SECTION  – self-adhering sheet waterproofing

1. General
   1. SUMMARY
      1. Section Includes:
         1. Modified bituminous sheet waterproofing.
         2. Modified bituminous deck-paving sheet waterproofing.
         3. Blindside sheet waterproofing.
         4. Protection course.
         5. Molded-sheet drainage panels.
         6. Insulation drainage panels.
         7. Plaza-deck pavers.
      2. Related Requirements:

Retain subparagraph below to cross-reference requirements Contractor might expect to find in this Section but are specified in other Sections.

* + - 1. Section 07 14 13 – Hot Fluid-Applied Rubberized Asphalt Waterproofing.
      2. Section 07 16 16 – Crystalline Waterproofing.
      3. Section 07 21 13 – Board Insulation.
      4. Section 07 21 16 – Blanket Insulation.
      5. Section 07 26 16 – Under-Slab-On-Grade Vapour Retarder.
      6. Section 07 27 13 – Modified Bituminous Sheet Air Barrier.
      7. Section 07 95 13 – Expansion Joint Assemblies.
  1. REFERENCE Standards
     1. American Society for Testing and Materials (ASTM):
        1. ASTM A412-06a (2013), Standard Test Method for Vulcanized Rubber and Thermoplastic Elastomers – Tension.
        2. ASTM D 882-12, Standard Test Method for Tensile Properties of Thin Plastic Sheet.
        3. ASTM D 1970/D 1970M-15a, Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection.
        4. ASTM E 96/E 96M-15, Standard Test Methods for Water Vapour Transmission of Materials.
        5. ASTM E 154/E 154M-08a (2013) e1, Standard Test Methods for Water Vapour Retarders Used in Contact with Earth Under Concrete Slabs, on Walls or as Ground Cover.
  2. preinstallation meetings

Retain "Preinstallation Conference" Paragraph below if Work of this Section is extensive or complex enough to justify a conference.

* + 1. Preinstallation Conference: Conduct conference at Project site.

If needed, insert list of conference participants not mentioned in Section 01 31 00 – Project Management and Coordination. Revise subparagraph below to suit Project.

* + - 1. 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.
  1. action SUBMITTALS
     1. Product Data: For each type of product.
        1. Include construction details, material descriptions, and tested physical and performance properties of waterproofing.
        2. Include manufacturer's written instructions for evaluating, preparing, and treating substrate.
     2. Sustainable Design Submittals: Submit the following in compliance with Section 01 81 33 – Sustainable Design Requirements – Embodied Carbon:
        1. Completed LEED Criteria Worksheet for each component material of the product or assembly used in the installation of Work of this Section.

Retain "Environmental Product Declaration (EPD)" Subparagraph below for LEED v4 "MRc Building Product Disclosure and Optimization - Environmental Product Declarations." See the Evaluations. Verify, with manufacturer, that EPDs are available for each product.

* + - 1. Environmental Product Declaration (EPD): For each product.

"Product Certificates" Subparagraph below applies to ASHRAE 189.1, which requires that a minimum of 15 percent of building materials or products be extracted, harvested, manufactured, or recovered within 500 miles (800 km) of Project. See ASHRAE 189.1-2014, 9.4.1.2.

* + - 1. Product Certificates: For regional materials, indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include distance to Project, means of transportation, and cost for each regional material.

Retain "Shop Drawings" Paragraph below if justified by extent or complexity of waterproofing.

* + - 1. Shop Drawings: Show locations and extent of waterproofing and details of substrate joints and cracks, expansion joints, sheet flashings, penetrations, inside and outside corners, tie-ins with adjoining waterproofing, and other termination conditions.

Retain subparagraph below if using pedestal-supported concrete pavers on plaza decks over waterproofing.

* + - * 1. Include setting drawings showing layout, sizes, sections, profiles, and joint details of pedestal-supported concrete pavers.
      1. Samples: For each exposed product and for each colour and texture specified, including the following products:

Retain required Samples in subparagraphs below; revise to suit Project.

* + - * 1. 8-by-8-inch (200-by-200-mm) square of waterproofing and flashing sheet.
        2. 4-by-4-inch (100-by-100-mm) square of drainage panel.
        3. Plaza-deck paver, 4-by-4-inch (100-by-100-mm) square, in each colour and texture required.
        4. Paver pedestal assembly.
  1. informational submittals

Coordinate "Qualification Data" Paragraph below with qualification requirements in Section 014000 "Quality Requirements" and as may be supplemented in "Quality Assurance" Article.

* + 1. Qualification Data: For Installer.

Retain "Field quality-control reports" Paragraph below if Contractor is responsible for field quality-control testing and inspecting.

* + 1. Field quality-control reports.
    2. Sample Warranties: For special warranties.
  1. QUALITY ASSURANCE

Coordinate "Installer Qualifications" Paragraph below with qualifications that manufacturer requires of Installer for warranty purposes; verify with manufacturers that installers meeting this requirement are available for Project location.

* + 1. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by waterproofing manufacturer.
    2. Mockups: Build mockups to verify selections made under Sample submittals and to set quality standards for installation.

Retain option in first subparagraph below if using pavers.

