**SECTION 07 10 16**

**WATERPROOFING FOR UTILITIES**

**BASED ON MASTER SPECIFICATION DATED 11/18/2022**

***This section has been written to cover most (but not all) situations that you will encounter. Depending on the requirements of your specific project, you may have to add material, delete items, or modify what is currently written. The Division of Facilities Development expects changes and comments from you.***

 **P A R T 1 – G E N E R A L**

**SCOPE**

This section includes specifications for waterproofing systems. Included are the following topics:

PART 1 - GENERAL

Scope

Related Work

Reference

Shop Drawings

PART 2 - PRODUCTS

Sheet Waterproofing Membrane

Spray On Waterproofing Membrane

Blindside Waterproofing Membrane

Waterproof Membrane Primer

Protection Board

PART 3 - EXECUTION

Surface Preparation

Priming

Installation (Sheet Membrane Waterproofing)

Installation (Blindside Waterproofing)

Protection board Work

Cold Weather Protection

Application

**RELATED WORK**

Section 03 30 00 Cast-in-Place Concrete

**REFERENCE**

Applicable provisions of Division 1 shall govern work under this section.

**SHOP DRAWINGS**

Product Data: Provide data on waterproofing primer and protection board.

 **P A R T 2 - P R O D U C T S**

**BLINDSIDE WATERPROOFING MEMBRANE**

Manufacturers:

 W.R Grace “Preprufe”,Preprufe 300R-Below slab,

 Carlisle, “MiraPly” or WRMeadows PRECON

Material: Composite sheet, HDPE film, adhesive and water resistant protective coating.

Elongation: 300%, ASTM D 412

Peel Adhesion to Concrete: 5 lb./in. ASTM D903

Tensile Strength: 1200 lbs./in. ASTM D412

Hydrostatic Head Resistance: 230 feet min.

Accessories: Primer, mastic, joint sealers, Joint Seam Tape, cant straps and protection boards as recommended by manufacturers.

**SPRAY-ON POLYUREA WATERPROOFING MEMBRANE**

Manufacturers: GCP Applied Technologies “Silcor 900MP”, PPG “BDM”,Spray applied waterproofing or approved equal.

Provide 90 mils coating to exterior structure surface. Wrap entire structure with composite membrane.

Adhesion to Concrete: 479 psi. ASTM D4541

Tensile Strength: 4090 psi. ASTM D412

Tear Resistance: 487 lb/in. ASTM D751

Low Temperature Crack Bridging: Pass ASTM C836

Shore Hardness: 91A ASTM 2240

Accessories: Spray equipment, and other accessories as recommended by product manufacturer.

**LIQUID MEMBRANE**

Manufacturers: W.R Grace “Bithuthene Liquid Membrane”, Carlisle “CCW-703”.

Material: Liquid elastomeric, cold applied, trowel applied.

Accessories: Trowel, Paddle mixer and other accessories as recommended by product manufacturer.

**SHEET WATERPROOFING MEMBRANE**

Manufacturers:

W.R. Grace, "Bituthene".

Carlisle, “MiraDri”.

Material: .060 inch thick 100% bonded to concrete surfaces with joints lapped minimum 6".

Accessories: Primer, mastic, joint sealers, cant strips and protection boards as recommended by manufacturer.

Tensile Strength (ASTM D 412): 250 psi min.

Ultimate Elongation (ASTM D 412): 300% min.

Brittleness Temperature (ASTM D 746): 25° F. (32° C.)

Hydrostatic Head Resistance: 150 feet min.

Water Absorption (ASTM D 570): Not more than 0.5% weight gain for 48 hours of immersion at 70° F.

***Note: Sheet type membrane is NOT to be the basis of design unless specifically approved by the PM. Sheet type membranes do not age well on below grade steam structures. This type of waterproofing should only be used where prolonged exposure to heat will NOT adversely affect the material properties.***

**WATERPROOFING MEMBRANE PRIMER**

Manufacturers: GCP Applied Technologies “SILCOR Primer EPF”, PPG Raven 155.

Material: Two-component epoxy primer for concrete substates.

Accessories: Roller or brush, and other accessories as recommended by product manufacturer.

