8/4/09

STANDARD STRUCTURE PROVISIONS – B-5179A Buncombe / Madison Counties

I. GENERAL REQUIREMENTS

A. GENERAL SCOPE OF WORK

This work shall consist of furnishing all labor, equipment, and materials to overlay the existing bridge decks and if applicable, the approaches with one of the following deck treatments: (1) Hydrodemolition and Latex Modified Concrete-Very Early Strength (LMC-VES), (2) Two Layer Epoxy/Stone Overlay, and (3) Asphalt.

B. LOCATION AND DESCRIPTION

See table below for individual scope of work details for each bridge

Hydrodemolition & Latex Modified Concrete-Very Early Strength Overlay:
Buncombe Co. Bridge #'s 289, 314, 316, 329, & 330 on US 19/23

Work includes removing deteriorated concrete using hydro-demolition methods and overlaying with Latex Modified Concrete-Very Early Strength (LMC-VES), replacing existing joints with elastomeric concrete and evazote joint seals, grooving bridge deck, milling and resurfacing approaches, disposal of waste material, traffic control, sediment control, seeding and mulching all grassed areas disturbed; and all incidental items necessary to complete the project as specified and shown on the plans.

Two Layer Epoxy & Stone Overlay:
Madison Co. Bridge #'s 328, 538, 539, 540, 541, 543, 547, 548, 549, 550, & 551
Buncombe Co. Bridge #'s 302, 303, 429 & 494

Work includes milling existing asphalt if applicable, cleaning the existing bridge decks, repairing all delaminated or unsound areas and placing two layers of epoxy and stone overlay, repairing joints, disposal of waste material, traffic control, sediment control, seeding and mulching all grassed areas disturbed; and all incidental items necessary to complete the project as specified and shown on the plans.

Asphalt Overlay:
Buncombe Co. Bridge #'s 337 & 338

Work includes milling the existing bridge decks, repairing all delaminated or unsound areas, replacing existing asphaltic plug joints with elastomeric concrete and evazote joint seals, resurfacing with asphalt, disposal of waste material, traffic control, sediment control, seeding and mulching all grassed areas disturbed; and

all incidental items necessary to complete the project as specified and shown on the plans.

INDIVIDUAL SCOPE OF WORK

ounty	Br. #	Route	Treatment	Construction Times	Scope of Work	STANDARD/ TCP REF.
Buncombe	289	US 19/23 FUTURE I-26	Hydro-demolition and LMC overlay	Hydro-Demo staged	Hydro Demolition with LMC-VES Overlay, Phased Construction. See Structure and Traffic Control Plans.	TC PLANS
Buncombe	302	US 19/23 FUTURE I-26	Epoxy Stone Overlay	Day or Night	Mill existing asphalt overlay, Sound Deck and make necessary repairs, Apply epoxy stone overlay. Deck Area: 5,480 sf	TC PLANS
Buncombe	303	US 19/23 FUTURE I-26	Epoxy Stone Overlay	Day or Night	Mill existing asphalt overlay, Sound Deck and make necessary repairs, Apply epoxy stone overlay. Deck Area: 5,840 sf	TC PLANS
Madison	328	SR 1001	Epoxy Stone Overlay	Day or Night	Apply Epoxy Stone Overlay, Traffic Control using Roadway Standards & MUTCD. Deck Area: 18,734 sf	1101.02 Sht 3
Buncombe	314	US 19/23 FUTURE I-26	Hydro-demolition and LMC overlay	Hydro-Demo staged	Hydro Demolition with LMC-VES Overlay, Phased Construction. See Structure and Traffic Control Plans.	TC PLANS
Buncombe	316	US 19/23 FUTURE I-26	Hydro-demolition and LMC overlay	Hydro-Demo staged	Hydro Demolition with LMC-VES Overlay, Phased Construction. See Structure and Traffic Control Plans.	TC PLANS
Buncombe	329	US 19/23 FUTURE I-26	Hydro-demolition and LMC overlay	Hydro-Demo staged	Hydro Demolition with LMC-VES Overlay, Phased Construction. See Structure and Traffic Control Plans.	TC PLANS
Buncombe	330	US 19/23 FUTURE I-26	Hydro-demolition and LMC overlay	Hydro-Demo staged	Hydro Demolition with LMC-VES Overlay, Phased Construction. See Structure and Traffic Control Plans.	TC PLANS
Buncombe	337	US 19/23 FUTURE I-26	Mill, repair deck and asphalt overlay	Day or Night	Mill asphalt, Sound Deck and Make Necessary Repairs, Apply Asphalt Overlay, Replace 2 Asphaltic Plug Joints with elastomeric concrete and evazote seals, Traffic Control using Roadway Standards & MUTCD. Deck Area: 6,636 sf	1101.02 Shts 3&6