* + - 1. Build for each typical waterproofing installation including pavers and accessories to demonstrate surface preparation, crack, and joint treatments, inside and outside corner treatments, and protection.
         1. Size: 100 sq. ft. (9.3 sq. m) in area, unless otherwise indicated on the Drawings.
         2. Description: Each type of wall, deck, and plaza installation.
      2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Consultant specifically approves such deviations in writing.

Retain subparagraph below if the intention is to make an exception to the default requirement in Section 014000 "Quality Requirements" for demolishing and removing mockups.

* + 1. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
  1. DELIVERY, STORAGE, HANDLING and protection
     1. Coordinate deliveries to comply with construction schedule and arrange ahead for strategic off the ground, under cover storage area. Do not load any area beyond the design limits.
     2. Material shall be carefully checked, unloaded, stored, and handled to prevent damage. Protect materials with suitable waterproof coverings.
     3. Deliver and store waterproofing materials in the manufacturer's original containers and wrappers with seals intact.
     4. Store solvent-based materials in safe areas well away from open flames or excessive heat.
     5. Do not permit materials to freeze. Store materials at temperatures above 10 deg C.
     6. Do not permit traffic of any kind over unprotected waterproof membranes. Do not allow backfill to be placed against unprotected waterproof membranes. Apply drainage board/protection board as soon as possible after installation of membrane.
  2. compatibility
     1. All waterproofing membranes materials must be provided by the same manufacturer to ensure compatibility between products used for the different applications identified in this Section.
  3. fiel conditions
     1. Environmental Limitations: Apply waterproofing within the range of ambient and substrate temperatures recommended in writing by waterproofing manufacturer. Do not apply waterproofing to a damp or wet substrate.
        1. Do not apply waterproofing in snow, rain, fog, or mist.
     2. Maintain adequate ventilation during preparation and application of waterproofing materials.
  4. warranty

When warranties are required, verify with Owner's counsel that warranties stated in this article are not less than remedies available to Owner under prevailing local laws. Manufacturers of self-adhering sheet waterproofing rarely offer more than a materials-only warranty. These warranties customarily do not include costs of excavating and exposing the waterproofing membrane or backfilling and restoring affected construction.

* + 1. Manufacturer's Warranty:
       1. Waterproofing Warranty: Manufacturer agrees to furnish replacement waterproofing material for waterproofing that does not comply with requirements or that fails to remain watertight within specified warranty period.

Verify available warranties and warranty periods.

* + - * 1. Warranty Period: Five (5) years from date of Substantial Completion.
    1. Warranty is inclusive for procedures to gain access to waterproofing membrane including removal and reinstallation of earthwork, protection board, drainage panels, and insulation.
    2. Warranty includes removing and reinstalling pedestals, and pavers on plaza decks where required.

1. Products

Before inserting names, verify that manufacturers and products listed there comply with requirements retained or revised in descriptions and are both available and suitable for the intended applications. For definitions of terms and requirements for Contractor's product selection, see Section 01 61 00 – Common Product Requirements.

* 1. manufacturers

Retain applicable products from options in "Source Limitations for Waterproofing System" Paragraph below; revise to suit Project.

* + 1. Source Limitations for Waterproofing System: Obtain waterproofing materials, protection course, and molded-sheet drainage panels from single source from single manufacturer.
  1. MODIFIED BITUMINOUS SHEET WATERPROOFING

Retain option in "Modified Bituminous Sheet Waterproofing" Paragraph below if application with auxiliary products complying with VOC limits is required.

* + 1. Modified Bituminous Sheet Waterproofing: Minimum 60-mil (1.5-mm) nominal thickness, self-adhering sheet consisting of 56 mils (1.4 mm) of rubberized asphalt laminated on one side to a 4-mil- (0.10-mm-) thick, polyethylene-film reinforcement, and with release liner on adhesive side; formulated for application with primer or surface conditioner that complies with VOC limits of authorities having jurisdiction.

Retain "Manufacturers" Subparagraph and list of manufacturers below to require products from manufacturers listed or a comparable product from other manufacturers.

* + - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
         1. American Hydrotech, Inc.
         2. Carlisle Coatings & Waterproofing Inc.
         3. CETCO, a Minerals Technologies company.
         4. GCP Applied Technologies Inc.
         5. Henry Company.
         6. Mar-flex Waterproofing & Building Products.
         7. Soprema, Inc.
         8. W.R. Meadows, Inc.
         9. Grace Construction Products

Verify that products retained in subparagraphs above comply with requirements in "Physical Properties" Subparagraph below; revise to suit Project. Cited physical properties represent common values published by manufacturers. Insert other published properties or values if further limits are required and revise product list accordingly.

* + 1. Physical Properties:
       1. Tensile Strength, Membrane: 250 psi (1.7 MPa) minimum; ASTM D412, Die C, modified.
       2. Ultimate Elongation: 300 percent minimum; ASTM D412, Die C, modified.
       3. Low-Temperature Flexibility: Pass at minus 20 deg F (minus 29 deg C); ASTM D1970/D1970M.
       4. Crack Cycling: Unaffected after 100 cycles of 1/8-inch (3-mm) movement; ASTM C836/C836M.
       5. Puncture Resistance: 40 lbf (180 N) minimum; ASTM E154/E154M.
       6. Water Absorption: 0.2 percent weight-gain maximum after 48-hour immersion at 70 deg F (21 deg C); ASTM D570.
       7. Water Vapor Permeance: 0.05 perm (2.9 ng/Pa x s x sq. m) maximum; ASTM E96/E96M, Water Method.

