<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>07160</td>
<td>BITUMINOUS, CEMENTATION, EPOXY, DAMPPROOFING AND WATERPROOFING</td>
</tr>
<tr>
<td>07555</td>
<td>MODIFIED BITUMEN ROOFING - PROTECTED MEMBRANE</td>
</tr>
</tbody>
</table>
SECTION 07160

BITUMINOUS, CEMENTITIOUS, EPOXY, DAMPPROOFING AND WATERPROOFING

PART 1 - GENERAL

1.01 SECTION INCLUDES

This section includes hot or cold single or multiple coats of asphalt or bitumen or paint or sheet waterproofing and dampproofing as shown on the drawings and the requirements of the contract documents including but not limited to the following:

A. Cold applied bitumen waterproofing paint, or sheet to concrete and masonry and behind cladding, plaster and ceramic tiles to wet area walls and slabs and at junctions of masonry walls and site concrete.

B. Protective high build epoxy resin waterproof coating to floors, walls and water tanks.

C. Applied cementitious waterproofing to swimming pools.

D. Two component acrylic modified Cementitious coating to stores, plantrooms, gutters and planters where shown.

E. Below grade damp proofing.

F. Cavity wall damp proofing.

1.02 SYSTEM DESCRIPTION

A. Waterproofing System: Application of bituminous paint, sheet and coatings to prevent moisture migration.

B. Location: Where shown on drawings.

C. Internal coating to potable water tanks.

D. Protective coating to floors.

1.05 SUBMITTALS

A. Submit under provisions of Section 01330.
B. Product Data: Provide properties of proposed material.

C. Manufacturer's Installation Instructions: Including any special procedures.

D. Manufacturer's Certificate: Certify that Products meet or exceed specified requirements.

1.06 SUBMITTALS FOR REVIEW

A. Section 01300 - Submittals, Procedures for Submittals.

B. Product Data: Provide manufacturers data on materials performance, properties, preparation, areas of application, application, mixing, consumption.

C. Submit shop drawings for review and approval showing the location, materials, construction details including coordination with and incorporation into the overall construction.

1.07 QUALITY ASSURANCE

A. Perform work in accordance with manufacturers instructions.

B. Test material samples in accordance with ANSI/ASTM D449 D450.

C. Maintain one copy of each document on site.

1.08 QUALIFICATIONS

A. Applicator: Company specializing in performing the work of this section with minimum five years experience.

1.09 MOCKUP

A. Provide mockup of waterproofing systems under provisions of section 01400.

B. Mockup may remain as part of the work.

1.10 ENVIRONMENTAL REQUIREMENTS

A. Maintain conditions recommended by manufacturer.

1.11 WARRANTY

A. Provide ten-year warranty under provisions of Section 01700.

B. Warranty: Include coverage for waterproofing failing to resist penetration of water.

C. For warranty repair work, be responsible for removing and replacing materials concealing waterproofing.
PART 2 PRODUCTS

2.01 MATERIALS

A. Materials shall be as Tretolastic damp surface primer with 2 coats Tretol 202T bitumen solutions to wall manufactured by Tretol Bid Product Ltd. with Pluvex bitumen sheet manufactured by Ruberoid Building Products Ltd. or other equal and approved equivalent products to walls and floors of wet areas.

B. Non-toxic solvent high build, protective epoxy resin, as Ceilcote 180 manufactured by "Feb Master Builders" or other equal and approved equivalent products to linings of potable water tanks.

C. Two component acrylic modified cementitious coating, as Masterseal manufactured by "Feb Master Builders" or other equal and approved equivalent products to floors and skirtings.

D. Acceptable Manufacturers for Dampproofing:

1. W.R. Grace and Company or equal and approved.
2. Celotex Corporation or equal and approved.
3. FEB Products or equal and approved.
4. Dermabit or equal and approved.

