

E.PROFORMANCE SHORING FOR NON-HYDROSTATIC BLINDSIDE WATERPROOFING AND VAPOR INTRUSION MITIGATION SPECIFICATION

SECTION 02 56 16 – GAS CONTAINMENT

SECTION 02 56 19.13 – FLUID-APPLIED GAS BARRIER

SECTION 07 14 16 – COLD FLUID-APPLIED WATERPROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the contract, including general and supplementary conditions, and Division 1 specification section, apply to this section.

1.2 SECTION INCLUDES

- A. The installation of materials designed to provide below grade waterproofing and vapor intrusion protection when installed per project specification, this section covers the waterproofing and vapor intrusion membrane, along with the following:
 - 1. Surface preparation and substrate treatment
 - 2. Auxiliary materials
 - 3. Prefabricated drainage mat
 - 4. Foundation drain

1.3 RELATED SECTIONS

- A. Section 02 24 00: Environmental Assessment
- B. Section 02 32 00: Geotechnical Investigation
- C. Section 03 15 00: Concrete Accessories
- D. Section 03 30 00: Cast-in-Place Concrete
- E. Section 03 40 00: Precast Concrete
- F. Section 07 90 00: Joint Protection
- G. Section 31 30 00: Earthwork Methods
- H. Section 33 41 00: Subdrainage

1.4 PERFORMANCE REQUIREMENTS

- A. General: Provide a waterproofing system that prevents the passage of water under non-hydrostatic conditions, methane gas, contaminant vapor, and complies with the physical requirements as demonstrated by testing performed by an independent testing agency.

1.5 SUBMITTALS

- A. Product Data: For each type of waterproofing specified submit manufacturer's printed technical data, tested physical and performance properties, instructions for evaluating, preparing, and treating substrates, and installation instructions.
- B. Shop Drawings: Project specific drawings showing locations and extent of waterproofing, details for substrate joints and cracks, sheet flashing, penetrations, transitions, and termination conditions.
- C. Samples: Submit two standard size samples of each of the following:
 - 1. Individual components of the specified composite membrane system.
- D. Applicator Certification: Submit written confirmation at the time of bid that applicator is currently approved by the membrane manufacturer.

1.6 QUALITY ASSURANCE

- A. Applicator Qualifications: Waterproofing applicator shall be an EPRO Authorized Applicator who is trained and performs work that in accordance with EPRO standards and policies. For project requiring a no-dollar-limit labor and material warranty, the waterproofing applicator must be E.Assurance Certified at the time of bid.
- B. Third Party Inspection: Independent inspection of the composite system installation may be required based on project conditions and desired warranty coverage. Inspection reports shall be submitted directly to the composite waterproofing manufacturer and made available to other parties per the owners' direction. For projects requiring a no-dollar-limit labor and material warranty, an independent inspector must be E.Assurance Certified and comply with the documentation requirements.
- C. Pre-Construction Meeting: A meeting shall be held prior to application of the waterproofing system to assure proper substrate preparation, confirm installation conditions, and any additional project specific requirements. Attendees of the meeting shall include, but are not limited to the following:
 - 1. EPRO representative
 - 2. EPRO certified applicator
 - 3. Third party inspector
 - 4. General contractor
 - 5. Owners representative
 - 6. Concrete/Shotcrete contractor
 - 7. Rebar contractor
 - 8. Project design team
 - 9. All appropriate related trades
- D. Field Sample: Apply each assembly of the composite membrane system field sample to 100 ft² (9.3 m²) to demonstrate proper application techniques and establish a standard of workmanship that meets the project and manufacturer's requirements.

1. Notify composite membrane system manufacturer representative, architect, certified inspector, and other appropriate parties one week in advance of the dates and times when field sample will be prepared.
2. If architect and certified inspector determines that field sample does not meet requirements; reapply composite membrane system until field sample is approved.
3. Retain and maintain approved field sample during construction in an undisturbed condition as a standard for judging the completed composite membrane system. An undamaged field sample may become part of the completed work.