Buncombe	338	US 19/23 FUTURE I-26	Mill, repair deck and asphalt overlay	Day or Night	Mill asphalt, Sound Deck and Make Necessary Repairs, Apply Asphalt Overlay, Replace 2 Asphaltic Plug Joints with elastomeric concrete and evazote seals, Traffic Control using Roadway Standards & MUTCD. Deck Area: 8,680 sf	1101.02 Shts 3&6
Buncombe	429	I-26	Epoxy Stone Overlay	Day or Night	Sound deck, Make necessary repairs, Apply epoxy stone overlay, Traffic Control using Roadway Standards & MUTCD. Deck Area: 32,039 sf	1101.02 Sht 3
Buncombe	494	I-40	Epoxy Stone Overlay	Day or Night	Sound Deck and make necessary repairs, Apply epoxy stone overlay, Traffic Control using Roadway Standards & MUTCD. Deck Area: 53,959 sf	1101.02 Shts 3&7
Madison	538	I-26	Epoxy Stone Overlay	Day or Night	Sound deck, Make necessary repairs, Apply epoxy stone overlay, Traffic Control using Roadway Standards & MUTCD. Deck Area: 4,880 sf	1101.02 Shts 3&6
Madison	539	I-26	Epoxy Stone Overlay	Day or Night	Sound deck, Make necessary repairs, Apply epoxy stone overlay, Traffic Control using Roadway Standards & MUTCD. Deck Area: 5,808 sf	1101.02 Sht 3
Madison	540	I-26	Epoxy Stone Overlay	Day or Night	Sound deck, Make necessary repairs, Apply epoxy stone overlay, Traffic Control using Roadway Standards & MUTCD. Deck Area: 6,200 sf	1101.02 Shts 3&6
Madison	541	I-26	Epoxy Stone Overlay	Day or Night	Sound deck, Make necessary repairs, Apply epoxy stone overlay, Traffic Control using Roadway Standards & MUTCD. Deck Area: 6,600 sf	1101.02 Shts 3&7
Madison	543	Island Road	Epoxy Stone Overlay	Day or Night	Sound deck, Make necessary repairs, Apply epoxy stone overlay, Traffic Control using Roadway Standards & MUTCD. Deck Area: 5,143 sf	1101.02 Sht 3

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Madison	547	I-26	Epoxy Stone Overlay	Day or Night	Sound deck, Make necessary repairs, Apply epoxy stone overlay, Traffic Control using Roadway Standards & MUTCD. Deck Area: 91,448 sf	1101.02 Shts 3&5 EBL Shts 5&7 WBL
Madison	548	I-26	Epoxy Stone Overlay	Day or Night	Sound deck, Make necessary repairs, Apply epoxy stone overlay, Traffic Control using Roadway Standards & MUTCD. Deck Area: 7,904 sf	1101.02 Shts 3&7
Madison	549	I-26	Epoxy Stone Overlay	Day or Night	Sound deck, Make necessary repairs, Apply epoxy stone overlay, Traffic Control using Roadway Standards & MUTCD. Deck Area: 6,640 sf	1101.02 Sht 3
Madison	550	I-26	Epoxy Stone Overlay	Day or Night	Sound deck, Make necessary repairs, Traffic Control using Roadway Standards & MUTCD. Deck Area: 5,360 sf	1101.02 Sht 3
Madison	551	I-26	Epoxy Stone Overlay	Day or Night	Sound deck, Make necessary repairs, Apply epoxy stone overlay, Traffic Control using Roadway Standards & MUTCD. Deck Area: 11,316 sf	1101.02 Shts 3&7

II. HYDRO-DEMOLITION OF BRIDGE DECK (8-26-09)

1.0 Description

Hydro-demolition shall consist of the removal of the deck surface by means of high pressure water blasting which will remove concrete, asphalt, oil, dirt, concrete laitance and rust from the exposed reinforcing bars by direct impact, pressurization of micro and macro cracks and cavitation produced by jet instability. If reinforcing bars or bridge drainage devices are pulled up or snagged during scarification milling operations, the Contractor shall cease operations and consult with the Engineer to determine what adjustments, if any, need to be made to the roto-milling operations.