E. Bituminous Dampproofing for Below Grade Applications (DAMP-1): Fiber reinforced (non-asbestos), solvent-base, non-sag asphaltic coating designed for troweled application and conforming to the following.

1. ASTM D-2822, Type 1.
2. Fed. Spec. SS-C-153C, Type 1, Class A and B.

F. Bituminous Dampproofing for Cavity Wall Applications (DAMP-2): Fiber reinforced (non-asbestos), solvent-base, semi-mastic asphaltic coating designed for sprayed application and conforming to the following.

1. ASTM D-2823

G. Emulsified Bituminous Dampproofing for Below Grade Applications (DAMP-3): Fiber reinforced (non-asbestos), water-base, non-sag asphaltic coating designed for troweled application on damp substrate and conforming to the following.

1. ASTM D-1227, Type 4.
2. Fed. Spec SS-R-1781, Type 1

H. Emulsified Bituminous Dampproofing for Cavity Wall Application (DAMP-4): Fiber reinforced (non-asbestos), water-base, non-sag asphaltic coating designed for spray application on damp substrate and conforming to the following.
1. ASTM D1227, Type 4.


J. Polyethylene Sheeting: 0.15mm thick, fungi resistant polyethylene sheeting conforming to Voluntary Product Standard PS17-69.

K. Neoprene Flashing: 1.5mm thick, fungi resistant polyethylene sheeting conforming to Voluntary Product Standard PS17-69.

L. Protection Board: Semi-rigid 12mm by 1200 mm by 2400 mm panels with a blend of asphalt and inorganic mineral filler particles with asphalt-saturated felt and fiberglass met coating.

1. Acceptable manufacturer and product:
   a. Celotex Corporation or equal and approved.
   b. W.R. Meadows, Inc.: PC-2 Protection Course or equal and approved.

M. Water Tank: Flexible two part waterproofing membrane comprising of a liquid component of selected polymers and a powder component of selected cements, fillers and aggregates. Complies with:
   • AS/NZS 4020:2002 Testing of Products For Use In Contact With Drinking Water - Australian Water Quality Centre Report Number 4007/92.1595
   • AS4858 Class 11
Acceptable Manufacturer Cristoflex or equivalent.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify substrate surfaces are durable; free of matter detrimental to adhesion or application of waterproofing system.

B. Verify items which penetrate surfaces to receive waterproofing are securely installed.

C. Flash around all penetration.

3.02 PREPARATION

A. Protect adjacent surfaces not designated to receive waterproofing.

B. Clean and prepare surface to receive waterproofing in accordance with manufacturer's instructions.

C. Do not apply waterproofing to surfaces unacceptable to manufacturer or applicator.

D. Apply mastic to seal penetrations, small cracks, or minor honeycomb in substrate.

3.03 APPLICATION

A. Install materials in accordance with the manufacturers instructions and prime surfaces in
accordance with manufacturer’s instructions.

B. Apply to walls in internal wet areas up to height of tiling or stone cladding.

C. Apply below external double skin masonry walls.

D. Apply to concrete and blockwork below grade.

E. Apply to all external concrete and blockwork backings to external cladding.

F. Apply to under sides of sloping concrete canopies to receive finishes.

G. Apply where shown on drawings.

H. Fill depressions, holes, and cracks with a material compatible with the dampproofing.

I. Provide bituminous dampproofing where indicated as DAMP-1 or DAMP-3 and on exterior side of below grade walls where interior floor slab is below exterior grade.

J. Expansion and Control Joints in Below Grade Walls:
   1. Install joints before application of dampproofing.
   2. Prime substrate which is to receive flashing adhesive as recommended by adhesive manufacturer.
   3. Install continuous strip of neoprene flashing centered over joint. Roll into adhesive to ensure bond.
      a. Ensure that center portion of neoprene flashing over joint (25mm from each side of joint center line) is not bonded. Do not stretch flashing over joint.
      b. Trowel flashing adhesive continuously along each edge of neoprene flashing to provide watertight seal.
   4. Terminate under horizontal waterproofing above.