**BACKFILL PROTECTION BOARD**

Manufacturers: Grace Hydroduct 220 or Carlise CCW Miradrain 6200

Material: 0.4” High impact polystyrene

 Non-woven geotextile fabric

12 GPM flow rate

***Note: Backfill Protection board is not required with Polyurea waterproofing. Remove from spec if not used.***

 **P A R T 3 - E X E C U T I O N**

**GENERAL**

Contractor shall follow all manufacturers’ recommended preparation, installation and personnel protection instructions. Contractor shall verify that all materials are compatible with bonding agents and or all other adjacent materials.

**SURFACE PREPARATION**

Ambient, surface and material temperatures should be over 40 degrees F. during the application of waterproofing membrane mastic and primer. Application at temperatures below 40° F. shall be with manufacturers approval and per their recommendations.

Ensure surfaces are in condition to receive the waterproofing. Start of application shall be considered as acceptance of surface conditions. All concrete is to be surface dry and cured for at least three (3) days prior to start of waterproofing work.

Remove fins and loose material, fill wire holes and cracks with mortar and caulk with plastic cement around pipe, anchors and other items penetrating the walls. Clean surfaces of loose dirt, grease, dust, oil or other material. Dry surface according to manufacturer's directions.

Clean existing concrete surfaces of existing concrete with repair mortar to accept new waterproofing.

Remove existing loose, peeling or flaking waterproofing or debris from structure by mechanical methods before installing new waterproofing. All new waterproofing shall be attached to concrete or well bonded substrate. Any waterproofing that is adhered to failing substrate shall be removed, the substrate mechanically cleaned back to solid material and the waterproofing reinstalled at no expense to the project.

**PRIMING**

Membranes without self-adhesive properties may require separate primer or may combine this operation with application of main body adhesive as per manufacturer's recommendations.

Prime all concrete surfaces below grade with the membrane manufacturer's approved primer in accordance with the primer manufacturer's recommended installation instructions.

Primer shall be compatible with green and damp concrete.

**INSTALLATION (SHEET MEMBRANE WATERPROOFING)**

***IF the project has existing structures and they have existing asphalt waterproofing the old asphalt waterproofing can be blasted/cleaned back to concrete and primed. The old asphaltic waterproofing can be left in place and can be primed over with a primer for this intended purpose (Carlise CCW-WB or CCW-AWP) are approved for this use. If the old waterproofing is to be left in place add this primer to the SECTION 2 products section. Contact the primer manufacturer for any special procedures in using these primers.***

***If this existing waterproofed structure is to be demolished the concrete cannot be crushed/recycled or used for fill unless this old coating has been removed. If the coating is not removed the concrete must be disposed of properly. If the coated concrete is to be demolished add the above notes to the demolition section 02 41 13.***

Roll membrane sheet onto the primed surface. Remove wrinkles or air spaces. ALL seams shall be lap seams. Butt joint seam are not allowed. Lap seams not less than six inches. Cover all interior (concrete side) lap seams with 6” seam tape. Cover all exterior (soil side) lap seams with liquid membrane six (6) inches wide minimum.

Seal laps with membrane manufacturer's approved mastic. A one-fourth (1/4) inch bead of approved mastic shall be gunned about one-half (2") inch in from the edge of each strip after it has been laid and the succeeding strip must be laid on it with a minimum six (6) inches overlap and rolled down.

Round outside corners and fill inside corners with an inorganic cant strip prior to the application of membrane. Double cover inside and outside corners with membrane by applying an additional twelve (12) inch wide strip of membrane centered along the axis of the corner, adhered to all surfaces.

Lay membrane sheets from the low point to the high point across the fall line so that the laps shed water. Seal expansion, construction and control joints in accordance with standard practice. Apply membrane in double thickness over control and construction joints. Over expansion joints a minimum eight (8) inches wide strip of membrane must be laid on the joint before applying the standard double thickness for joints.

Set the top edge of the membrane on the vertical surface and press or roll down firmly and completely in two (2) parallel one-fourth (1/4") inch beads of membrane manufacturer's approved mastic and held in place with continuous batten strips of wood or pre-drilled aluminum nailed at one foot intervals. Install battens as the work progresses and at the end of each day's work.