The Contractor shall submit for approval prior to beginning work, his Hydro-demolition Management Plan. This plan shall include how the Contractor shall provide for the collection, treatment, and disposal of all run-off water generated by the scarification and hydro-demolition processes. This Water Management Plan shall be prepared in accordance the NCDOT Guidelines for Managing Hydro-demolition Water (a copy of which is included in the Appendix). The contractor shall comply with applicable regulation concerning such water disposal.

2.0 Equipment

Use the following surface preparation equipment:

- Hydro-demolition machine, self-propelled with min. 17,000 psi orifice pressure.
- Sawing equipment capable of sawing concrete to the specified depth.
- Scarifying equipment that is a power-operated, mechanical scarifier or grinder capable of removing at least 1/4 inch (6 mm) for each pass.
- Hand-held high velocity (7,500 psi minimum) water-jet equipment capable of removing rust scale from reinforcing steel, or removing small chips of concrete partially loosened by the scarifying or chipping operation, and of removing rehydrated dust left from scarification.
- Power driven hand tools for removal of unsound concrete are required that meet the following requirements:

  Pneumatic hammers weighing a nominal 35 lb (16 kg) or less.

  Pneumatic hammer chisel-type bits that do not exceed the diameter of the shaft in width.
- Hand tools such as hammers and chisels for removal of final particles of unsound concrete.
- Vibratory screed for overlays, except as noted herein.

The hydro-demolition machine shall be self-propelled and capable of producing a water-jet through an orifice at a pressure of at least 17,000 PSI. The machine shall move the jet

transversely across the area and forward and backward so that the entire deck is covered with the water-jet and operated at a pressure sufficient to remove the unsound concrete.

The machine shall have sufficient means to control and vary the following functions:
(1) Water pressure.
(2) Angle and distance of the orifice in relation to the surface to be blasted.
(3) Limits of transverse and longitudinal movement of the orifice.
(4) Speed of the orifice in the transverse and longitudinal direction.

The high pressure pump (or pumps) shall be equipped with over-pressurization relief valves and rupture disc systems. All high pressure components shall be rated at full working pressure of the hydro-demolition system. The complete hydro-demolition system must be capable of depressurization from a single point.

The equipment must operate at a noise level of less than 90 decibels at a distance of 50 feet.

3.0 Construction Methods

Remove all existing asphalt overlays and all loose, disintegrated, unsound or contaminated concrete from the bridge deck in accordance with the following surface preparation classifications shown below:

Seal all expansion joints subjected to run-off water from the hydro-demolition process with material approved by the Engineer, prior to beginning the Class I Surface Preparation. The expansion joints shall remain sealed until water from the hydro-demolition process no longer passes over them. The contractor shall take all steps necessary to eliminate the flow of water through the expansion joints, and any other locations water could leak from the deck.

All deck drains in the immediate work area and the other sections of the bridge affected by the work being performed in the immediate work area shall be sealed prior to beginning the Deck Scarification. They shall remain sealed until it has been determined that materials from the hydro-demolition and concrete overlay operations can not be discharged through them any longer.

A. Deck Scarification: Removal of any asphalt wearing surface from the bridge deck or if applicable, the approach roadway pavement, and scarification of the concrete deck to remove the entire concrete surface of the deck to a uniform depth of at least 1 inch, but not less than 1/2 inch above the top mat of reinforcing steel. Remove and dispose of all concrete and asphalt, and thoroughly clean the scarified surface. In areas where reinforcing steel is located in the depth to be scarified, use another method with the Engineer's approval. If reinforcing bars or bridge drainage devices are pulled up or snagged during scarification milling operations, the Contractor shall cease operations and consult with the Engineer to determine what adjustments, if any, need to be made.