K. Spray apply bituminous dampproofing where indicated as DAMP-2 or DAMP-4 and on exterior of interior wythe (within the cavity) of masonry cavity walls.
   1. Apply dampproofing to obtain a film thickness of not less than 1.5m.

3.04 PROTECTION OF FINISHED WORK

A. Where applicable protect finished work under provisions of Section 01500.

B. Do not permit traffic over unprotected or uncovered membrane.

END OF SECTION 07160
SECTION 07555

MODIFIED BITUMEN ROOFING - PROTECTED MEMBRANE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Multiple ply roofing as shown on drawings and schedules of felt and polyester mats and modified asphalt bitumen on insulation with associated membrane, ballast and pavers with all required flashings including but not limited to the following:-

1. Modified Bitumen Membrane Roofing.
2. Board Insulation.
3. Aggregate, Pavers, Ballast over Water Pervious Fabric.
4. Flashings and Accessories.

1.02 RELATED SECTIONS

A. Section 07212 - Board Insulation.
B. Section 07620 - Sheet Metal Flashings & Trim
C. Section 07820 - Skylights
D. Section 15430 - Plumbing Specialties: Drains, Hoppers.
E. Section Division 15 Mechanical: Prefabricated curb for mechanical equipment.

1.03 REFERENCES

A. ASTM E84 - Surface Burning Characteristics.
B. ASTM E119 - Fire Resistance Ratings.
E. ASTM D41 - Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing.
F. ASTM D312 - Asphalt Used in Roofing.
G. ASTM D2178 - Asphalt Impregnated Glass (Felt) Mat Used in Roofing and Waterproofing.
H. FM - Roof Assembly Classifications.

J. ULI - Fire Hazard Classifications.

1.04 SYSTEM DESCRIPTION

A. Modified Bitumen Protected Membrane Roofing System: Single ply torch applied membrane system with loose laid insulation covered by filter membrane, and gravel ballast or paver finish.

1.05 SUBMITTALS

A. Submit under provisions of Section 01300.

B. Shop Drawings: Indicate setting plan for insulation and membrane(s), layout of seams, direction of laps, base flashing details and expansion joints.

C. Product Data: Provide information for membrane and bitumen materials, base flashing materials, insulation and pavers.

D. Samples: Submit two samples 2.2 Kg containers of roofing aggregate. Two 300mm lengths of membrane and two pavers.

E. Manufacturer's Installation Instructions: Indicate special precautions required for seaming the membrane.

F. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

G. Manufacturer's Field Reports: Submit under provisions of Section 01400.

H. Reports: Indicate procedures followed, ambient temperatures and wind velocity during application.

I. Manufacturers 10 years warranty for materials being submitted for approval will be included with the submittal.

1.06 QUALITY ASSURANCE

A. Perform Work in accordance with manufacturer's instructions.

B. Maintain one copy of each document on site.

1.07 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the products specified in this section with five years documented experience.

B. Applicator: Company specializing in performing the work of this section with five years documented experience and approved by system manufacturer.

1.08 REGULATORY REQUIREMENTS

A. Conform to applicable code for roof assembly fire hazard requirements.
B. ULI: Class A Fire Hazard Classification.


D. UL Listing: Provide labeled materials which have been tested and listed by UL in “Building Materials Directory” for application indicated, with “Class A” rated materials/system for roof slopes shown.

E. Fire Performance Characteristics: Provide insulation materials which are identical to those whose fire performance characteristics, as listed for material or assembly of which insulation is a part, have been determined by testing, per methods indicated below, by UL or other testing and inspecting agency acceptable to authorities having jurisdiction.

1.09 MOCKUP

A. Provide mockup of each roof membrane system and associated components and accessories under provisions of Section 01400.

