SECTION 07 14 16

COLD FLUID-APPLIED WATERPROOFING

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\*\* NOTE TO SPECIFIER \*\* Barrett Company ; cold fluid-applied waterproofing.  
This section is based on the products of Barrett Company , which is located at:  
2926 Chester Ave.   
Cleveland, OH 44114  
Toll Free Tel: 800-647-0100  
Tel: 908-647-0100  
Fax: 908-647-0278  
Email: [request info (info@barrettroofs.com)](https://arcat.com/rfi?action=email&company=Barrett%252BCompany%252B&message=RE%253A%2520Spec%2520Question%2520(07142bcr)%253A%2520&coid=30815&spec=07142bcr&rep=&fax=908-647-0278)  
Web: <http://www.barrettroofs.com>   
 [ [Click Here](https://arcat.com/company/barrett-company-30815) ] for additional information.  
For over 10 decades the Barrett Company has had hands-on experience, professionally engineered products, and systems in the high-performance roofing and waterproofing markets.

1. GENERAL
   1. SECTION INCLUDES

\*\* NOTE TO SPECIFIER \*\* Delete items below not required for project.

* + 1. Cold fluid-applied waterproofing for vertical applications.
    2. Cold fluid-applied waterproofing for horizontal applications, including:
       1. Vegetated roofing.
       2. Paver systems.
       3. Concrete wear slabs.
       4. Ballast.
    3. Drainage panel.
    4. Protection course.
  1. RELATED SECTIONS

\*\* NOTE TO SPECIFIER \*\* Delete any sections below not relevant to this project; add others as required.

* + 1. Section 03 30 00 - Cast-in-Place Concrete.
    2. Section 04 20 00 - Unit Masonry.
    3. Section 06 10 00 - Rough Carpentry.
    4. Section 07 14 16 - Cold Fluid-Applied Waterproofing.
    5. Section 07 18 13 - Pedestrian Traffic Coatings.
    6. Section 07 21 19 - Foamed-In-Place Insulation.
    7. Section 07 62 00 - Sheet Metal Flashing and Trim.
    8. Section 07 72 13 - Manufactured Curbs.
    9. Section 07 91 23 - Backer Rods.
  1. REFERENCES

\*\* NOTE TO SPECIFIER \*\* Delete references from the list below that are not actually required by the text of the edited section.

* + 1. ASTM International (ASTM):
       1. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
       2. ASTM C203 - Standard Test Methods for Breaking Load and Flexural Properties of Block-Type Thermal Insulation.
       3. ASTM C272 - Standard Test Method for Water Absorption of Core Materials for Sandwich Constructions.
       4. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
       5. ASTM D5 - Standard Test Method for Penetration of Bituminous Materials.
       6. ASTM D8 - Standard Terminology Relating to Materials for Roads and Pavements.
       7. ASTM D36 - Standard Test Method for Softening Point of Bitumen, Ring-and-Ball Apparatus.
       8. ASTM D113 - Standard Test Method for Ductility of Asphalt Materials.
       9. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers - Tension.
       10. ASTM D1004 - Standard Test Method for Tear Resistance, Graves Tear, of Plastic Film and Sheeting.
       11. ASTM D1621 - Standard Test Method for Compressive Properties of Rigid Cellular Plastics.
       12. ASTM D1777 - Standard Test Method for Thickness of Textile Materials.
       13. ASTM D2024 - Standard Test Method for Cloud Point of Nonionic Surfactants.
       14. ASTM D2126 - Standard Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging.
       15. ASTM D3111 - Standard Practice for Flexibility Determination of Hot-Melt Adhesives by Mandrel Bend Test.
       16. ASTM D3236 - Standard Test Method for Apparent Viscosity of Hot Melt Adhesives and Coating Materials.
       17. ASTM D3617 - Standard Practice for Sampling and Analysis of Built-Up Roof Systems During Application.
       18. ASTM D3776 - Standard Test Methods for Mass Per Unit Area, Weight, of Fabric.
       19. ASTM D4830 - Standard Test Methods for Characterizing Thermoplastic Fabrics Used in Roofing and Waterproofing.
       20. ASTM D5295 - Standard Guide for Preparation of Concrete Surfaces for Adhered, Bonded, Membrane Waterproofing Systems.
       21. ASTM D5295 - Standard Guide for Preparation of Concrete Surfaces for Adhered, Bonded, Membrane Waterproofing Systems.
       22. ASTM D5898 - Standard Guide for Standard Details for Adhered Sheet Waterproofing.
       23. ASTM D6769 - Standard Guide for Application of Fully Adhered, Cold-Applied, Prefabricated Reinforced Modified Bituminous Membrane Waterproofing Systems.
       24. ASTM E96 - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials.
    2. American Concrete Institute (ACI):
       1. ACI 301 - Specifications for Structural Concrete.
    3. National Roofing Contractors Association (NRCA).
    4. Sheet Metal and Air Conditioning Contractors' National Association (SMACNA).
  1. SUBMITTALS
     1. Submit under provisions of Section 01 30 00 - Administrative Requirements.
     2. Product Data:
        1. Manufacturer's data sheets on each product to be used.
        2. Preparation instructions and recommendations.
        3. Storage and handling requirements and recommendations.
        4. Typical installation methods.