Revise option in "Hydrostatic-Head Resistance" Subparagraph below if applicable. Named products exceed 200 feet (60 m) except for York, which reports 150 feet (45 m).

* + - 1. Hydrostatic-Head Resistance: [**200 feet (60 m)**] <**Insert dimension**> minimum; ASTM D5385.

Retain "Sheet Strips" Subparagraph below for concealed strip flashings. Modified bituminous waterproofing membrane cannot be used for exposed sheet flashings.

* + 1. Sheet Strips: Self-adhering, rubberized-asphalt strips of same material and thickness as sheet waterproofing.
  1. MODIFIED BITUMINOUS DECK-PAVING SHEET WATERPROOFING

Retain this article if bridge- or parking-deck waterproofing membrane paved with hot-mix asphalt is required.

* + 1. Modified Bituminous Deck-Paving Sheet: Minimum 65-mil (1.6-mm) nominal thickness, self-adhering sheets designed to be overlaid with asphalt paving; consisting of rubberized-asphalt membrane with woven or nonwoven fabric reinforcement laminated to one surface or embedded within the membrane, and with release liner on adhesive side.

Retain "Manufacturers" Subparagraph and list of manufacturers below to require products from manufacturers listed or a comparable product from other manufacturers.

* + - 1. [Manufacturers](http://www.specagent.com/LookUp/?ulid=1611&mf=&src=wd): Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
         1. [Carlisle Coatings & Waterproofing Inc](http://www.specagent.com/LookUp/?uid=123457174094&mf=04&src=wd).
         2. [W.R. Meadows, Inc](http://www.specagent.com/LookUp/?uid=123457174095&mf=04&src=wd).
         3. Soprema Inc.
         4. <**Insert manufacturer's name**>.

Verify that products retained in subparagraphs above comply with requirements in "Physical Properties" Subparagraph below; revise to suit Project. Cited physical properties represent the few common values published by manufacturers. Insert other published properties or values if further limits are required and revise product list accordingly.

* + 1. Physical Properties:
       1. Tensile Strength, Membrane: [**50 lbf/in. (8.75 kN/m)**] <**Insert value**> minimum; ASTM D882.
       2. Pliability: Unaffected when bent 180 degrees over a 1/4-inch (6.4-mm) mandrel at minus 15 deg F (minus 26 deg C); ASTM D146/D146M.
       3. Puncture Resistance: [**40 lbf (180 N)**] [**100 lbf (445 N)**] [**200 lbf (890 N)**] minimum; ASTM E154/E154M.

Retain "Sheet Strips" Subparagraph below for concealed strip flashings. Modified bituminous waterproofing membrane cannot be used for exposed sheet flashings.

* + 1. Sheet Strips: Self-adhering, reinforced, rubberized-asphalt strips of same material and thickness as sheet waterproofing.
  1. BLINDSIDE SHEET WATERPROOFING

Sheet waterproofing products in "Blindside Sheet Waterproofing for Vertical Applications" and "Blindside Sheet Waterproofing for Horizontal Applications" paragraphs below are preplaced before concreting; they develop a bond with fresh concrete placed against them.

* + 1. Blindside Sheet Waterproofing for Vertical Applications: Uniform, flexible, multilayered-composite sheet membrane that forms a permanent bond with fresh concrete placed against it; complete with accessories and preformed shapes for an unbroken waterproofing assembly; with the following physical properties:

Retain "Manufacturers" Subparagraph and list of manufacturers below to require products from manufacturers listed or a comparable product from other manufacturers.

* + - 1. [Manufacturers](http://www.specagent.com/LookUp/?ulid=12296&mf=&src=wd): Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
         1. [Carlisle Coatings & Waterproofing Inc](http://www.specagent.com/LookUp/?uid=123457174083&mf=04&src=wd).
         2. [GCP Applied Technologies Inc.](http://www.specagent.com/LookUp/?uid=123457174080&mf=04&src=wd)
         3. [W.R. Meadows, Inc](http://www.specagent.com/LookUp/?uid=123457174082&mf=04&src=wd).
         4. Soprema Inc.
         5. <**Insert manufacturer's name**>.

Verify that products retained in subparagraphs above comply with requirements in "Physical Properties" Subparagraph below; revise to suit Project. Cited physical properties represent common values published by manufacturers. Insert other published properties or values if further limits are required and revise product list accordingly.

* + - 1. Physical Properties:
         1. Low-Temperature Flexibility: Pass at minus 20 deg F (minus 29 deg C); ASTM D1970/D1970M.
         2. Peel Adhesion to Concrete: 5 lbf/in. (875 N/m) minimum; ASTM D903, modified.
         3. Lap Adhesion: 5 lbf/in. (875 N/m) minimum; ASTM D1876, modified.
         4. Hydrostatic-Head Resistance: 230 feet (70 m); ASTM D5385, modified.
         5. Puncture Resistance: 100 lbf (445 N) minimum; ASTM E154/E154M.
         6. Water Vapor Permeance: 0.1 perm (6 ng/Pa x s x sq. m) maximum; ASTM E96/E96M, Water Method.
         7. Ultimate Elongation: 335 percent minimum; ASTM D412, modified.
    1. Blindside Sheet Waterproofing for Horizontal Applications: Uniform, flexible, multilayered-composite sheet membrane that forms a permanent bond with fresh concrete placed against it; complete with accessories and preformed shapes for an unbroken waterproofing assembly; with the following physical properties:

Retain "Manufacturers" Subparagraph and list of manufacturers below to require products from manufacturers listed or a comparable product from other manufacturers.