B. Mockup Size: 3 x 3 m, including insulation, water pervious fabric, ballast, and typical base and counter flashings specified at location designated.

C. Mockup may not remain as part of the Work.

1.10 PRE-INSTALLATION CONFERENCE

A. Convene one week prior to commencing work of this section, under provisions of Section 01039.

B. Review installation procedures and coordination required with related Work.

1.11 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect, and handle products to site under provisions of Section 01600.

B. Deliver products in manufacturer's original containers, dry, undamaged, seals and labels intact.

C. Store products in weather protected environment, clear of ground and moisture.

D. Stand roll materials on end.

1.12 ENVIRONMENTAL REQUIREMENTS

A. Do not apply roofing membrane during inclement weather ambient temperatures below 15 degrees C.

B. Do not apply roofing membrane to damp or dirty deck surface.

C. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed during same day.
1.13 COORDINATION

A. Coordinate work under provisions of Section 01039.

B. Coordinate the work with installing associated metal flashings as the work of this section proceeds.

1.14 WARRANTY

A. Provide 10 years warranty under provisions of Section 01700.

B. Warranty: Cover damage to building resulting from failure to prevent penetration of water and exposing defects and making good to all damage.

PART 2 PRODUCTS

2.01 MANUFACTURERS - MEMBRANE MATERIALS

A. Refer to appendix "A".

B. Substitutions: Under provisions of Section 01630.

2.02 SINGLE LAYER COVERED SYSTEM

A. Membrane: APP modified Bitumen Membrane reinforced with 200 gm/m² polyester mat nominal.

   Thickness: 4 mm. primer to ASTM D-41.

B. Separation layer: 150 microns polyethylene sheet.

C. Insulation Boards: Extruded polystyrene rigid foam 50mm thick. As "Roofmate" manufactured by Dow Corning or equal and approved, having the following properties:

   1. Five year aged average thermal conductivity of 0.032 w/mk when tested at 24°C in accordance to ASTM C-518.
   2. Compressive strength of 280 kPA average, when tested according to ASTM D-1621.
   3. Water absorption of 1% in volume average when tested in accordance with ASTM D-2842.
   4. Water vapour permeability of 0.6 perm inch average when tested in accordance with ASTM C-355.


E. Finish Layer: 40 mm precast cement concrete pavers or ceramic tiles on screed bed as shown.

F. Flashing: Paver skirting minimum 150 mm high above finished slab or floor level to protect membrane upstand.
G. Sealant: Silicone solar resistant building sealant

ASTM C920, Grade 50, Use + NT M GAO and GSA

1. Elongation capability +100 - 50 %

2. Service temperature range -up to 149°C.

2.03 SINGLE LAYER PROTECTED SYSTEM

A. Membrane: APP modified Bitumen Membrane reinforced with 200 gm/m² polyester mat nominal.

   Thickness: 4 mm, primer to ASTM D-41.

B. Separation layer: 150 microns polyethylene sheet.

C. Insulation Boards: Extruded polystyrene rigid foam 50mm thick. As "Roofmate" manufactured by Dow Corning or equal approved, having the following properties:

   1. Five year aged average thermal conductivity of 0.032 w/mk when tested at 24°C in accordance to ASTM C-518.

   2. Compressive strength of 280 kPA average, when tested according to ASTM D-1621.

   3. Water absorption of 1% in volume average when tested in accordance with ASTM D-2842.

   4. Water vapour permeability of 0.6 perm inch average when tested in accordance with ASTM C-355.


E. Gravel Ballast: Washed Wadi bed gravel 10-18 mm diameter minimum 50 mm overall thickness.

F. Walkways: 400x400x40 mm concrete panels loose laid on plastic spacers.

G. Flashing: Solar reflective granule finish on membrane (as 2.03 A. above) minimum 150 mm high held in place with extruded aluminum pressure plate and solar resistant sealant seal.