\*\* NOTE TO SPECIFIER \*\* Delete if not applicable to product type.

* + 1. Verification Samples: Two representative units of each type, size, pattern and color.
    2. Shop Drawings: Include details of materials, construction and finish. Include relationship with adjacent construction.
  1. QUALITY ASSURANCE
     1. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with a minimum five years documented experience.
     2. Installer Qualifications: Company specializing in performing Work of this section with minimum two years documented experience with projects of similar scope and complexity.
     3. Source Limitations: Provide each type of product from a single manufacturing source to ensure uniformity.

\*\* NOTE TO SPECIFIER \*\* Include mock-up if the project size or quality warrant the expense. The following is one example of how a mock-up on might be specified. When deciding on the extent of the mock-up, consider all the major different types of work on the project.

* + 1. Mock-Up: Construct a mock-up with actual materials in sufficient time for Architect's review and to not delay construction progress. Locate mock-up as acceptable to Architect and provide temporary foundations and support.
       1. Intent of mock-up is to demonstrate quality of workmanship and visual appearance.
       2. If mock-up is not acceptable, rebuild mock-up until satisfactory results are achieved.
       3. Retain mock-up during construction as a standard for comparison with completed work.
       4. Do not alter or remove mock-up until work is completed or removal is authorized.
  1. PRE-INSTALLATION CONFERENCE
     1. Convene a conference approximately two weeks before scheduled commencement of the Work. Attendees shall include Architect, Contractor and trades involved. Agenda shall include schedule, responsibilities, critical path items and approvals.
  2. DELIVERY, STORAGE, AND HANDLING
     1. Store and handle in strict compliance with manufacturer's written instructions and recommendations.
     2. Protect from damage due to weather, excessive temperature, and construction operations.
  3. PROJECT CONDITIONS
     1. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.
  4. WARRANTY
     1. Manufacturer's standard limited warranty for labor and materials, including the membrane, membrane flashings, protection course, insulation and drainage medium.

1. PRODUCTS
   1. MANUFACTURERS
      1. Barrett Company, which is located at: 2926 Chester Ave.; Cleveland, OH 44114; ASD Toll Free: 800-647-0100; Phone: 908-647-0100; Email: \_\_\_\_\_\_\_\_; Web: www.barrettroofs.com.

\*\* NOTE TO SPECIFIER \*\* Delete one of the following two paragraphs; coordinate with requirements of Division 1 section on product options and substitutions.

* + 1. Substitutions: Not permitted.
    2. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 - Product Requirements.

\*\* NOTE TO SPECIFIER \*\* Delete articles not required.