B. Class IA Surface Preparation: Scarify and remove portland cement concrete from the concrete approach pavement to the depth shown on the plans to permit the construction of a 1¼ inch (32 mm) minimum depth overlay on the approach pavement to the limits

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shown on the plans. Transversely saw the existing concrete pavement to create a square construction joint for the overlay. Remove concrete in front of the sawed joint with power driven hand tools. Dispose of removed concrete and thoroughly clean the exposed scarified pavement surface.

C. Class I Surface Preparation (Partial Depth): Remove by hydro-demolition and by chipping with hand tools all loose, unsound and contaminated deck concrete and in areas where reinforcing steel is exposed by removing deck to an average depth of 1/2 inch below the top mat of reinforcing steel. Dispose of the removed concrete, clean, repair or replace rusted or loose reinforcing steel, and thoroughly clean the newly exposed surface.

Care shall be taken not to cut, stretch, or damage any exposed reinforcing steel.

D. Class II Surface Preparation (Partial Depth): Remove by hydro-demolition and by chipping with hand tools all loose, unsound and contaminated deck concrete to an average depth of approximately one-half the deck thickness, but no less than 3/4 inch below the top mat of steel. In areas where the entire perimeter of the reinforcing steel bar is exposed, chip or use hand-held high velocity water-jet equipment to provide a minimum depth of 3/4 inch below the bar. Dispose of the removed concrete, clean, repair or replace rusted or loose reinforcing steel, and thoroughly clean the newly exposed surface.

Care shall be taken not to cut, stretch, or damage any exposed reinforcing steel.

In overhangs, removing concrete areas of less than 0.60 ft^2/ft length of bridge without overhang support is permitted unless the Engineer directs otherwise. For concrete areas greater than 0.60 ft^2/ft length of bridge, approval of the overhang support is required.

E. Class III Surface Preparation (Full Depth): Remove by hydro-demolition, and chipping with hand tools all loose, unsound and contaminated deck concrete to the full slab depth. Thoroughly clean the routed out areas and dispose of concrete removed. Clean, repair, or replace reinforcing bars and fill the areas from which unsound concrete has been removed with Class AA or latex modified concrete up to the bottom of the proposed concrete overlay.

Clean or replace reinforcing bars and place Class AA concrete in accordance with the methods described below:

Refill areas where concrete was removed with Class AA concrete up to the bottom of the proposed concrete overlay in accordance with Section 420 of the Standard Specifications. Any of the methods for curing Class AA concrete as stated in the Standard Specifications are permitted except the membrane curing compound method.

Provide a raked finish to the surface of the Class AA concrete to provide a minimum relief of 1/16" and a maximum relief of ¼". Place the overlay course only after the Class AA concrete has attained 2500 psi (17.2 MPa) as measured by an approved, non-destructive test method.

Refilling the areas from which concrete has been removed with latex modified concrete during the Class III repair is permitted if any of the following conditions are met:

- The reinforcing steel cover is 1½ inches or less for the top mat of steel.
- The area being repaired is less than 1 yd^2.
- The Engineer directs the fill.

For areas of less than 3 ft^2 suspending forms from existing reinforcing steel using wire ties is permitted. For larger areas, support forms by blocking from the beam flanges, or other approved method.

Submit for approval detailed plans for Class III Surface Preparation including under deck containment. Detail how waste, debris, and wastewater is kept from falling below. When Class III repairs adjacent to the rail are necessary, support the rail in a manner approved by the Engineer.

4.0 Surface Preparation

Two trial areas shall be designated by the Engineer to demonstrate that the equipment, personnel, and methods of operation are capable of producing results to the satisfaction of the owner's Engineer. The first trial area shall consist of approximately 50 square feet of sound concrete as determined by the Engineer. The equipment shall be calibrated to remove the sound concrete an additional 1/2 inch from the scarified surface. After completion of this test area, the equipment shall be moved to the second area consisting of deteriorated or defective concrete, to determine whether this unsound concrete will be completely removed with the previous calibration and to establish a baseline for requiring the contractor to place under-deck containment in areas subject to full depth removal, before beginning the hydro-demolition process in a span. Should it be determined that not all defective concrete has been removed, the hydro-demolition system shall be recalibrated to remove an additional 1/4 inch of sound concrete, then re-test on deteriorated concrete.

