SP- 150313
(New)

SPECIAL PROVISIONS
FOR
COLD SPRAY-APPLIED ELASTOMER WATERPROOFING MEMBRANE

Woodbury County
IM-NHS-029-7(32)149--03-97
IM-NHS-029-7(33)148--03-97
IM-NHS-029-7(50)149--03-97

Effective Date
November 21, 2017

THE STANDARD SPECIFICATIONS, SERIES 2015, ARE AMENDED BY THE FOLLOWING MODIFICATIONS AND ADDITIONS. THESE ARE SPECIAL PROVISIONS AND THEY SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.

150313.01 DESCRIPTION.

This work shall consist of furnishing labor, products and equipment required for the application of a seamless spray elastomer waterproofing membrane to the exposed concrete roof of the Perry Creek conduit.

150313.02 MATERIALS.

A. Acceptable Products.

1. Listing of specific manufacturer's products shall not be construed as product approval without certified tests. Actual physical properties of the products furnished must conform to the minimum physical properties specified. Alternative manufacturers will be considered if equivalent product function and performance are established to the satisfaction of the Engineer.

2. The following products may be used for the waterproofing membrane:

a. Bridge Deck Membrane (by Bridge Preservation)
Bridge Preservation
686 S. Adams Street
Kansas City, KS 66105
913-321-9000

b. Deckguard (by D.S. Brown)
The D.S. Brown Company
300 East Cherry Street
North Baltimore, OH 45872
419-257-3561

c. Eliminator (by Stirling Lloyd)
Stirling Lloyd Products, Inc.

152 Rockwell Road, Bldg A
Newington, CT 06111
425-999-6507

3. Alternative manufacturers will be considered if equivalent product function and performance are established to the satisfaction of the Engineer.

B. General.

1. The coating system shall be spray applied, 100% solids, fast cure, high build polymer system combined with graded basalt aggregate, and shall chemically bond to the base membrane. Primer is required.

2. Crack Bridging Test.
The base membrane system shall pass the ASTM C 1305 Crack Bridging Test. The thickness to be tested shall be either 80 mils minimum, or the minimum thickness required to pass the crack bridging test, whichever is thicker. The thickness required to pass the test shall be the minimum thickness required for all field application of the base membrane.

C. Primer.
Concrete Primer – Two-component polymer primer with the material properties shown in Table 1.

Table 1: Multi-Component Polymer Primer

Physical Property	Test Method	Value
Gel Time		>5 minutes
Tack Free Time, max @ 77°F		<2.5 hours
Mixing Ratio		Per Manufacturer
Adhesion to Concrete	ASTM D 4541	>150 psi

D. Spray Applied Waterproofing Membrane (Base Coat).
Base Coat Membrane – 100% solids, rapid curing elastomer with the material properties shown in Table 2.

Table 2: Spray Applied Waterproofing Membrane

Physical Property	Test Method	Value
Solids Content		100%
Gel Time		<10 seconds
Cure Time		<30 seconds
Tack Free Time		<30 minutes
Shore Hardness	ASTM D 2240	>40D
Water Vapor Transmission	ASTM E 96	<0.94 perms
Adhesion to Concrete	ASTM D 4541	>150 psi
Tensile Strength	ASTM D 638	>2,000 psi
Tear Strength (pli; Die C)	ASTM D 638	>350 pli
Elongation at Break	ASTM D 638	>150%
Crack Bridging Ability (80 mils Neat - ⅛" opening @ -15°F, 10 cycles)	ASTM C 1305	Pass @ 40 cycles

E. Spray Applied Aggregate Membrane (Top Coat).
Top Coat Membrane – 100% solids, rapid curing elastomer with the material properties shown in Table 3.