* + - 1. [Manufacturers](http://www.specagent.com/LookUp/?ulid=12297&mf=&src=wd): Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
         1. [Carlisle Coatings & Waterproofing Inc](http://www.specagent.com/LookUp/?uid=123457174086&mf=04&src=wd).
         2. [GCP Applied Technologies Inc.](http://www.specagent.com/LookUp/?uid=123457174087&mf=04&src=wd)
         3. [W.R. Meadows, Inc](http://www.specagent.com/LookUp/?uid=123457174089&mf=04&src=wd).
         4. Soprema Inc.
         5. <**Insert manufacturer's name**>.

Verify that products retained in subparagraphs above comply with requirements in "Physical Properties" Subparagraph below; revise to suit Project. Cited physical properties represent common values published by manufacturers. Insert other published properties or values if further limits are required and revise product list accordingly.

* + - 1. Physical Properties:
         1. Low-Temperature Flexibility: Pass at minus 20 deg F (minus 29 deg C); ASTM D1970/D1970M.
         2. Peel Adhesion to Concrete: 5 lbf/in. (875 N/m) minimum; ASTM D903, modified.
         3. Lap Adhesion: 5 lbf/in. (875 N/m) minimum; ASTM D1876, modified.
         4. Hydrostatic-Head Resistance: 230 feet (70 m); ASTM D5385, modified.
         5. Puncture Resistance: 200 lbf (890 N) minimum; ASTM E154/E154M.
         6. Water Vapor Permeance: 0.1 perm (6 ng/Pa x s x sq. m) maximum; ASTM E96/E96M, Water Method.
         7. Ultimate Elongation: 335 percent minimum; ASTM D412, modified.

Retain "Mastic, Adhesives, and Detail Tape" Paragraph below to seal through-wall penetrations, end laps, and tie-ins; revise to suit Project.

* + 1. Mastic, Adhesives, and Detail Tape: Liquid mastic and adhesives, and adhesive tapes recommended by waterproofing manufacturer.
  1. auxiliary materials
     1. Furnish auxiliary materials recommended by waterproofing manufacturer for intended use and compatible with sheet waterproofing.

Insert specific VOC-limit values in subparagraph below if known; coordinate with products and revise to suit Project.

* + - 1. Furnish liquid-type auxiliary materials that comply with VOC limits of authorities having jurisdiction.

Retain "Primer" or "Surface Conditioner" Paragraph below, or both, to suit type(s) of waterproofing required.

* + 1. Primer: Liquid **waterborne or solvent-borne** primer recommended for substrate by sheet waterproofing material manufacturer.
    2. Surface Conditioner: Liquid, waterborne surface conditioner recommended for substrate by sheet waterproofing material manufacturer.
    3. Liquid Membrane: Elastomeric, two-component liquid, cold fluid applied, of trowel grade or low viscosity.
    4. Substrate Patching Membrane: Low-viscosity, two-component, modified asphalt coating.
    5. Metal Termination Bars: Aluminum bars, approximately 1 by 1/8 inch (25 by 3 mm), predrilled at 9-inch (229-mm) centers.

Retain protection course type from four paragraphs below if required; revise text or insert another product to suit Project. Delete paragraphs if molded-sheet drainage panels or insulation drainage panels replace protection course. Verify acceptability of protection course type with waterproofing manufacturer. Indicate locations, such as plaza deck and foundation walls, if more than one type of protection course is required.

* + 1. Protection Course, Asphaltic: ASTM D 6506, semirigid sheets of fiberglass or mineral-reinforced-asphaltic core, pressure laminated between two asphalt-saturated fibrous liners and as follows:
       1. Thickness: Nominal **1/8 inch (3 mm)** for vertical applications; **1/4 inch (6 mm)** elsewhere.
       2. Adhesive: Rubber-based solvent type recommended by waterproofing manufacturer for protection course type.
    2. Protection Course, Extruded-Polystyrene Board Insulation, Unfaced: ASTM C578, Type X, 1/2 inch (13 mm) thick.
  1. MOLDED-SHEET DRAINAGE PANELS

Retain this article if molded-sheet drainage panels are required. Insert other drainage-panel types if required.

Retain one or more molded-sheet drainage panel paragraphs below if specifying drainage panels in this Section; revise to suit Project. If not indicated on Drawings, insert thickness requirement only after coordinating required thickness with required flow rate.

Retain "Nonwoven-Geotextile-Faced, Molded-Sheet Drainage Panel with Polymeric Film" or "Nonwoven-Geotextile-Faced, Molded-Sheet Drainage Panel without Polymeric Film" Paragraph below if specifying nonwoven-geotextile-faced drainage panels, usually for foundation walls.