E. Materials: Composite membrane system and auxiliary materials shall be single sourced.

1.7 MATERIAL DELIVERY, STORAGE AND DISPOSAL

- A. Delivery: Deliver materials to site labeled with manufacturer's name, product brand name, material type, and date of manufacture. Upon the arrival of materials to the jobsite, inspect materials to confirm material has not been damaged during transit.
- B. Storage: Proper storage of onsite materials is the responsibility of the certified applicator. Consult product data sheets to confirm storage requirements. Storage area shall be clean, dry, and protected from the elements. If ambient air temperatures are expected to fall below 40°F, precautions will need to be taken to protect any polymer modified asphalt product from near freezing temperatures. Protect stored materials from direct sunlight.
- C. Disposal: Remove and replace any material that cannot be properly applied in accordance with local regulations and specification section 01 74 19.

1.8 PROJECT CONDITIONS

- A. Substrate Review: Substrates shall be reviewed by the certified applicator and accepted prior to application.
- B. Penetrations: All plumbing, electrical, mechanical, and structural items to be passing through the composite membrane system shall be properly spaced, positively secured in their proper positions, and appropriately protected prior to system application and throughout the construction phase. Braided grounding rods are not allowed to pass through the membrane in waterproofing applications.
- C. Reinforcement Steel: Waterproof membrane shall be installed before placement of reinforcing steel. Any anchor bolts, or other methods, of securing reinforcement steel must be in place prior to the application of the polymer modified asphalt. Piano wire, shotcrete wire rods, or similar methodologies, are prohibited from penetrating the system post installation. When penetrations occur after the system is installed, it is the responsibility of the general contractor to notify the waterproofing applicator to immediately make repairs prior to the placement of overburden.
- D. Clearance: Minimum clearance of 24 inches is required for application of spray applied polymer modified asphalt, **e.spray**. For areas with less than 24-inch clearance, the product may be applied by hand using **e.roll**.
- E. Overspray: Protect all adjacent areas not receiving waterproofing. Masking is necessary to prevent unwanted overspray from adhering to, or staining, areas not receiving the membrane. Once **e.spray** adheres to a surface it is extremely difficult to remove.
- F. Weather Limitations: Perform work only when existing and forecast weather conditions are within manufacturer's recommendations.

1. Spray Applied Polymer Modified Asphalt Membrane: Minimum ambient temperature must be 40°F (7°C) and rising. For applications temperatures below 38 degrees, but greater than +19°F/-7°C, special equipment and material handling is needed. Substrate shall be clean and free from standing moisture.
2. EPRO applicators reserve the right not to install product when application conditions might be within manufactures acceptance, but ambient conditions may limit a successful application.

1.9 WARRANTY

- A. General Warranty: The special warranty specified in this section shall not deprive the owner of other rights the owner may have under other provisions of the contract documents, and shall be in addition to, and run concurrent with, other warranties made by the contractor under requirements of the contract documents.
- B. Special Warranty: Submit a written warranty signed by waterproofing manufacturer agreeing to replace system materials that do not conform with manufactures published specifications, or are deemed to be defective. Warranty does not include failure of waterproofing due to failure of soil substrate prepared and treated according to requirements or formation of new joints and cracks in the specially applied concrete that exceed 1/8 inch (3.175 mm) in width.
 1. Warranty Period: 5 years after date of substantial completion. Longer warranty periods are available upon request.
 2. Coverage: Manufacturer will guarantee that the material provided is free of defects for the warranty period.
- C. Additional Warranty Options: Upgraded warranties are available by contacting the manufacturer. These warranties may have additional requirements and approval must be granted in accordance to the manufacturer's warranty requirements. Additional warranty options include:
 1. Standard Labor and Material (E.Series L&M): Manufacturer will provide non-prorated coverage for the warranty term, agreeing to repair or replace material that does not meet requirements or remain watertight.
 2. No-Dollar-Limit Labor and Material Warranty (E.Assurance NDL): Manufacturer will provide a non-prorated, no-dollar-limit, coverage for the warranty term, agreeing to repair or replace material that does not meet requirements or remain watertight.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: EPRO Services, Inc. (EPRO), P.O. Box 347; Derby, KS 67037; Tel: (800) 882-1896; Email: info@eproinc.com; Web: www.euproinc.com
- B. Shoring Walls: E.Proformance Shoring (90 mils) – **e.drain 12ds**, **e.drain**, **e.spray** (60 mils)