Table 3: Spray Applied Aggregated Membrane

Physical Property	Test Method	Value
Solids Content		100%
Gel Time		<30 seconds
Tack Free Time		<5 minutes
Open to Traffic		1 hour
Shore Hardness	ASTM D 2240	>40D
Tensile Strength	ASTM D 638	>2,000 psi
Tear Strength (pli; Die C)	ASTM D 638	>350 pli
Elongation at Break	ASTM D 638	>150%
Crack Bridging Ability (80 mils Neat + 40 mils with Aggregate - ⅛" opening @ -15°F, 40 cycles)	ASTM C 1305	Pass @ 40 cycles

F. Topping Aggregate.
Furnish basaltic bridge topping aggregate (Mohs Hardness Range 6 to 7) as provided by membrane manufacturer.

G. Joint Bond Breaker Tape.
Plastic-backed tape approved for use with the spray-applied waterproofing membrane by the manufacturer.

H. Membrane Surface Activator.

1. Single component activating agent used to treat over coating applications as recommended by the membrane manufacturer.

2. May also be used with membrane at coating overlap areas where coating has cured for more than 24 hours

150313.03 CONSTRUCTION.

A. Definitions.
Concrete Surface Preparation – SSPC-SP13/NACE No. 6

B. Submittals.

1. Manufacturer shall provide current (within the last 5 years) independent laboratory test results illustrating each component's conformance to the physical property requirements listed in Tables 2 and 3.

2. The manufacturer's material safety data sheets (MSDS) for each of the components.

3. The manufacturer's current product data sheets. Provide all primers and membranes from the same manufacturer.

4. The manufacturer's current installation and testing procedure document. This document shall conform in its entirety with all the requirements specified herein.

5. Two sample coupons (4 inch by 4 inch) that are representative of the finished membrane surface, texture, and color. Approved samples will serve as a basis for acceptance of the work for the duration of the product.

C. Project Conditions.

1. **Environmental Requirements.**
   a. Install system when air and substrate temperature is above -20°F and substrate temperature is above the dew point and rising.
   b. Substrate moisture content shall be 5.0% or less. Test concrete moisture content with a non-destructive concrete moisture meter, such as Tramex.

2. **Personal Requirements.**
   Provide protective clothing, gloves, and respirators for use by installers as required.

D. Quality Assurance.

1. Manufacturer Qualifications: Use ISO 9001 certified manufacturer with a minimum of 5 years experience providing the principal materials for work in this section. The manufacturer should be a primary blender with proprietary formulations, an Authorized Applicator program, and capacity to provide field technical services as required. Provide all primers and membranes from the same manufacturer.

2. Manufacturer's On-Site Representative: Manufacturer shall provide an authorized representative to be on the job site for the duration of the installation of the membrane system. The manufacturer's representative, upon consultation with the Engineer, may suspend any item of work that is suspect and does not meet the requirements of this specification. Resumption of work will occur only after the manufacturer's representative and the Engineer are satisfied that appropriate remedial action has been taken by the contractor.

3. Contractor Qualifications: Contractor applying the waterproofing system shall be authorized to apply the system by the manufacturer. This authorization shall apply to the individuals installing the materials. Manufacturer authorized applicators shall be re-certified yearly. The contractor shall be an established firm regularly engaged in satisfactory installations of similar materials on projects similar in nature and complexity.

4. Schedule pre-installation conference to review installation schedule, shut down, and restricted access procedures. Indicate Engineer and Contractor's superintendent.

5. Inspect surface preparation, application procedures, and review proposed dry film thickness at each installation location.

E. Delivery, Storage, and Handling.

1. Deliver product in manufacturer's original containers.

2. Store product in warm, dry condition in accordance with manufacturer's product data sheets.

3. Replace product damaged by shipment, weather, or job conditions.

F. Execution.

1. **Inspection.**
   Prior to application of primer, inspect and approve substrate preparation.