* 1. WATERPROOFING MEMBRANE
     1. Basis of Design: Black Pearl Reinforcing Membrane; as manufactured by Barrett Company.
        1. Performance Requirements:
           1. Compliance with ASTM D6769.
           2. Reinforcement Basis Weight, ASTM D3776: 0.459 oz./sq.ft. (140 gm/sq.m.).
           3. Sheet Thickness, ASTM D1777: 50 mil (1.3 mm).
           4. Tensile Strength, ASTM D4830: 75 lbf/in (2.58 Nm/m).
           5. Elongation, ASTM D4830: 26 percent MD, 28 percent XD.
           6. Tear Strength, ASTM D4830: 30 lbf (41 Nm) MD, 27 (37 Nm) XD.
           7. Fatigue Life, ASTM D8B: Greater than 10,000 cycles.
        2. Description: Polyester fortified with fiberglass set in the machine direction.
     2. Primer and Adhesive:
        1. Performance Requirements:
           1. Softening Point of Bitumen Component, ASTM D36: 160 degrees F (71.1 degrees C).
           2. Solids Content, ASTM D3236: Minimum 55 percent.
           3. Penetration, ASTM D5: 30 dmm.
           4. Elongation at 77 degrees F (25 degrees C), ASTM D412: 100 percent.
           5. Tensile and Adhesive, ASTM D1004 Die C: Average 1000 psi (6895 kPa).
           6. Ductility at 77 degrees F (25 degrees C), ASTM D113: 15.7 inches (400 mm).
           7. Low Temp Flexibility, ASTM D3111: Minus 10 degrees F (minus 23 degrees C).
           8. Solubility, ASTM D2024: Minimum 99 percent.
        2. Basis of Design: Black Peral Primer-Adhesive; as manufactured by Barrett Company.
     3. Related Materials:

\*\* NOTE TO SPECIFIER \*\* Delete material options not required.

* + - 1. PolyFelt 3.5, Filter Fabric: UV and drain protective spunbonded filament polyester geotextile fabric.
      2. RamFlash PMMA System, Cold-Applied Flashing System: Comprised of a two-component polymethyl methacrylate primer, reinforcing fleece and membrane system.
      3. RamMastic, Detailing Mastic: A trowel grade SBS modified cold process cement.
      4. Ram RB 20, Root Barrier.: 20 mil (0.51 mm) polyethylene sheet.
      5. Ram RB 30, Root Barrier.: 30 mil (0.76 mm) polyethylene sheet.
      6. RAM RB 25: Root barrier tape.
      7. KeeneSeal 100, Joint Sealant: Single component silyl-terminated polyether elastomeric sealant that meets ASTM C920.
  1. DRAINAGE PANELS
     1. Description: Drainage materials with a drainage core and filter fabric recommended by waterproofing manufacture.

\*\* NOTE TO SPECIFIER \*\* Delete basis of design options not required.

* + 1. Basis of Design: Ram DD 025; as manufactured by Barrett Company.
       1. Material: Polymeric 1/4 inch (6.4 mm) cuspate core with a nonwoven filter fabric.
       2. Flow rate 9 gpm per foot (112 lpm per m).
    2. Basis of Design: Ram DD 050; as manufactured by Barrett Company.
       1. Material: Polymeric 7/16 inch (11 mm) cuspate core with a nonwoven spunbonded filter fabric with a high flow rate.
       2. Flow rate 18 gpm per foot (224 lpm per m).
    3. Basis of Design: Ram 1241; as manufactured by Barrett Company.
       1. Material: Polymeric 1/2 inch (13 mm) water retaining perforated cuspate core with spunbonded fabric on bottom side needle punched root barrier fabric on topside. Designed to retain 0.06 gallons per square foot (2.4 liters per square meter).
    4. Basis of Design: Ram 2451; as manufactured by Barrett Company.
       1. Material: Polymeric 1 inch (25 mm) water retaining perforated cuspate core with spunbonded fabric on bottom side needle punched root barrier fabric on topside. Designed to retain 0.11 gallons per square foot (4.5 liters per square meter).
    5. Basis of Design: Ram EN 36 013; as manufactured by Barrett Company.
       1. Material: Polymeric entangled net prefabricated composite drain 0.13 inches (3.3 mm) thick, zig- zag geometric patterned core, drainage mat with a layer of non-woven geotextile.
    6. Basis of Design: Ram EN 36 025; as manufactured by Barrett Company.
       1. Material: Polymeric entangled net prefabricated composite drain 0.25 inches (6.4 mm) thick, zig- zag geometric patterned core, drainage mat with a layer of non-woven geotextile.
    7. Basis of Design: Ram EN 36 045; as manufactured by Barrett Company.
       1. Material: Polymeric entangled net prefabricated composite drain 0.45 inches (11 mm) thick, zig- zag geometric patterned core, drainage mat with a layer of non-woven geotextile.
  1. PROTECTION COURSE
     1. Description: Manufacture protection course materials recommended by application.