If additional defective concrete is found, the depth of cut will increase in 1/4 inch increments until only sound concrete is found remaining.

When satisfactory results are obtained, the machine parameters shall be used for production removal. The contractor shall make adjustments to the operating parameters, as required, to perform concrete removal as indicated on the drawings and to adjust to the variance in the compressive strength of the concrete.

Hand held water blasting equipment, pneumatic hammers, and hand tools may be substituted for the hydro-demolition unit in areas inaccessible (such as adjacent to the curb) or inconvenient (such as small patch areas).

The Engineer will re-inspect after each removal and require additional removals until compliance with plans and specifications are met.

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Regardless of the method of removal, the removal operation shall be stopped if it is determined that sound concrete is being removed. Appropriate recalibration, or change in equipment and methods shall be performed prior to resuming the removal operation.

The Contractor shall take all steps necessary to prevent cutting or otherwise damaging existing steel designated to remain in place. Any such bars damaged (nicks deeper than 20% of the bar diameter) by the Contractor's operation shall be repaired or replaced. Defects in embedded reinforcing steel due to corrosion, which has reduced the cross sectional area of the steel by 25% or greater, shall have new reinforcing steel of similar cross section area lap-spliced to each side of the damaged area. Reinforcing bars shall be Grade 60 and meet the material requirements of Section 1070 of the Standard Specifications. Replacement bars shall be spliced to existing bars using either minimum 30 bar diameter lap splices or approved mechanical connectors.

The Contractor shall support and protect the exposed reinforcing steel, which is left unsupported by the hydro-demolition process, against displacement and damage from loads such as those caused by removal equipment and delivery buggies. All reinforcing steel damaged or dislodged by these operations shall be replaced with bars of the same size at the contractor's expense.

Rebar exposed and cleaned by hydro-demolition shall not require re-cleaning if encased in concrete within seven (7) days. Rebar exposed for more than seven (7) days shall be cleaned by high velocity water jets (4,000 PSI minimum) prior to placement of the new concrete.

When large areas of the deck on composite bridges are removed resulting in the debonding of the main stress carrying longitudinal reinforcing bars, the removal shall be performed in stages to comply with the construction sequence shown on the plans or as directed by the Engineer.

The Contractor shall shield his operations to prevent injury or damage from flying or falling debris. The Contractor shall provide a method of handling expected and unexpected blow-through of the deck where shown on the plans and as directed by the Engineer. This method shall provide for the containment of the runoff water and debris, and the protection of the area under the bridge deck. The Contractor shall be responsible for any injury or damage caused by his operations. The containment shall remain in-place until the latex modified concrete has been cast and reach minimum strength.

The removal area shall be thoroughly cleaned of all dirt, foreign materials and loose concrete to the extent necessary to produce a firm solid surface for adherence of new concrete.

Removal of concrete debris shall be accomplished either by hand or by mechanical means capable of removing wet debris and water all in the same pass and directly follow the hydro-demolition process to prevent the debris from re-setting or re-adhering to the surface of the remaining sound concrete. All concrete debris shall become the property of the

Contractor and shall be legally disposed of at the contractor's expense. The contractor shall be responsible for disposing of all debris generated by the scarification operations.

Any debris which is allowed to re-settle or re-adhere to the surface of the sound concrete shall be carefully removed by the Contractor (at no additional cost), and the Contractor shall exercise care to avoid any damage to the remaining sound concrete or exposed reinforcement. Following the removal of the debris and prior to the placement of the overlay, the entire surface shall be blasted clean with high pressure water to remove any bond-breaking residue, loose material from the concrete surface, and/or rust from the reinforcing steel. This residue shall be collected and disposed of by the contractor. The Contractor will not be permitted to allow material to fall from the deck.

All water used for hydro-demolition shall be potable. The Contractor is responsible for furnishing all of the water required for the project.

Any areas of the prepared surface contaminated by oil or other materials detrimental to good bond as a result of the contractor's operations shall be removed to such depth as may be required at the contractor's expense.

The Contractor shall provide adequate lighting as required to allow for the safe conduct of nighttime removal operation if he elects to do hydro-demolition at night. Submit a lighting plan to the Engineer for approval prior to beginning work.

