**PART 1 - GENERAL**

**1.01 SUMMARY**

A. Provisions of Division 01 apply to this section.

B. Section Includes:

1. Hot applied fluid waterproofing membrane on horizontal concrete surfaces. Including parking, recreation areas, walks, plazas, and as indicated.

C. Related Sections:

1. Section 31 41 00: Storm Drainage Systems.

2. Section 03 30 00: Cast-in-Place Concrete.

3 Section 07 13 00: Sheet Waterproofing.

4. Division 23: Mechanical

5. Division 26: Electrical.

**1.02 SUBMITTALS**

A. Certificates: Submit a certificate stating applicator is certified by the waterproofing material manufacturer and, upon completion, submit a certificate stating that waterproofing systems have been installed in conformance with reviewed submittals and manufacturer's recommendations.

B. Product Data: Submit manufacturer's Product Data including complete installation instructions.

C. Shop Drawings: Submit Shop Drawings indicating each condition of the Work. Indicate all adjoining Work, and indicate methods of adhesion and attachment, laps, and related conditions.

D. Samples: Submit Samples, not less than 12 inches square, of waterproofing mounted on plywood. Indicate each successive coat in strips not less than 2 inches wide.

E. Experience Record: Submit a list of at least five installations on which each of the materials and systems proposed for use have been in satisfactory service for at least 3 years.

**1.03 QUALITY ASSURANCE**

A. Qualifications of Manufacturer: Fluid-applied waterproofing system shall be manufactured by a firm with a minimum of 20 years experience in the production of fluid applied waterproofing.

B. Qualifications of Installer: A firm which has at least 3 years experience in work of the type required by this section, and is recommended by manufacturer to install the specified products.

C. Pre-Installation Conference and Inspection: After review of submittals but before starting installation of the Work of this section, conduct a meeting at the Project site attended by the PI, Architect, OAR, Contractor, and FUSD waterproofing applicator and a technical representative of the waterproofing material manufacturer. The waterproofing applicator and material manufacturer's technical representative shall inspect the substrates to receive Work of this section and report defective conditions to PI, Architect, OAR and Contractor.

D. Manufacturer's Representative: Provide arrangements necessary to have a trained representative of the manufacturer visit the Project site on a weekly basis during membrane waterproofing Work to review installation procedures.

E. Materials shall comply with current State of California and local Air Quality Management District requirements for volatile organic compounds of not over 350 grams per liter.

**1.04 DELIVERY, STORAGE, AND HANDLING**

A. Deliver materials, except bulk material, in manufacturer's unopened containers fully identified with manufacturer's name, trade name, type, class and grade. Each container shall be identified with material name, date of manufacturer and batch number.

B. Store materials in unopened containers. Store above grade and under cover, protected from damage.

**1.05 PROJECT CONDITIONS**

A. Install suitable impervious type masking to preclude staining of surfaces to remain exposed wherever waterproofing abuts or laps on to other finish surfaces, and provide additional protection as necessary to supplement masking; cover entire area of building subject to damage or staining.

B. Protect adjacent Work during installation of Work of this Section.

C. Apply Work of this section, only in dry weather and when temperature of surfaces to receive waterproofing are above 40 degrees F and below 90 degrees F.