* + 1. Nonwoven-Geotextile-Faced, Molded-Sheet Drainage Panel with Polymeric Film: Composite subsurface drainage panel acceptable to waterproofing manufacturer and consisting of a studded, nonbiodegradable, molded-plastic-sheet drainage core; with a nonwoven, needle-punched geotextile facing with an apparent opening size not exceeding No. 70 (0.21-mm) sieve laminated to one side of the core and a polymeric film bonded to the other side; and with a vertical flow rate through the core of [**9 to 21 gpm per ft. (112 to 261 L/min. per m)**] <**Insert values**>.

Retain "Manufacturers" Subparagraph and list of manufacturers below to require products from manufacturers listed or a comparable product from other manufacturers.

* + - 1. [Manufacturers](http://www.specagent.com/LookUp/?ulid=7252&mf=&src=wd): Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
         1. Cosella Dorken Inc.
         2. [BASF Corporation](http://www.specagent.com/LookUp/?uid=123457174151&mf=04&src=wd).
         3. [Carlisle Coatings & Waterproofing Inc](http://www.specagent.com/LookUp/?uid=123457174146&mf=04&src=wd).
         4. [CETCO, a Minerals Technologies company](http://www.specagent.com/LookUp/?uid=123457174152&mf=04&src=wd).
  1. PLAZA-DECK PAVERS

Retain this article for plaza-deck pavers installed on pedestals over waterproofing. Specify pavers installed in an aggregate, a mortar, or a bituminous setting bed in Section 321400 "Unit Paving."

Retain "Plaza-Deck Pavers" or "Stone Plaza-Deck Pavers" Paragraph below if specifying plaza-deck pavers in another Section; revise to suit Project. Insert other paver types if required.

* + 1. Plaza-Deck Pavers: [**Concrete**] [**Asphalt-block**] pavers specified in Section 32 14 00 – Unit Paving.
    2. Stone Plaza-Deck Pavers: [**Granite**] [**Limestone**] [**Marble**] [**Quartz-based stone**] [**Slate**] [**Travertine**] <**Insert type**> pavers specified in Section 32 14 00 – Unit Paving.

Retain "Concrete Plaza-Deck Pavers" Paragraph below if specifying plaza-deck pavers in this Section; revise to suit Project. Verify availability of pavers with manufacturers for characteristics required; insert other characteristics if required. Paragraph describes concrete pavers commonly used in pedestal-set applications over insulation and waterproofing or for placing on a setting bed; Hanover Consultantural Products and perhaps other manufacturers offer concrete plaza-deck pavers of lightweight concrete and with integrally cast concrete pedestals. Limit pedestal systems to pedestrian plazas; they are generally unsuitable for vehicles.

* + 1. Concrete Plaza-Deck Pavers: Solid, hydraulically pressed, standard-weight concrete units, **square edged, with top edges beveled** 3/16 inch (5 mm), manufactured for use as plaza-deck pavers; **6500-psi (45-MPa)** minimum compressive strength, ASTM C140/C140M; absorption not greater than 5 percent, ASTM C140/C140M; no breakage and maximum 1 percent mass loss when tested for freeze-thaw resistance according to ASTM C67.

"Regional Materials" Subparagraph below applies to LEED v4.

* + - 1. Regional Materials: Concrete pavers shall be manufactured within 100 miles (160 km) of Project site from aggregates and cementitious materials that have been extracted, harvested, or recovered, as well as manufactured, within 100 miles (160 km) of Project site.

Retain one thickness and one face size from options in "Thickness" and "Face Size" subparagraphs below. Include special paver sizes and insert descriptions of custom pavers such as stair tread and riser units, coping or curbed termination pavers, and oversize pavers.

* + - 1. Thickness: [2 inches (51 mm)] [2-3/8 inches (60 mm)] <Insert dimension>.
      2. Face Size: [12 inches (305 mm) square] [12 by 24 inches (305 by 610 mm)] [18 inches (457 mm) square] [24 inches (610 mm) square] [As indicated] <Insert dimension(s) and shape>.
      3. Colour and Texture: [As indicated by manufacturer's designations] [Match Consultant's sample] [As selected by Consultant from manufacturer's full range] .

Generally, retain "Paver Pedestals" Paragraph below if setting-bed systems are not required; revise to suit Project and products by named manufacturers. If retaining first option but not third option, do not name other manufacturers.

* + 1. Paver Pedestals: Paver-support assembly, [standard with paver manufacturer] [or] [as named below], including [fixed-height] [adjustable or stackable] pedestals, shims, and spacer tabs for joint spacing of [1/8 inch (3 mm)] [3/16 inch (5 mm)] [1/8 to 3/16 inch (3 to 5 mm)].

Retain "Manufacturers" Subparagraph and list of manufacturers below to require products from manufacturers listed or a comparable product from other manufacturers.

* + - 1. [Manufacturers](http://www.specagent.com/LookUp/?ulid=7266&mf=&src=wd): Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
         1. [Envirospec, Inc.](http://www.specagent.com/LookUp/?uid=123457174137&mf=04&src=wd)
         2. [Hanover Consultantural Products](http://www.specagent.com/LookUp/?uid=123457174138&mf=04&src=wd).
         3. [Roofblok Limited](http://www.specagent.com/LookUp/?uid=123457174140&mf=04&src=wd).
         4. [Sunny Brook Pressed Concrete Company](http://www.specagent.com/LookUp/?uid=123457174141&mf=04&src=wd).
         5. [Wausau Tile Inc.](http://www.specagent.com/LookUp/?uid=123457174142&mf=04&src=wd)
         6. [Westile Roofing Products](http://www.specagent.com/LookUp/?uid=123457174143&mf=04&src=wd).