H. Sealant: Silicone solar resistant building sealant ASTM C920, Grade 50, use + NT M G A O and GSA.

   1. Elongation capability +100 - 50%

   2. Service temperature range -54 to 149°C

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces and site conditions are ready to receive work.
B. Verify deck is supported and secured.
C. Verify deck is clean and smooth, free of depressions, waves, or projections, properly sloped to drains, valleys, or eaves.
D. Confirm dry deck by moisture meter with 12 percent moisture maximum.
E. Verify roof openings, curbs, pipes, conduit, sleeves, ducts, and vents through roof are solidly set, and cant strips wood nailing strips and reglets are in place.
F. Verify roof drain is set to achieve weep drainage at membrane level and top grating of drain at finish deck level.

3.02 PREPARATION - CONCRETE DECK
A. Fill surface honeycomb and variations with cementitious filler.

3.03 PREPARATION STEEL DECKS
A. Comply with manufacturer’s instructions, except where more stringent requirements are indicated.
B. Vapor Retarder Installation:
   1. On steel decks, comply with UL requirements for “Roof Deck Constructions” which are rated “Fire Acceptable” or comply with FM requirements for “Class I” metal deck construction.
   2. Seal joints in vapor retarder and seal to other surfaces at extremities and penetrations of retarder. Seal over nails, staples, tears, and punctures with tape or adhesively applied strips of vapor retarder material.
   3. Do not apply hot bitumen under conditions which result in foaming of material.

3.04 MEMBRANE APPLICATION
A. Apply membrane and primer in accordance with manufacturer's instructions.
B. Lay one ply base sheet, coated side down. Lap sides and ends in accordance with membrane manufacturer's instructions.
C. Equiviscous Temperature at Point of Application: Within 14 C degrees of bitumen rating labelled on bitumen container.
D. Apply membrane; seal seams and ends permanently waterproof.
E. Apply membrane smooth, free from air pockets, wrinkles, or tears.
F. Extend membrane up cant strips and minimum of 200 mm onto vertical surfaces above finished roof level.
G. Install waterproof cut-off to membrane at end of day's operation. Remove cut-off before resuming roofing.

H. Mop and seal membrane around roof penetrations and protrusions.

3.05 FLASHINGS AND ACCESSORIES

A. Apply flexible sheet base flashings to seal membrane to vertical elements.
B. Install prefabricated roofing control expansion joints in accordance with manufacturer's instructions.
C. Coordinate installation of roof drains, sumps, curbs, and related flashings.
D. Seal flashings and flanges of items penetrating or protruding through the membrane.

3.06 BALLAST INSTALLATION

A. Apply aggregate ballast, applied dry and at the rate of 4 900 kg/100 sq m.
B. Evenly distribute aggregate cover.
C. Install precast cement concrete pavers provided under Section 02518.
D. Install pavers directly on insulation on plastic spacers. Provide approximately 6 mm space between pavers to permit surface water drainage.

3.07 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of Section 01410.
B. Correct identified defects or irregularities.
C. Require site attendance of roofing and insulation materials manufacturers during installation of the Work.
D. On completion of the roof water proofing installation including the insulation and ballast, dam roof area and flood to a minimum depth of 75mm for at least 24 hours. If any leak appears during that period, remove dam materials, ballast and insulation and repair the waterproofing membrane as necessary. Replace insulation and ballast and retest the roof as specified above. This procedure shall be repeated until the roof proves to be watertight under test.

3.08 CLEANING

A. Remove bituminous markings from finished surfaces.
B. In areas where finished surfaces are soiled caused by work of this section, consult manufacturer of surfaces for cleaning advice and complying with their documented instructions.
C. Repair or replace defaced or disfigured finishes caused by work of this section.
3.09 PROTECTION

A. Protect building surfaces against damage from roofing work.

B. Where traffic must continue over finished roof membrane, protect surfaces.

END OF SECTION 07555