\*\* NOTE TO SPECIFIER \*\* Delete basis of design options not required.

* + 1. Basis of Design: Ram 200; as manufactured by Barrett Company.
       1. Material: Fiberglass sheet, smooth surfaced 3.0 mm (118 mil) heavy-duty fiberglass reinforced rubberize sheet.
    2. Basis of Design: Ram 203; as manufactured by Barrett Company.
       1. Material: Fiberglass sheet, smooth surfaced 2.2 mm (86 mil) medium-duty fiberglass reinforced rubberize sheet.
    3. Basis of Design: Ram 306FR; as manufactured by Barrett Company.
       1. Material: A white granular 4.0 mm (160 mil) heavy-duty fiberglass reinforced rubberize sheet.
  1. INSULATION
     1. Insulation: Dense, rigid, extruded polystyrene insulation, designed for application indicated.
        1. Performance Requirements:
           1. Thermal Conductivity at 75 degrees F (24 degrees C), ASTM C518: 0.20K.

\*\* NOTE TO SPECIFIER \*\* Delete compressive strength option not required.

* + - * 1. Compressive Strength, ASTM D1621: Minimum 60 psi (414 kPa).
        2. Compressive Strength, ASTM D1621: Minimum 40 psi (276 kPa).
        3. Compressive Strength, ASTM D1621: Minimum 25 psi (172 kPa).
        4. Flexural Strength, ASTM C203: Minimum 75 lbs/in (8.5 Nm).
        5. Water Absorption, ASTM C272 : 0.1 percent.
        6. Water Vapor Permeance, ASTM E96: 0.3 to 0.8 perms.
        7. Dimensional Stability, ASTM D2126: Maximum 2 percent.

\*\* NOTE TO SPECIFIER \*\* Delete basis of design options not required.

* + - 1. Basis of Design: Dow.
      2. Basis of Design: Owens-Corning.
      3. Basis of Design: \_\_\_\_\_\_.

\*\* NOTE TO SPECIFIER \*\* Delete thickness option not required.

* + - 1. Thickness: As indicated on Drawings.
      2. Thickness: \_\_\_\_\_.
  1. PAVERS
     1. Paver Units: Exposed aggregate precast concrete units.
        1. Performance Requirements:
           1. Compressive Strength, ASTM C140: Minimum 7000 psi (48,260 kPa).
           2. Water Absorption, ASTM C140: Maximum 5 percent.
           3. Freeze and Thaw Resistance, ASTM C67: Maximum 1 percent loss.
           4. Flexural Strength, ASTM C293: 600 psi (4140 kPa).
        2. Pedestals: Barrett Roofscape Pedestal Units.
           1. Material: High density polyethylene with integral 1/8 inch (3.2 mm) joint spacer ribs.
        3. Size: 24 x 24 x 2 inches (610 x 610 x 51 mm).

\*\* NOTE TO SPECIFIER \*\* Delete color options not required.

* + - 1. Color: To be selected by Architect.
      2. Color: As indicated on Drawings.
      3. Color: \_\_\_\_\_\_.
  1. BALLAST
     1. Stone Ballast: Clean graded rock ballast:
        1. Size: 3/8 to 1 inch (9.5 to 25 mm) diameter.
        2. Weight: 15 pounds (6.8 kg) per square foot (0.09 square meters) for 2 inches (51 mm) of insulation.

\*\* NOTE TO SPECIFIER \*\* Delete if not required.

* + - 1. Additional Weight: 5 pounds (2.3 kg) per square foot (0.09 square meters) for each additional inch (25 mm) of insulation.
      2. Minimum Weight at Roof Perimeter: 20 pounds (9.1 kg) per square foot (0.09 square meters) for 20 foot (7300 mm) width.