Retain "Fill" Subparagraph below if specifying telescoping pedestals that require fill.

* + - 1. Fill: As recommended in writing by pedestal manufacturer.

1. Execution
   1. EXAMINATION
      1. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of waterproofing.
         1. Verify that concrete has cured and aged for minimum time period recommended in writing by waterproofing manufacturer.
         2. Verify that substrate is visibly dry and within the moisture limits recommended in writing by manufacturer. Test for capillary moisture by plastic sheet method according to ASTM D4263.

Retain subparagraph below if installing blindside sheet waterproofing over compacted subgrade.

* + - 1. Verify that compacted subgrade is dry, smooth, sound, and ready to receive waterproofing sheet.
    1. Proceed with installation only after unsatisfactory conditions have been corrected.
  1. preparation
     1. Clean, prepare, and treat substrates according to manufacturer's written instructions. Provide clean, dust-free, and dry substrates for waterproofing application.

Remaining paragraphs in this article apply to each type of waterproofing except blindside sheet waterproofing. Delete if using only blindside sheet waterproofing.

* + 1. Mask off adjoining surfaces not receiving waterproofing to prevent spillage and overspray affecting other construction.
    2. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.
    3. Remove fins, ridges, mortar, and other projections.
    4. Fill form tie holes, honeycomb, aggregate pockets, holes, and other voids.
    5. Prepare, fill, prime, and treat joints and cracks in substrates. Remove dust and dirt from joints and cracks according to ASTM D4258.

Retain subparagraph below if sheet waterproofing covers nonmoving joints and cracks. Consult manufacturers because recommendations vary. Consistent with ACI terminology, the term "contraction joint" is used in place of "control joint." Usually retain the smaller joint width option. Some manufacturers of modified bituminous deck-paving waterproofing permit a joint width of 1/8 inch (3 mm) before requiring strip reinforcement.

* + - 1. Install sheet strips of width according to manufacturer's written instructions and center over treated construction and contraction joints and cracks exceeding a width of [**1/16 inch (1.6 mm)**] [**or**] [**1/8 inch (3 mm) for modified bituminous deck-paving waterproofing**].

Retain first paragraph below for treatment at expansion, isolation, and other discontinuous joints. Verify, with written instructions of sheet waterproofing manufacturers, that paragraph applies to Project for self-adhered sheet waterproofing; revise to suit Project. Besides a primary architectural expansion joint, building expansion joints may need a continuous sheet waterproofing covering. Coordinate expansion-joint treatment with expansion-joint assemblies that interface with waterproofing. Specialty manufacturers such as Situra also produce membrane-type waterproofing expansion joints.

* + 1. Bridge and cover isolation joints, expansion joints, and discontinuous deck-to-wall and deck-to-deck joints with overlapping sheet strips of widths according to manufacturer's written instructions.

Description in subparagraph below is based on a detail from GCP Applied Technology, Inc.

* + - 1. Invert and loosely lay first sheet strip over center of joint. Firmly adhere second sheet strip to first and overlap to substrate.

Retain "Corners" Paragraph below if modified bituminous sheet waterproofing is required.

* + 1. Corners: Prepare, prime, and treat inside and outside corners in accordance with manufacturer's instructions.
       1. Install membrane strips centered over vertical inside corners. Install 3/4-inch (19-mm) fillets of liquid membrane on horizontal inside corners and as follows:
          1. At footing-to-wall intersections, extend liquid membrane in each direction from corner or install membrane strip centered over corner.
          2. At plaza-deck-to-wall intersections, extend liquid membrane or sheet strips onto deck waterproofing and to finished height of sheet flashing.
    2. Prepare, treat, and seal vertical and horizontal surfaces at terminations and penetrations through waterproofing and at drains and protrusions.
  1. INSTALLATION OF MODIFIED BITUMINOUS SHEET WATERPROOFING

Retain this article for modified bituminous sheet and for fabric-reinforced modified bituminous sheet in vertical or wall applications and in horizontal or plaza-deck applications.

* + 1. Install modified bituminous sheets according to waterproofing manufacturer's written instructions.
    2. Apply primer to substrates at required rate and allow it to dry. Limit priming to areas that will be covered by sheet waterproofing in same day. Reprime areas exposed for more than 24 hours.
    3. Apply and firmly adhere sheets over area to receive waterproofing. Accurately align sheets and maintain uniform 2-1/2-inch- (64-mm-) minimum lap widths and end laps. Overlap and seal seams, and stagger end laps to ensure watertight installation.

Retain subparagraph below for low-temperature applications; revise to suit Project. Verify that manufacturers produce low-temperature products. An upper-limit temperature may be recommended by sheet manufacturer to reduce workmanship problems with more aggressive adhesion.

* + - 1. When ambient and substrate temperatures range between 25 and 40 deg F (minus 4 and plus 5 deg C), install self-adhering, modified bituminous sheets produced for low-temperature application. Do not use low-temperature sheets if ambient or substrate temperature is higher than 60 deg F (16 deg C).