D. Do not install any materials when water in any form is present on the surface or if materials are wet.

**1.06 WARRANTY**

1. Manufacturer shall provide a 5 year material warranty.
2. Installer shall provide a 5 year labor warranty.

**PART 2 - PRODUCTS**

**2.01 ACCEPTABLE MANUFACTURERS**

A. Fluid applied waterproofing shall be manufactured by American Hydrotech, Inc., American Permaquik, or equal.

**2.02 MATERIALS**

A. Asphalt Primer: ASTM D 41.

B. Waterproofing: Hydrotech Liquid Membrane 6125 or Permaquick PG 6100, conforming to the following:

| PHYSICAL PROPERTIES | | |
| --- | --- | --- |
| Physical property, units | Test Method | Acceptable value |
| Flash point, degrees | ASTM D 92 | 565 degrees F.  296 degrees C. |
| Penetration  @ 77 degrees F.  @ 122 degrees F. | ASTM D 1191 | 56, max. 110  140, max. 200 |
| Water vapor permeability  ng/pa.s.m2 | ASTM E 96, procedure E | 1.5, 1.7 max. |
| Low temperature flexibility |  | -25 deg. C., no delamination, adhesion loss or cracking. |
| Acid resistance | ASTM D 896, procedure 7.1 | pass - nitric acid, sulfuric acid |
| Flow | ASTM D 1191 | 3.0mm max @ 140 degrees F., 60 degrees C. |
| Softening point | ASTM D 36 | 180 degrees F,  82 degrees C |
| Elongation, percent | ASTM D 1191 | 1000 |
| Resiliency, percent | ASTM D 3407 | 40 |
| Bond to concrete, 0 degrees F.,  -10 degrees C. | ASTM D 3408 | pass |
| Solids content, percent |  | 100, no solvents |
| Specific gravity |  | 1.23 |
|  |  |  |

C. Heavy Duty Reinforcing: Hydrotech Flex Flash UN or Permaquick PQ 2063 butyl.

D. Standard Duty Reinforcing: Hydrotech Flex Flash F or Permaquick PQ 2016.

E. Flashing: Hydrotech Hydroflash, Permaquick PQ 2047, butyl or uncured neoprene, not lighter than 0.060 inches thick.

F. Protection Board: Hydrotech Hydroflex 30, Permaquick PQ 2450, non-absorbing polypropylene/polyethylene copolymer.

G. Exposed Flashing: Uncured neoprene or butyl, not lighter than 0.060 inches thick.

H. Perforated Gravel Ring: Fabricate from stainless steel.

I. All other materials: Manufacturer’s standard for items required to be provided.

**PART 3 - EXECUTION**

**3.01 PRELIMINARY WORK**

A. Inspect and verify condition of substrates and related Work, in the presence of the manufacturer’s technical representative. Do not start installation of membranes until defects in substrates have been corrected. Concrete shall be smooth, dry, and free of voids. Install a parge coat on masonry construction. Wood decks shall be clean, dry, and free from projecting nails, splinters, and foreign materials.

**3.02 PREPARATION**

A. Preparation of Surfaces: Clean substrate of materials, including curing compounds, form release agents and retarding agents, which would impair Work. Patch cracks, voids and honeycombs to provide smooth, structurally sound surface. Cut off high spots and grind smooth. Install fluid applied waterproofing only after curbs, blocking, drains, drains piping, conduits and other items have been installed.

**3.03 PROTECTION OF ADJACENT CONSTRUCTION**

A. Protect building from damage resulting from spillage, dripping, and dropping of materials. Prevent materials from entering and clogging drains and waterways.

**3.04 INSTALLATION**

A. Install fluid applied waterproofing in accordance with manufacturer's printed instructions except as hereinafter specified. Coordinate the Work so the complete membrane, including reinforcement and protection board, are applied in a continuous operation, and that all areas where installation has started are completed the same working day.

B. Prime concrete.

C. Heat materials to proper temperature recommended by manufacturer, but do not exceed upper temperature limit. Remove over-heated materials from the Project site. Provide clearly visible thermometer on kettles and maintain in proper working order.

D. Unless otherwise indicated, extend fluid applied waterproofing 8 inches on vertical surfaces where waterproofing is turned up or down.

E. Detailing: All detailing, flashings and terminations shall be installed in accordance with reviewed Shop Drawings. Provide the longest pieces of flashing or reinforcing which are practicable based on Project site conditions.

1. Cracks: Cracks over 1/16 inch but less than 1/4 inch in width, install membrane, 125 mils thick, over the crack area. Center a 6 inch wide strip of heavy duty reinforcing over the crack and embed firmly into the warm membrane. Install another coat of membrane, 125 mils thick, over the reinforcing sheet, totally encapsulating it in membrane.

2. Construction and control joints: Install membrane, 125 mils thick, over the joint area. Center a 6 inch wide strip of heavy duty reinforcing over the joint and embed firmly into the warm membrane, 125 mils thick, over the reinforcing sheet, totally encapsulating it in membrane.