1. EXECUTION
   1. EXAMINATION
      1. Do not begin installation until substrates have been properly constructed and prepared.
      2. If substrate preparation is the responsibility of another installer, notify Architect in writing of unsatisfactory preparation before proceeding.
   2. PREPARATION
      1. Remove all dirt, trash, debris, grease, oil, water, moisture and other contaminates from the footings and walls which may affect the bond of the membrane to application surface.
      2. Condition of Surface: New concrete surfaces shall provide an acceptable finish and have cured for a minimum of 48 hrs. The General Contractor shall certify no wax base or stearate based curing compounds have been used. All form release agents must be approved in writing prior to application. All concrete surfaces shall comply with ASTM D5295 standard preparation guide.
         1. Horizontal concrete surfaces shall comply with ACI 301-11.7.3.
      3. Existing concrete surfaces shall be examined for any defects or failure to meet ASTM D5295 standard. All surfaces shall be free from laitance, grease, oil, unapproved curing compounds, bug holes, air holes, and honeycombs or other foreign matter detrimental to performance of the waterproofing membrane. Contractor shall certify no wax base or stearate based curing compounds have been used.
      4. Voids, cracks, holes and other damaged surfaces shall be repaired with compatible materials.
      5. Before commencing work, examine all areas and report in writing to Architect and manufacturer any conditions that will adversely affect successful installation. Do not begin work until the conditions have been addressed and corrected.
      6. Expansion Joints: Expansion joints shall be sharply formed and free of broken edges, loose aggregate and completely free of preformed joint fillers, sealants or back-up materials to a depth that is at least twice the width of the joint.
         1. Chamfer edges of the joint.

\*\* NOTE TO SPECIFIER \*\* Delete if not required.

* + - 1. For horizontal applications, curb expansion joints at each side of the joint, either by integrally forming with the slab or securely fastening sulfate treated wood strips to deck.
  1. MEMBRANE INSTALLATION
     1. Install in accordance with manufacturer's instructions, approved submittals, and in proper relationship with adjacent construction.

\*\* NOTE TO SPECIFIER \*\* Delete application options not required.