5.0 Measurement and Payment

Scarifying Bridge Deck will be measured and paid for by the contract unit price per square yard and shall be full compensation for the milling of any existing asphalt wearing surface from the bridge deck or approaches, milling of the entire concrete bridge deck, repairing or replacing any damaged reinforcing steel, and the cleaning and disposal of all waste material generated.

Class IA Surface Preparation will be measured and paid for by the contract unit price per square yard and shall be full compensation for the milling of any existing concrete approach pavement, and the cleaning and disposal of all waste material generated.

Hydro-demolition of Bridge Deck will be measured and paid for by the contract unit price per square yard and shall be full compensation for Classes I, II, and III deck preparation, installation of under deck containment removal and disposal of unsound and contaminated concrete, cleaning, repairing or replacing of reinforcing steel, placement of all Class AA concrete, and for furnishing all materials, labor, tools, equipment and incidentals necessary to complete the work.

Payment will be made under:

Pay Item	**Pay Unit**
Scarifying Bridge Deck	Square Yard
Class IA Surface Preparation	Square Yard
Hydro-demolition of Bridge Deck	Square Yard

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IV. MANAGING HYDRODEMOLITION WATER

(6-17-08) SPI 4-03

1.0 Description

Collect and properly dispose of hydrodemolition water from bridge decks.

2.0 Construction Methods

(A) Prepare a written hydrodemolition water management plan in accordance with the Guidelines for Managing Hydrodemolition Water available at http://www.ncdot.org/doh/preconstruct/ps/contracts/letting.html. Submit plan and obtain approval from the Engineer prior to beginning of the hydrodemolition operation.

(B) Prior to final payment, submit a paper copy of all completed records pertaining to disposal of hydrodemolition water.

3.0 Measurement and Payment

Payment for collecting, sampling, testing, pH adjustment, monitoring, handling, discharging, hauling, disposing of the hydrodemolition water, documentation, record keeping, and obtaining permits if applicable, shall be included in the payment for other items.

V. LATEX MODIFIED CONCRETE - VERY EARLY STRENGTH (7-18-06)(Rev.4-22-09)

1.0 Description

This work consists of furnishing and placing an overlay of latex modified concrete-very early strength (LMC-VES) over conventional existing concrete or repair concrete on bridge decks and approach pavement. Unless otherwise indicated on the plans, groove the bridge floor in accordance with Article 420-14(B) of the *Standard Specifications*.

2.0 Materials

For equipment, proportioning and mixing of modified compositions, see Section 1000-8 of the *Standard Specifications*. Prior to beginning any work, obtain approval for all equipment to be used for deck preparation, mixing, placing, finishing, and curing the latex modified concrete.

For material of modified compositions, see Section 1000-8 of the *Standard Specifications* with the following modifications:

Page 10-10, Section 1000-8(A), add the following:

Cement – For latex modified concrete-very early strength, Cement shall be approximately 1/3 calcium sulfoaluminate (C4A3S) and 2/3 dicalcium silicate (C2S) or other hydraulic cement that will provide a Latex-Modified Concrete that meets the physical requirements for Latex-Modified Concrete as indicated in this special provision.

Page 10-11, Table beginning in paragraph 4, add the following:

Minimum compressive strength, normal setting concrete, 3000 psi at 7 days; very early strength concrete, 3000 psi at 3 hours.

Water-Cement Ratio by weight, normal setting concrete, maximum 0.40; very early strength concrete, maximum 0.42

Page 10-11, last paragraph of 1000-8, add the following:

Submit the latex modified concrete mix design, including laboratory compressive strength data for a minimum of six 4-inch by 8-inch cylinders at the appropriate age (7 days for normal setting concrete; 3 hours for very early strength concrete) to the Engineer for review. Include test results for the slump and air content of the laboratory mix. Perform tests in accordance with AASHTO T 22, T 119 and T 152.

3.0 System Quality Submittals

Past Performance Submittal: Prior to beginning work, the latex modified concrete overlay Contractor shall submit records demonstrating verifiable satisfactory performance utilizing very early strength latex modified concrete on at least five (5) bridges in any state with similar scope of work.

4.0 Construction Methods

(A) Preparation of Surface

Completely clean all surfaces within the 48 hours prior to placing the overlay unless otherwise approved.