Retain "Horizontal Application" Paragraph below for plaza-deck or near-horizontal conditions.

* + 1. Horizontal Application: Apply sheets from low to high points of decks to ensure that laps shed water.
    2. Apply continuous sheets over already-installed sheet strips, bridging substrate cracks, construction, and contraction joints.
    3. Seal edges of sheet waterproofing terminations with mastic.

Retain first paragraph below if terminating into other waterproofing.

* + 1. Install sheet waterproofing and auxiliary materials to tie into adjacent waterproofing.
    2. Repair tears, voids, and lapped seams in waterproofing not complying with requirements. Slit and flatten fishmouths and blisters. Patch with sheet waterproofing extending 6 inches (150 mm) beyond repaired areas in all directions.
    3. Immediately install protection course with butted joints over waterproofing membrane.

Retain applicable options in subparagraph below if drainage panels or board insulation is used and is permitted by waterproofing manufacturer to replace protection course.

* + - 1. [**Molded-sheet drainage panels**] [**Board insulation**] may be used in place of a separate protection course to vertical applications when approved by waterproofing manufacturer and installed immediately.
  1. INSTALLATION OF MODIFIED BITUMINOUS DECK-PAVING SHEET WATERPROOFING

Retain this article for horizontal carpark or bridge-deck applications to receive deck-paving sheets before application of hot-mix asphalt paving.

* + 1. Install modified bituminous deck-paving sheets according to waterproofing manufacturer's written instructions.
    2. Apply primer to substrates at required rate and allow it to dry. Limit priming to areas that will be covered by sheet waterproofing in same day. Reprime areas exposed for more than 24 hours.
    3. Apply and firmly adhere sheets over areas to receive waterproofing. Accurately align sheets and maintain uniform 2-1/2-inch- (64-mm-) minimum side-lap widths and 6-inch (150-mm) end laps. Overlap and seal seams and stagger end laps to ensure watertight installation.
    4. Apply sheet waterproofing from low to high points of decks to ensure that laps shed water.
    5. Apply continuous sheets over already-installed sheet strips, bridging substrate cracks, construction, and contraction joints.
    6. Seal edges of sheet waterproofing terminations with mastic.

Retain first paragraph below if terminating into other waterproofing.

* + 1. Install sheet waterproofing and auxiliary materials to tie into adjacent waterproofing.
    2. Repair tears, voids, and lapped seams in waterproofing that do not comply with requirements. Slit and flatten fishmouths and blisters. Patch with sheet waterproofing extending 6 inches (150 mm) beyond repaired areas in all directions.
  1. INSTALLATION OF BLINDSIDE SHEET WATERPROOFING

Retain this article when membrane is applied vertically as blind-side waterproofing against timber lagging, shotcrete, or similar soil-retaining construction, or is applied horizontally for below-grade, split-slab applications or near-horizontal, under-slab applications against compacted substrates.

* + 1. Install blindside sheet waterproofing according to manufacturer's written instructions.

Retain first paragraph below if required. Molded-sheet drainage panels may be used for horizontal or vertical drainage or, in vertical applications, to provide a smooth surface over shotcrete or timber lagging.

* + 1. Place and secure molded-sheet drainage panels over substrate. Lap edges and ends of geotextile to maintain continuity.

Retain "Vertical Applications" Paragraph below for wall or near-vertical applications.

* + 1. Vertical Applications: Install sheet with face against substrate. Accurately align sheets and maintain uniform side and end laps of minimum dimensions required by membrane manufacturer. Overlap and seal seams, and stagger and tape end laps to ensure watertight installation. Mechanically fasten to substrate.
       1. Securely fasten top termination of membrane with continuous metal termination bar anchored into substrate and cover with detail tape.

Retain "Horizontal Applications" Paragraph below for horizontal or near-horizontal applications.

* + 1. Horizontal Applications: Install sheet with face against substrate. Accurately align sheets and maintain uniform side and end laps of minimum dimensions required by membrane manufacturer. Overlap and seal seams, and stagger and tape end laps to ensure watertight installation.
    2. Corners: Seal lapped terminations and cut edges of sheet waterproofing at inside and outside corners with detail tape.
    3. Seal penetrations through sheet waterproofing to provide watertight seal with detail tape patches or wraps and a liquid-membrane troweling.
    4. Install sheet waterproofing and auxiliary materials to produce a continuous watertight tie into adjacent waterproofing.
    5. Repair tears, voids, and lapped seams in waterproofing not complying with requirements. Tape perimeter of damaged or nonconforming area extending 6 inches (150 mm) beyond repaired areas in all directions. Apply a patch of sheet waterproofing and firmly secure with detail tape.
  1. INSTALLATION OF MOLDED-SHEET DRAINAGE PANELS
     1. Place and secure molded-sheet drainage panels, with geotextile facing away from wall or deck substrate, according to manufacturer's written instructions. Use adhesive or another method that does not penetrate waterproofing. Lap edges and ends of geotextile to maintain continuity. Protect installed molded-sheet drainage panels during subsequent construction.

Retain subparagraph below if installing board insulation or protection course before installing molded-sheet drainage panels.

* + - 1. For vertical applications, install [**board insulation**] [**protection course**] before installing drainage panels.
  1. INSTALLATION OF PLAZA-DECK PAVERS

Retain this article for pavers installed on pedestals.