* + 1. Horizontal Application:
       1. Apply 15-20 mils of Black Pearl Primer Adhesive with a non-serrated straight edge squeegee at the rate of 45 sq. ft./gal. Allow it to dry to a tacky condition (approximately 20 minutes) before installing the Black Pearl Sheet Membrane. Adhesive must extend 1 inch beyond the sheet.
       2. Rub the sheet into the Black Pearl Primer Adhesive with a stiff broom, squeegee, hand garden roller, or similar method.
       3. Lap all edge seams a minimum of 3 inches. Stagger all end laps a minimum of 6 inches. Ensure that total contact with the substrate is maintained. Any membrane "bridging" is unacceptable and will come back to haunt you the installer. Coat the top of the first ply with 15-20 mils of Black Pearl Primer Adhesive at the rate of 45 sq. ft./gal. Allow to dry to tack state. Smoothly embed the second ply, offsetting the side laps of the first ply by half a sheet's width. Any "Fishmouths" or wrinkles in the fabric need to be cut out and detailed.
       4. If additional plies are specified, repeat the same procedure. With multiple ply application, check the adhesion of each ply by applying hand pressure to the sheet. If the sheet moves, delay the next ply application until the underlying sheet has set.
       5. When all specified plies are installed, it is time to run the flood test (ASTM D-5957), or EVM survey (ASTM D-7877). If any leakage or voids are detected, repair the suspect area and retest until there is no leakage of any kind.
       6. When testing is complete, uniformly coat the final sheet with 15-20 mils of Black Pearl Primer Adhesive at the rate of 45 sq. ft./gal. If specified, install a Ram Protection Course directly into the top coat of Black Pearl Primer Adhesive, starting at the low points. Install any additional overburden such as aeration mats, root barriers, concrete pavers, stone ballast, and similar components in accordance with plans and specifications.
       7. When installing the membrane rub the membrane into place with stiff brooms or a squeegee. Total contact with all substrates is required. No bridging or unattached membrane will be accepted.
       8. Install second layer of membrane in a primer and adhesive coating applied at the rate of 1.0 gallon (3.8 L) per 80 square feet (7.4 square meters), after allowing the primer and adhesive to reach a tacky state. Broom or squeegee in place. Offset the side laps from the first ply by half a sheet width and end laps by 6 inches.
    2. Vertical Application:
       1. Footer Detail: Install 20 mils of the Black Pearl Primer Adhesive into the horizontal-to-vertical junction a minimum of 7 inches on the vertical surface and as far a possible onto the horizontal, leaving room for the termination bar. Install the Black Pearl Sheet Membrane a minimum of 6 inches onto the horizontal-to-vertical junction. Repeat the previous step with 20 mils of Black Pearl Primer Adhesive. Then install the complete system over the detailed area. All other detailing follows the installation guidelines for horizontal applications.
       2. Vertical Surfaces: For applications on vertical surfaces, the Black Pearl Sheet Membrane is to be applied in vertical strips and terminated at grade. Apply Black Pearl Primer Adhesive at a rate of 45 sq. ft./gal. Pre-cut sheets of the Black Pearl Sheet Membrane to workable lengths (typically about 5 to 7 feet). Allow Black Pearl Primer Adhesive to dry to a tacky state, then embed the sheets smoothly into the coating, ensuring that they fully adhere to the vertical substrate. Side laps shall be maintained at 3 inches. The bottom of the sheet shall start at the corner of the previously applied base flashing and run up the vertical substrate to termination of the sheet. Ensure that the top edge of the sheet is sealed tight to the vertical substrate using either Black Pearl Primer-Adhesive or Ram Mastic. The succeeding plies on vertical substrates should overlap the lower application plies by 4 inches.
       3. Multiple plies shall be installed in the same manner as the first ply with offset side laps. For multiple ply applications, check the adhesion set-up of each ply by applying hand pressure to the sheet and exerting sideway pressure. If the sheet moves, delay installation of the next ply until the underlying plies are firmly set.
       4. Where required, apply 20 mils of Black Pearl Primer Adhesive at a rate of 45 sq. ft./gal at the top edge of the topmost lift. Embed a sealing strip of Black Pearl Sheet Membrane 8 to 9 inches wide, cut lengthwise from the sheet, directly into the coating with a handheld squeegee. For specified above-ground applications, install termination bars at the top of the membrane, fastened 8 inches on centers.
       5. Inspection and approval of all waterproofing membrane installations shall occur before application of any protection, insulation board or other overburden. All warranted installations must be inspected and accepted by the Barrett Company before any overburden installation can occur. Protection courses for vertical substrates are recommended to be 1-inch thick and 1-pound minimum density expanded or extruded polystyrene, made or cut into 2 feet by 4 feet wide sheets and adhered with 20 mils of Black Pearl Primer- Adhesive at a rate of 45 sq. ft./gal. All protection course insulation shall be laid up in brick pattern.
  1. PROTECTION COURSE AND DRAINAGE MAT INSTALLATION
     1. After quality control test and acceptance of membrane, install specified protection course in topcoat of primer and adhesive. Provide 3 inch (76 mm) side laps.
     2. Insure that membrane, flashing and other associated work is completed, tested and approved by Manufacturer.
     3. Upon acceptance of the waterproofing application, install insulation directly on the waterproofing in a horizontal brick style pattern using Primer and adhesive.
        1. Stagger end joints.
        2. Tightly abut all boards.
     4. Install drainage mat over the insulation and drape over the footing, running over the drainage tile if present.
     5. Provide temporary ballast required to prevent wind damage.
  2. INSULATION AND BALLAST INSTALLATION

\*\* NOTE TO SPECIFIER \*\* Delete insulation and ballast options not required.

* + 1. Insulation: Ensure that membrane, flashing and other associated work is completed and tested. Upon acceptance of the waterproofing application, install extruded polystyrene insulation directly on the protection course with open channel sides down in accordance with manufacturer's requirements and recommendations.
       1. Stagger end joints.
       2. Tightly abut all boards.
       3. The maximum acceptable opening between boards is 1/4 inch (6.4 mm).
       4. Provide temporary ballast and filter fabric as required to prevent wind damage.
       5. In multiple layer applications, all joints shall be staggered.
    2. Pavers: Specified paver units shall be set on specified pedestals in areas indicated to line and grade as shown, with uniform joint width.
       1. Adjust pedestal elements so that precast paver has bearing on all four corners.
       2. Where cutting is required, it shall be done with a high-speed masonry saw producing clean sharp edges.
       3. Precast paver units shall fit to within 1/4 inch (6.4 mm) of all projections and walls or as shown on drawings.
       4. Protect units in place from soiling or damage during the construction process.
       5. Replace any units damaged prior to Owner acceptance.
       6. Provide shims as required to align paver surface with existing elements and other pavers.
       7. Following pre-determined layout, locate first row of paver units at the longest exterior edge of deck.
       8. Use 1/2 unit pedestals at the edgeline and 1/4 unit pedestals at corners.
       9. Place paver stones by lowering horizontally rather than nosing into position to eliminate possible indentation of the substrate.
       10. Run subsequent rows of pavers parallel to first row.
       11. Finished installation shall be set to line and grade shown with uniform joint width.
       12. Replace any units that exhibit damage to surface finish, corners or edges which will be exposed to view in the finished work.
       13. Contractor shall protect units in place from soiling or damage.
       14. Install 0.18 inch (4.6 mm) thick stainless steel banding 3 inches (76 mm) wide centered over each of the outer two perimeter rows of pavers and elsewhere as required and approved by the insulation manufacturer.
    3. Stone Ballast: Install in accordance with insulation manufacturer requirements.