2.2 SYSTEM PHYSICAL PROPERTIES

- A. The physical properties listed in this section reflect testing on the entire composite system. Physical properties of the individual system composite can be found in Specification Section 2.3.
1. **E.Proformance Shoring** becomes fully integrated with the foundation wall by applying a 60 mil layer of **e.spray** (polymer modified asphaltic membrane) to **e.drain** (30 mil HDPE 3/8" dimpled drain mat). E.Proformance shoring assembly provides ideal waterproofing protection for structures without significant presence of water

PROPERTIES	TEST METHOD	VALUE
Tensile Strength	ASTM D412	688 psi
Elongation	ASTM D412	696%
Adhesion to Concrete	ASTM D903	15.6 lbf/in
Puncture Resistance	ASTM D1709	116 lbf/in
Hydrostatic Head Resistance	ASTM D5385	100 psi (231 ft)
Water Vapor Transmission	ASTM E96	.021 perms

2.3 WATERPROOFING MATERIALS

- A. Polymer Modified Asphalt
1. **e.spray**: **e.spray** is a non-hazardous, low-viscosity, water-based, anionic asphalt emulsion modified with a blend of synthetic polymerized rubbers and proprietary additives. **e.spray** is highly stable during transit and proper storage, but becomes highly reactive during the spray application to form a rapidly cured membrane with exceptional bonding, elongation, and hydrophobic characteristics.

PROPERTIES	TEST METHOD	VALUE
Color		Brown to Black
Solvent Content		No Solvents
Shelf Life		6 Months
Tensile Strength	ASTM D412	32 psi
Elongation	ASTM D412	4140%
Resistance to Decay	ASTM E154 Section 13	4% Perm Loss
Accelerated Aging	ASTM G23	No Effect
Moisture Vapor Transmission	ASTM E96	0.026 g/ft ² /hr
Hydrostatic Water Pressure	ASTM D751	26 psi
Perm Rating	ASTM E96	0.21 perms
Methane Transmission Rate	ASTM D1434	0
Adhesion to Concrete & Masonry	ASTM C836 & C704	20 lbf/inch
Adhesion to HDPE	ASTM C836	28.363 lbf/inch
Adhesion to Polypropylene Fabric	ASTM C836	31.19 lbf/inch
Hardness	ASTM C836	80
Crack Bridging	ASTM C836-00	No Cracking
Low Temp. Flexibility		No Cracking at -20° C
Packaging: 55 gallon drum, 275 gallon tote, 330 gallon tote		

2. **e.roll:** *e.roll* is a medium viscosity water-based, polymer-modified anionic asphalt emulsion, which exhibits exceptional bonding, elongation and waterproofing characteristics.

PROPERTIES	TEST METHOD	VALUE
Color		Brown to Black
Solvent Content		No Solvents
Shelf Life		6 Months
Tensile Strength	ASTM D412	32 psi
Elongation	ASTM D412	3860%
Resistance to Decay	ASTM E154 SECTION 13	9% Perm Loss
Accelerated Aging	ASTM G23	No Effect
Moisture Vapor Transmission	ASTM E96	0.071 g/ft ² /hr
Hydrostatic Water Pressure	ASTM D751	28 psi
Perm Rating	ASTM E96	0.17 perms
Methane Transmission Rate	ASTM D14334	0
Adhesion to Concrete & Masonry	ASTM C836	1 lbf/inch
Hardness	ASTM C836	85
Crack Bridging	ASTM C836	No Cracking
Low Temp. Flexibility	ASTM C836-00	No Cracking at -20° C
Packaging: 5 gallon bucket		

B. Prefabricated Drainage

1. **e.drain:** *e.drain* features a lightweight three-dimensional, highly flexible high density polyethylene (HDPE) core and a polypropylene geotextile filter fabric. The filter fabric is bonded to the dimples of the HDPE core.

PROPERTIES	TEST METHOD	VALUE
DIMPLED CORE		
Core		HDPE
Core Material Thickness		30 Mil
Color		Brown
Dimple Height	ASTM D1777-96	.31 inch
Compressive Strength	ASTM D6364-06	5,200 lbs./ft ²
Flow rate	ASTM D4716	5.1 gal/min/ft
FILTER FABRIC		
Grab Tensile	ASTM D4632-91	130 lbs
CBR Puncture Resistance	ASTM D6241	40 lbs
Apparent Operating Size	ASTM D4751-99	70 sieve size (.0212 mm)
Water Flow Rate	ASTM D4491-99	55 gpm/ ft ²
UV Resistance	ASTM D4355-92	70% (500 hrs)
Dimensions: 6' x 65.7', 8' x 65.7'		
Weight: 6' rolls = 60 lbs., 8' rolls = 73 lbs.		