Thoroughly soak the clean surface for at least 12 hours immediately prior to placing the latex modified concrete. After soaking the surface for at least 12 hours, cover it with a layer of white opaque polyethylene film that is at least 4 mils (0.100 mm) thick. Immediately prior to placing the latex modified concrete, remove standing water from the surface.

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(B) Placing and Finishing

Prior to placing modified material, install a bulkhead of easily compressible material at expansion joints to the required grade and profile. Placing material across expansion joints and sawing it later is not permitted.

Place and fasten screed rails in position to ensure finishing the new surface to the required profile. Do not treat screed rails with parting compound to facilitate their removal.

Separate screed rails or construction dams from the newly placed material by passing a pointing trowel along their inside face. Carefully make this trowel cut for the entire depth and length of rails or dams after the modified composition has sufficiently stiffened and cannot flow back.

Place the latex modified concrete in one operation.

Construction joints other than those shown on the plans will be submitted to the Engineer for approval.

When a tight, uniform surface is achieved and before the concrete becomes non-plastic, further finish the surface of the floor by burlap dragging or another acceptable method that produces an acceptable uniform surface texture.

Promptly cover the surface with a single layer of clean, wet burlap as soon as the surface will support it without deformation. Wet cure only the surface for minimum 3 hours and until a compressive strength of 3000 psi is reached. Keep the curing material saturated during the wet cure period.

Do not place the latex modified concrete before the burlap is saturated and approved by the Engineer. Drain excess water from the wet burlap before placement.

As soon as practical, after the concrete has hardened sufficiently, test the finished surface with an approved rolling straightedge that is designed, constructed, and adjusted so that it will accurately indicate or mark all floor areas which deviate from a plane surface by more than 1/8 inch in 10 feet (3 mm in 3 m). Remove all high areas in the hardened surface in excess of 1/8 inch in 10 feet (3 mm in 3 m) with an approved grinding or cutting machine. Where variations are such that the corrections extend below the limits of the top layer of grout, seal the corrected surface with an approved sealing agent if required by the Engineer. If approved by the Engineer, correct low areas in an acceptable manner.

Vehicular traffic may travel across an un-grooved deck, however, complete the transverse sawed grooves across the entire deck area after the concrete achieves design strength and no later than seven days after placing the latex modified concrete.

(C) Limitations of Operations

The mixer will not be permitted on the bridge deck unless otherwise approved.

No traffic is permitted on the finished latex modified concrete surface until the total specified curing time is completed and until the concrete reaches the minimum specified compressive strength.

Do not place latex modified concrete if the temperature of the concrete surface on which the overlay is to be placed is below 40°F (4°C) or above 85°F (29°C). Measure the surface temperature by placing a thermometer under the insulation against the surface.

Prior to placing latex modified concrete, the Engineer determines the air temperature and wind speed. Do not place latex modified concrete if the ambient air temperature is below 45°F (7°C) or above 85°F (29°C), or if the wind velocity is in excess of 10 mph (16 km/h). If working at night, provide approved lighting. Provide aggregates for use in the latex modified concrete that are free from ice, frost and frozen particles when introduced into the mixer.

Do not place latex modified concrete when the temperature of the latex modified concrete is below 45°F (7°C) or above 85°F (29°C).

Stop all placement operations during periods of precipitation. Take adequate precautions to protect freshly placed latex modified concrete from sudden or unexpected precipitation. Keep an adequate quantity of protective coverings at the worksite to protect the freshly placed pavement from precipitation.

5.0 Measurement and Payment

Latex Modified Concrete Overlay-Very Early Strength will be measured and paid for in cubic yards of latex modified concrete satisfactorily placed in the completed deck.

Placing and Finishing of Latex Modified Concrete Overlay-Very Early Strength will be paid for at the contract unit price bid per square yard which price will be full compensation for furnishing all labor, materials, tools, equipment and incidentals required to complete the work in accordance with the contract documents.

Grooving Bridge Floors will be measured and paid in the actual number of square feet.