\*\* NOTE TO SPECIFIER \*\* Delete Article if not required.

* 1. VEGETATED ROOF COMPONENT INSTALLATION

\*\* NOTE TO SPECIFIER \*\* Delete component options not required.

* + 1. Root Barrier: Install primary root barrier in accordance with manufacturer's recommendations over the protection course. Install primary root barrier sealing all seams with root barrier tape.
       1. Provide a minimum of 12-inch (305 mm) side and end laps of root barrier.
       2. Run root barrier past full height at all base flashings, drain access boxes, vent pipe access boxes and perimeters and temporarily seal with tape.
       3. Do not run root barrier under the drain clamps.
       4. Trim fabric and root barrier after installation of overburden.
    2. Aeration Mat: Place directly over insulation in lieu of filter fabric.
       1. Provide 3 inch (76 mm) side laps.
    3. Drainage and Water Retention Mat: Clean surface of any loose debris. Install material with heavier, black mat down and open cups facing up over the filter fabric or aeration mat.
       1. Start panels so that the edge with the fabric lap is facing the perimeter condition.
       2. Seal the lap to the perimeter.
       3. Cut panels to fit tightly around the penetrations.
       4. Place adjacent panels so that the cores are butted-together.
       5. Lay the 4 inch (102 mm) fabric lap onto the adjacent panel.
       6. Secure the flaps at 3 inch (76 mm) intervals with adhesive or duct tape.
       7. Join roll ends by peeling back the fabric and cutting off 4 inches (102 mm) of the core.
       8. Place panel ends so that the cores are butted together.
       9. Glue or tape overlap in place at 12 inch (305 mm) intervals.
    4. Drain and Vent Pipe Access Boxes:
       1. Sheet metal inspection boxes shall be fabricated from aluminum Alloy 3003 - H14 in compliance with ASTM B209 specifications, with H14 temper or minimum 0.015 inch (0.38 mm) thick stainless steel with a 2D finish unless otherwise specified by the Architect.
       2. Thickness gauge shall be as recommended by SMACNA reference tables for the span and load requirements encountered or place access boxes and border elements in locations noted on the drawings and at all drains and vent pipe protrusions.
    5. Metal Border Edging: Set metal border edging as specified over the drainage/retention mat as shown on the drawings using edge clips at all joints.
    6. Growing Media and Erosion Control Mat:
       1. The landscape installation shall commence with application of the growing medium followed by the vegetation and other specified components in strict compliance with weather requirements as set forth by the approved media and vegetation suppliers, including weather, humidity,waterings, fertilization and other protocols. Install specified soil over the drainage/water retention mat as prescribed by the media supplier including required compaction. Install geo-textile erosion control mat over the soil with side and end laps of 12 inches (305 mm). Ballast all edges of the geotextile with specified pavers or stone ballast in a minimum 2 foot (610 mm) width. Install biodegradable erosion control pins and plates on 4 foot (1219 mm) centers in all directions over the field of the roof.
       2. Fill vegetation free zones with extruded polystyrene insulation and cover with filter fabric, washed river rock, or paver ballast as shown on the drawings.
       3. Thoroughly soak the growth media with water using a sprinkler or hand sprayer. For a 4-inch (102 mm) growth media layer, expect to use approximately 30 gallons (114 liters) per 100 sq. ft. (9.3 square meters).
    7. Planting:
       1. Low profile vegetation mixture shall include a minimum of 6 hardy sedum species approved by the architect, that will generate a continuous ground cover. Maximum mature plant height is generally less than 24 inches (610 mm).
       2. All high profile planting schemes should also incorporate a variegated Sedum design. The plant mixture must include a minimum of 6 species of Sedum in approximately equal quantities. Sedum planting season generally runs from April 15th until October 15th . The installing contractor shall consult with plant supplier to verify planting times. Do not plant vegetation out of season or in adverse weather conditions, as recommended by nursery supplier.
       3. Cut an 8 inch (203 mm) X through the Erosion Control Mat and set plugs into the media to their full depth with the media pressed firmly around the installed plugs. Install plugs at the rate of 2 per square foot. At the end of each day, soak newly planted areas.
       4. Provide plant maintenance for the first two years, maintaining a minimum of 80 percent plant survivability. Replace plantings that fail to meet survivability requirements.
       5. When using a sedum mat, install as prescribed by the approved mat supplier. Water the finished installation with a heavy soaking and re-water as required by weather conditions.
  1. FIELD QUALITY CONTROL