Precautions: Cover membranes within two (2) days after application with protection board.

Do not puncture or tear the membrane prior to covering it.

Careful inspection shall be made prior to covering the waterproofing membrane and any ruptures must be patched with new membrane material or approved mastic.

Whenever a job must be left partially complete, set and roll down the exposed edges of the outside strips in two parallel beads of mastic to prevent water from getting under the membrane before it is completely installed.

Backfill around structure shall be equal to #8 sieve sand.

A minimum of 6” of sand backfill is required around waterproofing.

**INSTALLATION (SPRAY-ON WATERPROOFING)**

Trowel or mortar (repair) mix to fill in **ALL** voids and cracks larger than 0.5mm.

Install primer per manufacturer’s recommendation.

Provide a minimum 90 mils coating to exterior tunnel and manhole surfaces where shown on drawings.

Follow manufacturer’s application instructions. Surface preparation shall be in accordance with manufacturer’s recommendations.

**INSTALLATION (UNDERSLAB WATERPROOFING)**

Roll membrane out over flat surface cleared of all sharp or puncturing material. ALL seams shall be lap seams. Butt joint seam are not allowed. Install adhesive side up. Lap seams not less than 6 inch.

Roll excess membrane outside footprint of base slab to lap vertical at least 6 inch on base slab.

Protect waterproofing during construction in accordance with manufacturers recommendations.

**BACKFILL PROTECTION BOARD WORK**

Apply protection board in strict accordance with manufacturer's directions to steam pit and box conduits as a protection board for waterproofing.

Use adhesive to secure protection board to wall. Adhesive shall be compatible with waterproofing.

Tape ALL joints and seams as work proceeds to prevent stones or debris from migrating between protection board and waterproofing.

Protection board should be laid with closed joints and staggered end joints.

After membrane waterproofing barrier has been installed, allow a 24 hour waiting period before installation of board and backfilling.

Apply board and backfill within two (2) days (or time frame as recommended by the manufacturer) to prevent shrinkage of the membrane and cracking.

If Protection board has sagged or fallen of structure remove the area clean the waterproofing and re-attach and tape all seams.

Protect backfill board high traffic areas with ½” plywood or other suitable material until excavation is backfilled.

Protection board damaged by construction activities shall be removed and replaced at no additional cost to the project.

***Note: Backfill protection board it only to be used with film type water proofing. Polyurea type waterproofing should not need protection board.***

**DRAIN BOARD WORK**

Apply drain board in strict accordance with manufacturer's directions to steam pit and box conduits as a protection board for waterproofing.

Use adhesive to secure board to wall. Adhesive shall be compatible with waterproofing.

Overlap all open joints with geotextile fabric as recommended by manufacturer while work proceeds to prevent stones or debris from migrating between board and waterproofing.

Drain board should be laid with closed joints and staggered end joints.

After membrane waterproofing barrier has been installed, allow a 24 hour waiting period before installation of board and backfilling.

Apply board and backfill within two (2) days (or time frame as recommended by the manufacturer) to prevent shrinkage of the membrane and cracking.

Protect drain board high traffic areas with ½” plywood or other suitable material until excavation is backfilled.

Drain board damaged by construction activities shall be removed and replaced at no additional cost to the project.

**COLD WEATHER PROTECTION**

Waterproofing shall be applied only in air temperatures above the minimum recommended by the manufacturer.

Waterproofing membrane shall not be installed at temperatures below 25° F. If waterproofing must be laid in conditions below 25°F contractor shall provide tenting and temporary heaters to create local conditions above 25°F for manufacturers recommended duration.

**APPLICATION**

Waterproof Membrane: Install on exterior concrete surfaces (including floors) of new steam pits, tunnels and box conduit.

Extend minimum 18" onto existing construction or as shown on drawings.

All terminal ends of waterproofing sheet membrane shall be secured with a termination bar.

Protection board: Install over all waterproofed membrane surfaces of steam pits, tunnels, box conduits and where indicated on plan.

 END OF SECTION