2. **e.drain 12ds**: **e.drain 12ds** features a lightweight three-dimensional, highly flexible polypropylene core and a non-woven geotextile filter fabric. The filter fabric is bonded to the dimples of the polypropylene core to prevent clogging within the drain.

PROPERTIES	TEST METHOD	VALUE
DIMPLED CORE		
Core Material		Polypropylene
Color		Black
Compressive strength	ASTM D1621	9,500 PSF (455 kN/m ²)
Thickness	ASTM D1777	1 Inch
Flow rate	ASTM D4716	30 gpm/ft of width
FILTER FABRIC		
CBR puncture	ASTM D6241	250 lbs
Grab tensile strength	ASTM D4632	100 lbs
AOS	ASTM D4751	70 U.S. sieve
Permitivity	ASTM D4491	2.0 sec ⁻¹
Flow rate	ASTM D4491	140 gpm/ft ²
UV resistance	ASTM D4355	70% (500 hrs)
Dimensions: 165' x 12" x 1"		
Weight: 65 pounds		

2.4 AUXILIARY MATERIALS

- A. General: All accessory products shall be provided by the specified waterproofing manufacturer. Auxiliary products used in lieu of, or in addition to, the manufactures products must be approved in writing by EPRO prior to installation.
- B. Reinforcement Fabric: Manufacturer's polyester fabric, **e.poly** is available in 6 inch, 12 inch, and 40 inch widths.
- C. Detailing Material: **e.roll**, a roller applied water based high viscosity polymer modified asphaltic material OR **e.trowel**, a trowel applied water based high viscosity polymer modified asphaltic material.
- D. Backer Rod: Closed cell polyethylene foam
- E. Water Stop: A single row **e.stop b** shall be placed at all cold joints, construction joints, penetrations, and steel beams in back lagged conditions. Water stop is not required at lift joints.
- F. Termination Bar: **e.term hd**, or approved alternate
- G. Fastener: **e.fastener** or approved alternate.
- H. Shot Pins: Minimum 1-inch galvanized steel pins with ¾ inch aluminum washer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Comply with project documents, manufacturer's product information, including product application and installation guidelines, pre-job punch list, as well as, manufacturer's shipping and storage recommendations.

3.1.2 SURFACE PREPARATION

- A. The general contractor shall engage the certified waterproofing contractor and certified inspector to ensure surfaces are prepared in accordance with manufacturer's instructions. Unless, explicitly stated in the contract documents, the waterproofing contractor is not responsible for surface preparation.
- B. Examine all substrates, areas, and conditions under which the composite membrane system will be installed, applicator and inspector must be present. Do not proceed with installation until unsatisfactory conditions have been corrected and a surface prep requirements have been met. If conditions exist that are not addressed in this section notify inspector and contact EPRO for additional clarification.
- C. Wood Lagging: Wood lagging shoring should extend to the lowest level of the waterproofing installation with any voids or cavities exterior of the lagging timbers filled with compacted soil or cementitious grout. Interior surface of lagging boards should be planar, with no greater than 1-inch variance in a 12-inch plane, and fit tight together with gaps less than 2 inches (25 mm). Gaps in excess of 2 inches should be filled with cementitious grout, compacted soil, wood, extruded polystyrene (20 psi min.) or EPRO approved polyurethane spray foam. Plywood or other surface treatment may be used over large lagging gaps up to 6 inches, if soil conditions permit. All lagging board nails and other mechanical projections shall be removed or flattened. Install a protection material over all soldier piles with raised lagging hanger bolts, form tie rods, or other irregular surface; protection material should extend a minimum 6 inches (150 mm) to both sides of the steel piling. **e.drain** and **e.drain 12ds** base drain system should be connected to an operative water discharge system.
- D. Shotcrete, Secant Pile, Rock Face, or Caisson Shoring Walls: Interior surface of retention walls should be planar without irregular surface conditions and a light trowel finish. Voids and sharp transitions that leave a void space to the outside of the drainage and waterproofing installation need to be filled to create a uniform and planer surface. Irregular rock and concrete, void pockets greater than 3/4 inch, cracks, sharp concave transitions should be completely filled or smoothed with cementitious grout, shotcrete, or other solid material approved by the manufacturer.
- E. Sheet Piles: Minimum 1/2 inch plywood must be butt jointed to form a uniform substrate that spans deviations created by the piles. Voids between the plywood and shoring shall be filled with high strength grout or other suitable material.
- F. Negative Side Internal Bracing: Internal shoring bracing, such as rakers, should be uniform and circular when interfacing with the shoring wall. Irregular bracing, such as soldier piles, creates problematic detailing and is not an approved material at the wall interface.