\*\* NOTE TO SPECIFIER \*\* Delete testing options not required.

* + 1. Flood Test: Each contiguous area shall be water tested with 2 inches (51 mm) of standing water for a 48 hour period.
       1. Provide for overflow in the event of rain.
       2. Flood tests shall be witnessed and approved by Architect and Manufacturer.
       3. An electric field vector mapping may be used in lieu of the flood test.
    2. Electric Field Vector Mapping (EFVM):
       1. After installation of the waterproofing membrane and protection board and prior to the placement of the remaining system components or overburden. An EFVM is required, conducted by a surveyor approved by the Architect and waterproofing manufacturer.
       2. Place conductor wire on bare membrane. Secure wire with small strips of waterproofing or other compatible membrane or tape.
       3. Thoroughly wet waterproofing membrane with potable water in area of test. Wetting can be accomplished by hand or mechanical spray devises. Membrane shall be wet during testing procedures.
       4. Technician shall mark on waterproofing membrane or surface exact location of defect and assign an identification number to each location.
       5. Visually inspect entire waterproofing membrane area and repair breaches found. An EFVM retest shall be performed to confirm integrity of repairs.
       6. Technician shall prepare a report of each day's test results containing a written description and photograph of defects located and a schematic CAD drawing indicating location of conductor wire and of defects located in testing field to within 1 in (25 mm) of accuracy. This report shall be made available in hard copy.
       7. Report results of tests, both successful and unsuccessful. In addition to results, report shall include date of test, project name, list of products being applied and tested, name of applicator, name of Contractor, and conditions causing failure of waterproofing membrane in event of an unsuccessful test.
       8. Materials and installations failing to meet specified requirements shall be replaced at Contractor's expense. Retesting of materials and installations failing to meet specified requirements shall be done at Contractor's expense.
       9. EFVM wiring shall be left in place for future testing with layout diagram and leads clearly identified.
    3. Adhesion Tests and Thickness Tests shall be monitored by Applicator every hour throughout the application process.
    4. Test Cuts shall be made at locations requested by Architect or Manufacturer:
       1. Remove one 3 x 48 inch (76 x 1219 mm) cut per 100 squares of waterproofing area.
       2. Test cuts shall run perpendicular to the direction of the reinforcement to provide a representative sample of the waterproofing work.
       3. Follow field audit criteria outlined by ASTM D3617 practice.
       4. Laboratory results shall be submitted by the laboratory directly to the Architect.
       5. Repair sampled areas in accordance with Manufacturer's recommendations.
    5. Material usage and adhesion shall be monitored by the Installer's Quality Control Representative every hour throughout the application process. Provide observation reports to Architect and manufacturer on a weekly basis accompanied with relevant photographs.
    6. Correct any deficiencies in waterproofing as prescribed by material Manufacturer and approved by the Architect.
  1. CLEANING AND PROTECTION
     1. Remove equipment, trash, debris and any excess material from the jobsite.
     2. Repair damage and remove any stains caused by work of this Section.
     3. Protect finished waterproofed areas from damage during backfill operations and subsequent construction.

END OF SECTION