3. Expansion joints

a. Expansion joints up to 1/2 inch in width (50% total designed movement): Install membrane, 125 thick, over the expansion joint area. Center a strip of heavy duty reinforcing extending a minimum of 3 inches onto either side of the joint and embed firmly into warm membrane. Install another coat of membrane, 125 mils thick, over the reinforcing sheet, totally encapsulating it in membrane.

b. Expansion joints up to 2 inches in width (50% total designed movement): Install membrane, 125 mils thick, over the expansion joint area. Embed firmly into the warm membrane a sheet of heavy duty reinforcing looped down into the joint 1‑1/2 times the joint width, and extending a minimum of 6 inches onto either side of the joint. Insert an expansion joint foam rod (1 inch larger in diameter than the maximum joint opening) snugly into the top of the reinforcing loop. While membrane is still warm install another strip of heavy duty reinforcing extending a minimum of 8 inches onto either side of the joint, looping it upward at center to accommodate the rod. A final coat of membrane, 125 mils thick, shall be installed over the heavy duty reinforcing, except at the loop, totally encapsulating the reinforcing sheet edges.

c. The anticipated movement of the deck at expansion joints is designed to be taken by the excess (Flex-Flash UN) "looped" material. The detail shall not be constructed so that stress could occur within the flashing sheet.

4. Drains:

a. Install membrane, 125 mils thick, around the drain, extending it in the drain bowl flange and out 12 inches onto the roof deck.

b. Embed firmly one sheet of heavy duty reinforcing centered over the drain bowl into the membrane while it is warm. The reinforcing shall extend beyond the drain bowl flange onto the deck a minimum of 6 inches in all directions.

c. Install the drain clamping ring making sure all bolts are properly tightened. Cut out the center of the heavy duty reinforcing covering the drain bowl.

d. Install membrane, 125 mils thick, over the exposed heavy duty reinforcing totally encapsulating it.

5. Flashing for penetrations:

a. Flash all penetrations (pipes, supports, vents, etc.) passing through the membrane. All penetrations shall be properly secured to the deck.

b. The flashing seal shall be installed directly to the penetration passing through the membrane. The flashing shall not be terminated to an intermediate element (metal flashing, insulation, surface treatment etc.).

c. Flexible penetrations shall be enclosed in a stable "goose neck" set in membrane and secured to the deck. Provide a field fabricated pipe seal to flash the "goose neck."

d. Hot pipes (temperatures over 180 degrees F.): Provide flashing to an intermediate "cool" sleeve in accordance with membrane manufacturer's recommendations.

6. Exposed flashings, including curbs, parapets and walls:

a. The flashing sheet when installed shall extend out onto the deck a minimum of 3 inches and up the curb, parapet, wall, etc., a minimum of 8 inches above the finished surface. The flashing sheet shall be adhered to the vertical surface with bonding adhesive starting 2‑3 inches off the deck up full height and terminated. The 2‑3 inch of unbonded flashing on the vertical and the 3 inch of flashing which extends out onto the deck shall be firmly set into membrane, 125 mils thick, while it is still warm. The 3 inches of flashing that extends out onto the deck shall be coated with more membrane, 125 mils thick, totally encapsulating the sheet edge. The flashing shall be firmly embedded into the membrane at the corner so that no air pockets or voids are present.

1. Waterproofing Membrane System Application:

a. Install the rubberized asphalt membrane at a rate to provide a continuous, monolithic coating of 90 mil minimum or approximately 2.3 mm, into which is fully embedded a layer of the fabric reinforcing sheet, following by another continuous monolithic coat of membrane at a minimum thickness of 125 mil or approximately 3.2 mm. Total membrane thickness to be provided is 215 mils or approximately 5.5 mm. Overlap fabric reinforcing sheet 1-2 inches (25.4mm – 50.8 mm) with membrane between sheets.

G. Protection Board: Embed protection board in fluid applied waterproofing. Lap seams 3 inches and seal seams with membrane. Maintain protection until finish cover is installed.

H. Coordinate placement of concrete or paver covering to prevent damage to membrane system.

**3.05 TEST OF MEMBRANES**

A. All horizontal membranes shall be subject to standing water test after completion, but before protection board is applied. Tests shall be conducted as soon as possible after completion of membrane in each area. When membrane installation is completed, seal drain, sandbag perimeter, fill membrane with water to height of not less than 2 inches, pond test for not less than 24 hours, repair all leaks or defects, and test until results are satisfactory. Remove all sandbags, plugs, and drain when testing is completed. Clean surfaces of membrane.

**3.06 PROTECTION**

A. Protect the Work of this section until Substantial Completion.

**3.07 CLEANUP**

A. Remove rubbish, debris and waste materials and legally dispose of off the Project site.

**END OF SECTION**