3.2 SHORING WALL INSTALLATION – E.PROFORMANCE SHORING

- A. General: The composite membrane system shall be installed to the shoring system under strict accordance with the manufactures guideline and project specifications. This section describes the installation process for the system application to a shored wall condition.

- B. Sequencing: The first lift of the composite membrane system shall be installed prior to the placement of any concrete at the perimeter of the excavation and prior to any transition from the underslab system to vertical system. This initial drainage and underslab barrier shall extend a minimum of 4 feet past the first lift of rebar.

3.2.1 PREFABRICATED STRIP DRAIN

- A. Install **e.drain 12ds** horizontally against the shoring wall at specified elevation above the design water table. Allow for positive drainage flow into water discharge system. Attach to shoring using washered mechanical fasteners.

3.2.2 PREFABRICATED DRAINAGE MAT

- A. Drainage Orientation: Install drainage panels either horizontally or vertically with the geotextile fabric facing the soil retention system.
- B. Horizontal Installation: Install **e.drain** horizontally along the bottom of the excavation and secure using **e.fasteners**.
 - 1. Install the next lift of drainage and overlap the next layer of drainage a minimum of 6 inches. A shingling effect should be created by making certain the new drainage layer is placed inside the previously installed drainage layer at the overlap.
- C. Vertical Installation: Install **e.drain** vertically from the top of the excavation and secure using **e.fasteners**.
 - 1. Install vertically in one direction and overlap the vertical seam a minimum of 6 inches. A shingling effect should be created by making certain the new drainage layer is placed inside the previously installed drainage layer at the overlap.
- D. Back Lagged Condition: Install **e.drain** vertically and overlap onto the soldier pile a minimum of 6 inches.
- E. Fasten Pattern: Using **e.fasteners** secure seam overlaps 12 inches on center. Fasten the field of drain mat using an alternating pattern every 3 feet. The pattern shall be one fastener every 6 feet on center, and two evenly spaced fasteners every 3 feet.
- F. Overlap: Drainage overlaps shall be detailed using **e.spray/e.roll** polymer modified asphalt and **e.poly** reinforcement fabric.
 - 1. Pull the fabric of the bottom overlap sheet back and spray apply a minimum 30-mil coat of **e.spray/e.roll** a minimum of 6 inches onto the dimples, press firmly together.
 - 2. Apply a 30 mil coat of **e.spray/e.roll** 6 inches to either side of the overlap seam. Embed a 6 inch strip of polyester into the seam extending out 3" on either side of the seam, then apply a second 30-mil coat of **e.spray/e.roll** over the polyester.
- G. Place anchors or tie backs through the drainage mat by slitting vertically and sliding over the anchor as snug as possible.

3.2.3 SEALING OF PENETRATIONS

- A. Standard Pipe Penetrations: Standard penetration detailing should occur around all penetrations that are in place prior the membrane application, this includes soil nails, rock anchors, and tiebacks (non-hydrostatic).
 - 1. Prepare membrane penetrations so they are free of any material that will inhibit a direct bond to the penetration surface: foam, insulation, protective coatings, etc.

