junctures or other conditions where flashing is to be exposed, use 60 mil uncured neoprene. The uncured neoprene flashing should extend a minimum of 3" out onto the deck and up the vertical surface to its termination point. No exposed flashing, membrane shall terminate in reglet below finished grade or sidewalk as detailed on drawings. The uncured neoprene sheet should be secured to the vertical surface (except the bottom 3") with bonding adhesive. The fluid applied membrane should then be applied into the juncture underneath and behind the uncured neoprene sheet (1/8" min. thickness) 3" up the vertical and 6" out onto the deck. The uncured neoprene should then be embedded into the warm fluid applied membrane should then be applied (1/8" min.) to the top of the uncured neoprene that rests on the deck totally encapsulating the uncured neoprene sheets edge.
1. The uncured neoprene flashing shall be used in lengths as long as possible. When a lap or seam between one sheet and another must be made, use splicing cement to joint them (min. lap width, 4") and lap sealant to seal the sheet lap edge.

3.5 APPLICATION OF MEMBRANE

- A. Surface Conditioner: After preparation of surfaces as specified above, but prior to installation of reinforcing flashing and membrane, apply specified surface conditioner to the substrate surfaces at rate of 300 to 600 sq. ft. per gal. depending on the concrete surface and as recommended by American Hydro-Tech. Protect surface conditioner from rain until dry.
- B. Membrane Application: Apply the rubberized asphalt membrane at a rate to provide a continuous, monolithic coating of 90 mils, into which is fully embedded a layer of Flex Flash F, followed by another continuous monolithic coat of membrane at a minimum thickness of 125 mils. Monitor thickness by laying out formula of gallons/sq. ft. as recommended by the manufacturer.

3.6 PROTECTION SHEET INSTALLATION

- A. Embed the protection sheet into the membrane while it is still hot to insure that a good bond between them is achieved.
- B. On horizontals, overlap adjoining sheet edges (dry) a minimum of 2-3 inches to insure complete coverage. The adhere laps using hot rubberized asphalt. On verticals, protection or insulation boards should be butted tightly.
- C. The Protection Sheet must be covered by the topping materials as soon as possible, within 30 days of membrane installation. In the event that topping materials are not installed immediately, provide interim protection for liquid membrane waterproofing system until permanent protection slabs or other toppings are installed.

3.7 WATER TEST

- A. All areas should be water tested by ponding water a minimum depth of 2" for a period of 48 hours to check the integrity of the installation. Before testing, it should be verified that the structure can support the dead load of the water. If leaks occur the water must be drained completely, and the membrane installation repaired, and the test run again.

3.8 INSULATION PLACEMENT ABOVE THE MEMBRANE

- A. Prefabricated Drainage Layer: Install under insulation set dry following manufacturer's instructions.
- B. Insulation Placement
 - 1. Insulation shall be placed on the drainage layer as each section of the membrane installation is completed.
 - 2. Loose lay insulation in a staggered manner and tightly butt together all insulation boards. The maximum acceptable opening between insulation boards is 3/8". Insulation must be installed within 3/4" of all projections, penetrations, cant strips, etc.

3.9 JOB COMPLETION

- A. Contractor shall inspect the completed system and correct all defects.
- B. Clean up all debris and equipment.

END OF SECTION 071413