2. **Preparation**
   - **a.** For joining to existing cured membrane system, refer to Article 150313.03, F, 5.
   - **b.** Provide clean, sound concrete substrate.
   - **c.** Repair spalls and other defects with Five Star Structural Concrete or approved alternate material.
   - **d.** Prepare concrete surfaces to SSPC-SP13/NACE No. 6 Surface Preparation of Concrete.
   - **e.** Test prepared concrete surface using Elcometer adhesion testing (ASTM D 4541). Minimum pull strength is 150 psi.
   - **f.** Existing construction joints shall be filled with a joint filler approved for use by the waterproofing membrane manufacturer.
   - **g.** Apply bond-breaker tape to all joints to be covered with the membrane system.
   - **h.** Mask protected surfaces prior to spray applications.
   - **i.** Erect spray curtains and partitions as required.

3. **Installation.**
   - **a.** Do not begin membrane installation until all materials and equipment necessary to perform the installation and all required repairs are at the job site.
   - **b.** Contractor shall maintain spray and other installation equipment in proper operating condition throughout installation. Provide reserve equipment as required.
   - **c.** Manufacturer's on-site representative shall perform and record relevant field quality control readings throughout the installation process. (See Article 150313.01, F, 4 for complete requirements.)
   - **d.** Spray, squeegee, or roll primer at 130 to 200 square feet per gallon over surfaces to receive spray applied waterproofing membrane. Allow primer to go tack free before spraying waterproofing membrane.
   - **e.** Reapply primer if set more than 24 hours if recommended by the membrane manufacturer.
   - **f.** Spray waterproofing membrane (base coat) over primed surfaces at a minimum thickness of 80 mils (20 square feet per gallon) or the minimum thickness required to pass the ASTM C 836 and ASTM C 1305 Crack Bridging Test (see Article 150313.02, B, 2). Spray additional base coats as required to achieve the specified thickness.
   - **g.** Spray Top Coat Membrane at 40 mils and immediately broadcast fine mesh aggregate into membrane at 0.50 to 0.75 pounds per square foot to achieve a minimum 80% coverage rate.
   - **h.** Remove excess loose aggregate.

4. **Field Quality Control.**
   - **a.** All work in this section to be completed by waterproofing manufacturer's on-site representative. Representative shall record all readings and test results into a Quality Control Daily Log. A copy of each daily log shall be submitted to the Engineer at the end of each day.
   - **b.** Record environmental conditions readings at least once every four hours, when ambient conditions significantly change, or immediately prior to contractor performing new task (prior to installing primer, prior to installing base membrane, and so forth), whichever is more frequent.
   - **c.** Record material batch numbers, processing information, and quantity of each material used.
   - **d.** Perform tensile adhesion bond testing of both primer and base membrane in accordance with ASTM D 4541.
   - **e.** Perform dry film thickness testing of base membrane in accordance with SSPC-PA2 or SSPC-PA9 Measurement of Dry Coating Thickness. Destructive, stroke per gallon or ultrasonic methods are also suitable methods of thickness assurance on most projects.
     - **1)** If on-site representative uses magnetic test equipment, testing shall be performed in

accordance with SSPC-PA2 Measurement of Dry Coating Thickness with Magnetic Gages.

2) If on-site representative uses ultrasonic test equipment, testing shall be performed in accordance with SSPC-PA9 Measurement of Dry Coating Thickness on Cementitious Substrates Using Ultrasonic Gages.
3) Ultrasonic testing is usually accurate to +/- 3%.
4) Spray equipment is calibrated and tested to a stroke count per gallon of material sprayed.
5) Repair destructive areas by respraying or filling with special two component gun grade material provided by the waterproofing manufacturer.
6) Other components of system may be tested for thickness using wet film or stroke per gallon methods.

f. Perform visual inspections throughout installation process. Holidays or other defects in the waterproofing membrane shall be marked or repaired.