2. Trim **e.drain** to within 1/8 inch of the penetration.
 3. Apply **e.roll** 3 inches horizontally and 3 inches vertically around the base of the penetration.
 4. Install **e.stop b** around the base of the penetration.
 5. Embed reinforcement fabric 3 inches horizontally and 3 inches vertically around the base of the penetration.
 6. 6-inch **e.poly** reinforcement fabric is acceptable for most penetrations, for soil nails, rock anchors, and tiebacks (non-hydrostatic) 12-inch **e.poly** reinforcement fabric is required.
 7. Apply a second layer of **e.roll** 3 inches to reinforcement fabric until the reinforcement fabric is fully saturated.
- B. Rebar Rods: Wire ties, steel fasteners, or anchor bolts used to secure concrete reinforcement can be detailed prior to or after the application of **e.spray**. Any installation of wire ties, rebar rods, steel fasteners, or anchor bolts must be detailed per manufactures instruction using one of two methodologies.
- C. Rebar Rod Detail Option 1: Sealing with water stop.
1. Cut a 1" piece of **e.stop b**.
 2. Insert rebar rod into shoring wall through the 1" piece of **e.stop b**.
 3. Rebar rods shall be secured directly perpendicular to the vertical wall. Each rod shall be secured without the need of any additional support.
- D. Rebar Rod Detail Option 2: Sealing with reinforcement detail.
1. Rebar rods shall be secured directly perpendicular to the vertical wall. Each rod shall be secured without the need of any additional support.
 2. Apply **e.roll** 3 inches horizontally and 3 inches vertically around the base of the penetration.
 3. Embed **e.poly** reinforcement fabric 3 inches horizontally and 3 inches vertically around the base of the penetration.
 4. 6-inch **e.poly** reinforcement fabric is acceptable for most penetrations, for soil nails, rock anchors, and tiebacks (non-hydrostatic) 12-inch **e.poly** reinforcement fabric is required.
 5. Apply a second layer of **e.roll** 3 inch to reinforcement fabric until the reinforcement fabric is fully saturated.

3.2.4 POLYMER MODIFIED ASPHALT MEMBRANE

- A. Mask off adjoining surfaces where unwanted **e.spray** polymer modified asphalt membrane may impact other construction trades.
- B. Commence application of **e.spray** polymer modified asphalt when ambient air temperatures are within manufacturer recommendations.
- C. Surfaces that will receive the membrane must be clean and free from standing moisture.
- D. Start installing **e.spray** in presence of approved 3rd party inspector.

- E. Moving from the low point to the high point of the wall, apply one application of **e.spray** waterproofing in accordance to manufacturer's instructions in order to obtain a seamless membrane with a minimum dry film thickness of 60 mils (2 mm).
- F. Apply **e.spray/e.roll** in and around penetrations and cavities to ensure the formation of monolithic seal around all penetrations.
- G. Apply **e.spray/e.roll** to prepared wall terminations and vertical surfaces to heights indicated according to manufacturer's recommendations and details. (if applicable)
- H. Verify film thickness of waterproofing every 1000 ft² (93 m²).

3.2.5 TERMINATION AT TOP OF GRADE

- A. The system shall extend 2 feet past the top of the wall and be temporarily secured in place.
- B. When the wall is extended or a slab is placed at the top of wall, the cold joint shall be reinforced by applying 30 mils of **e.roll** on 3 inches of either side of the joint, embedding 6-inch **e.poly** reinforcement fabric, and then saturating the fabric with another application of 30 mils of **e.roll**.
- C. Trim the system to grade height and attach to the wall with a termination bar.
- D. Apply a reinforcement detail or bead of low VOC acrylic caulking over the top of the termination bar and continue transition per project drawings.

3.2.6 WATERSTOP INSTALLATION

- A. Place one row of **e.stop b** at all cold joints and concrete to steel beam connections.

3.3 FIELD QUALITY CONTROL

- A. Independent inspectors and certified applicators shall document the amount of **e.spray** used and document quantities in the inspection report.

3.4 CURING PROTECTING AND CLEANING

- A. Allow for **e.spray** to fully bond with the substrate, generally this occurs 24 to 48 hours after application depending on ambient weather conditions.
- B. Take care to prevent contamination and damage during application stages and curing. All machinery, other trades, and general construction, shall NOT take place over the membrane until inspection is complete and concrete has been placed.
- C. Prevent damage during the placement of overburden.

3.5 REPAIRS

- A. Shoring:
 1. Inspect damaged area to determine which system components have been damaged.
 2. If the **e.drain** has not been compromised, patch only the areas that have been damaged by re-installing the damaged materials. The patch should extend 6 inches beyond the damaged area.
 3. If the **e.drain** has been breached but no additional system components have been installed, install a patch of **e.drain** core that extends 6 inches beyond the damaged area. Area shall be sealed using the specified method for sealing the **e.drain**.

4. Apply a reinforcement detail of **e.roll** and reinforcement fabric 6 inches beyond the edge of the repair area.
5. Apply the remaining layers as specified.

End of Section