* + 1. Install pavers according to manufacturer's written instructions.

Retain first two paragraphs below if installing pavers on paving pedestals.

* + 1. Install paver pedestals and accessories to required elevations. Adjust for final level and slope of paved surfaces.
    2. Loosely lay pavers on pedestals, maintaining a uniform open joint width. Tightly seat pavers against spacers to eliminate lateral movement or drift of paving assembly. Align joint patterns parallel in each direction.

Revise subparagraph below to suit Project. Consider paved area layout, paver module, and construction tolerances when imposing limits. Verify minimum dimensions with paver manufacturer. Minimum pedestal dimensions may also govern. Custom-dimensioned pavers or pavers scored to repeat module may be available.

* + - 1. Lay out pavers to avoid less-than-half-width pavers at perimeter or other terminations.

Insert special installation requirements here. Examples might include tread/riser units on tabs or treatment of pavers at plaza/building expansion joints.

* + 1. Install pavers to vary no more than 1/16 inch (1.6 mm) in elevation between adjacent pavers and no more than 1/16 inch (1.6 mm) from surface plane elevation of individual paver.
    2. Limit variation in paving installation to within **1/4 inch in 10 feet (6 mm in 3 m)** of surface plane in any direction; noncumulative.
  1. FIELD QUALITY CONTROL

Retain "Testing Agency" and "Manufacturer's Field Service" paragraphs below to identify who shall perform tests and inspections. If retaining second option in "Testing Agency" Paragraph or if retaining "Manufacturer's Field Service" Paragraph, retain "Field quality-control reports" Paragraph in "Informational Submittals" Article.

* + 1. Testing Agency: Engage a qualified testing agency to perform tests, and to furnish reports to Consultant.

Retain "Manufacturer's Field Service" Paragraph below to require a factory-authorized service representative to perform inspections. Manufacturer may require this as a warranty condition.

* + 1. Manufacturer's Field Service: Engage a site representative qualified by waterproofing membrane manufacturer to inspect substrate conditions, surface preparation, membrane application, flashings, protection, and drainage components; and to furnish daily reports to Consultant.

Retain "Flood Testing" or "Low-Voltage Electrical Conductance Testing" Paragraph below, or both, if required.

Retain "Flood Testing" Paragraph below if required for horizontal surfaces sloping up to 2 percent or 1/4 in./ft. (20 mm/m). Revise paragraph by identifying particular Project areas to flood test if required. Limit water depth to not exceed deck load capacity.

* + 1. Flood Testing: Flood test each deck area for leaks, according to recommendations in ASTM D5957, after completing waterproofing but before placing overlying construction. Install temporary containment assemblies, plug or dam drains, and flood with potable water.
       1. Flood to an average depth of 2-1/2 inches (64 mm) with a minimum depth of 1 inch (25 mm) and a maximum depth of 4 inches (100 mm). Maintain 2 inches (51 mm) of clearance from top of sheet flashings.
       2. Flood each area for **twenty-four (24)** hours.
       3. Testing agency shall observe flood testing and examine underside of decks and terminations for evidence of leaks during flood testing.
       4. After flood testing, repair leaks, repeat flood tests, and make further repairs until waterproofing installation is watertight.
          1. Cost of retesting is Contractor's responsibility.
       5. Testing agency shall prepare survey report indicating locations of initial leaks, if any, and final survey report.

Retain "Low-Voltage Electrical Conductance Testing" Paragraph below if required. If a permanent electronic leak-detection system is required, consult companies offering these systems; coordinate waterproofing system components with requirements for a permanent electronic leak-detection system.

* + 1. Low-Voltage Electrical Conductance Testing: Testing agency shall survey entire roof area and flashings to locate discontinuity in the roof membrane using [**an exposed metal electrical loop to create an electrical field tested with handheld probes**] [**or**] [**a scanning platform with integral perimeter electrical loops creating a complete electrical field**]
       1. Testing agency shall test [**each deck area**] [**each deck area indicated for testing on Drawings**] <**Insert area to be tested**> for leaks using an electronic leak-detection method that locates discontinuities in the waterproofing membrane.
       2. Testing agency shall perform tests on abutting or overlapping smaller areas as necessary to cover entire test area.
       3. After testing, repair areas of discontinuities, repeat tests, and make further repairs until roofing and flashing installations are contiguous.
          1. Cost of retesting is Contractor's responsibility.
       4. Testing agency shall provide survey report indicating locations of initial discontinuities, if any.
    2. Waterproofing will be considered defective if it does not pass tests and inspections.
  1. PROTECTION, REPAIR, AND CLEANING

Retain first paragraph below for horizontal applications except for modified bituminous deck-paving sheet waterproofing.

* + 1. Do not permit foot or vehicular traffic on unprotected membrane.
    2. Protect waterproofing from damage and wear during remainder of construction period.

Retain first paragraph below if insulation drainage panels are required and may be exposed for a period of time.

* + 1. Protect installed insulation drainage panels 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.
    2. Correct deficiencies in or remove waterproofing that does not comply with requirements; repair substrates, reapply waterproofing, and repair sheet flashings.
    3. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended in writing by manufacturer of affected construction.

Insert Installer's Special Warranty Form here if required.

END OF SECTION