5. Repairs.

a. If an area of membrane requires repair or if the membrane becomes damaged, a patch repair shall be carried out to restore the integrity of the membrane system. The damaged area shall be cut back to sound materials and wiped with acetone (bare membrane only, see below) up to a width of at least 6 inches beyond the periphery of the damaged area, removing contaminates. The concrete shall be primed as necessary.

1) **Bare Membrane without Aggregate**: If existing membrane was installed 24 hours or more in advance, prior to application of the repair membrane, the existing membrane shall be wiped with Surface Activator using clean cotton rags. Allow the activator to set as recommended by the membrane manufacturer.
2) **Membrane with Aggregated Top Coat**: Consult waterproofing manufacturer's on-site representative to determine the extent of cleaning required. Areas to be prepared shall be prepared up to a width of at least 6 inches beyond the damaged area.
   a) For areas on-site representative determines to be relatively clean, remove all loose dirt, debris, or other contaminates that could interfere with the adhesion of the repair membrane to the existing membrane using clean, dry, oil-free compressed air.
   b) For areas on-site representative determines to be heavily dirty or contaminated, remove all loose dirt, debris, and other contaminates using clean, dry, oil-free compressed air. Remove additional contaminates using dry abrasive blast equipment.
   c) After surface preparation has been completed, apply Concrete Primer, if required by the membrane manufacturer, at a rate of 160 to 200 square feet per gallon.

b. Apply repair membrane while existing membrane is still tacky using standard spray equipment, or utilize Patch Coat material. A continuous layer shall be obtained over the concrete with a 6 inch overlap onto the existing membrane. Repairs shall comply with the manufacturer's guidelines for any over-coating times.

c. Where membrane is to be joined to existing cured material and at day joints, the new application shall overlap the existing membrane/day joint by at least 4 inches. The existing membrane/day joint shall be cleaned of all contamination including tack coat material or dirt to an edge distance of at least 6 inches and wiped with acetone (bare membrane only, see below).

1) **Bare Membrane without Aggregate**: If existing membrane was installed 24 hours or more in advance, prior to application of the repair membrane, the existing membrane shall be wiped with Surface Activator using clean cotton rags. Allow the activator to set as recommended by the membrane manufacturer.
2) **Membrane with Aggregated Top Coat**: Consult waterproofing manufacturer's on-site representative to determine the extent of cleaning required. The existing membrane/day joint shall be cleaned of all contamination including tack coat material or dirt to an edge distance of at least 6 inches using the cleaning/preparation

methods detailed below.

a) For areas on-site representative determines to be relatively clean, remove all loose dirt, debris, or other contaminates that could interfere with the adhesion of the repair membrane to the existing membrane using clean, dry, oil-free compressed air.

b) For areas on-site representative determines to be heavily dirty or contaminated, remove all loose dirt, debris, and other contaminates using clean, dry, oil-free compressed air. Remove additional contaminates using dry abrasive blast equipment.

c) After surface preparation has been completed, apply Concrete Primer at a rate of 160 to 200 square feet per gallon if recommended by the membrane manufacturer.

d. Small repairs shall be performed as specified in Article 150313.03, F, 4, e, 5.

e. Large repairs shall utilize the materials from Article 150313.03, F, 3, along with standard spray equipment and materials.

6. Cleaning.

a. Clean spills and oversprays as they occur.

b. Consult manufacturer's literature and MSDS for proper cleaning products and methods.

c. Clean site to Engineer's satisfaction prior to final acceptance.

7. Protection.

Protect installed work prior to acceptance by Contracting Authority.

8. Schedules.

Submit spray schedule if required.

150313.04 METHOD OF MEASUREMENT.

Measurement for Cold Spray-Applied Elastomer Waterproofing Membrane, in square yards, will be the quantity shown in the contract documents.

150313.05 BASIS OF PAYMENT.

For the quantity of Waterproofing Membrane placed, the Contractor shall be paid for the unit price per square yard. This payment shall be full compensation to furnish and install the Cold Spray-Applied Elastomer Waterproofing Membrane.