6.0 Pay Item	**Pay Unit**
Latex Modified Concrete Overlay-Very Early Strength	Cubic Yard
Placing and Finishing Latex Modified Concrete-Very Early Strength	Square Yard
Grooving Bridge Floors	Square Foot

VI. EPOXY OVERLAY SYSTEM:

7-22-09 SPI

1.0 Description

This work shall consist of furnishing and applying a two-coat epoxy overlay system over the concrete bridge deck in accordance with the contract documents and includes a crack filling and repairing overlay consisting of a pre-treatment and two (2) layers of hybrid polymer resins with a special blend of extremely hard aggregate designed to provide a 3/8 inch thick application for the purpose of crack treatment, complete waterproofing, and providing a non-skid surface. The overlay system shall be formulated and applied to withstand continuous heavy traffic, extreme changes in weather conditions, and deformations due to structure loading and temperature changes.

2.0 Materials

(A) Pre-Treatment

Pre-treatment shall be applied consisting of a two part hybrid polymer free of any fillers or volatile solvents and formulated to provide a simple volumetric mixing ratio of two components such as one to one or two to one by volume. This hybrid polymer pretreatment shall be formulated to provide a combination of low viscosity and low surface tension to fill and repair cracks and enhance bonding of the overlay system to the bridge deck.

Physical Requirements of Cured Pre-treatment: When components A and B are mixed in the appropriate ratio, the cured resin shall conform to the requirements for Epoxy, Type 2 in Article 1081-1 of the *Standard Specifications*.

(B) Overlay (Two Layers)

This two-part epoxy polymer overlay system shall be free of any fillers or volatile solvents and shall be formulated to provide a simple volumetric mixing ratio of two components such as one to one or two to one by volume. The epoxy polymer overlay system shall be formulated to provide flexibility in the system without any sacrifice of the hardness, chemical resistance or strength of the system. Use of external/conventional flexibilizers will not be accepted. Flexibility shall be by interaction of elastomers to chemically link in the process of curing so that the flexibility of the molecule is least affected during the low temperature conditions that are confronted in actual use.

Physical Requirements of Epoxy Polymer Overlay: When components A and B are mixed in the appropriate ratio, the cured resin shall conform to the requirements for Epoxy, Type 2 in Article 1081-1 of the *Standard Specifications*.

Load Bearing Capabilities of the Overlay System: The cured epoxy polymer overlay system shall exhibit the following load bearing capacity. At approximately 20% strain, the polymer shall retain at least 85% of its original load bearing strength (tensile stress) as per ASTM D-638.

Pre-treatment and Overlay Compatibility: The Pre-treatment and Overlay system shall be of compatible materials produced, supplied and certified by the same manufacturer.

(C) Aggregate

Aggregate used for all layers shall be non-friable, non-polishing, clean and free from surface moisture. The aggregate shall be 100% fractured, thoroughly washed and kiln dried to a maximum moisture content of 0.2% by weight, measured in accordance with ASTM C566. The fracture requirements shall be at least one mechanically fractured face and will apply to materials retained on a U.S. No. 10 sieve.

Aggregate properties shall conform to the properties of Table 1 and Table 2:

TABLE 1 AGGREGATE PROPERTIES		
Property	**Value**	**Test Method**
Moisture Content, max.	0.2% by weight	AASHTO T255
Mohs Hardness, min.	6.5	
Soundness Loss, 5 cycles in Sodium Sulfate, max.	5.4%	AASHTO T104
Micro-Deval, max.	10%	AASHTO TP58

TABLE 2 AGGREGATE GRADATION	
Sieve Size	**Percent Passing**
No. 6	60-100
No. 10	0-20
No. 20	0-10

3.0 System Quality Submittals

(1) **Independent Lab Performance Submittals:** Prior to beginning work, the epoxy polymer overlay system manufacturer shall submit documentation showing verification by a nationally recognized independent testing laboratory that the overlay material:

(a) H as the capability of preventing the ingress of essentially all the chloride ions into the concrete at 1" depth when tested according to NCHRP-244 method.
(b) Has the capability to de-activate the existing chloride ions present in the concrete specimen so that the corrosion of steel bars embedded in the concrete stop corroding.
(c) F ully complies with the test results from the above testing requirements and specified values in Tables 1and 2, and the *Standard Specifications* the individual components and cured system. Subsequently, this certification shall be provided on each lot number to be used on the project.

(2) **Past Performance Submittal:** Prior to beginning work, the selected epoxy polymer overlay system manufacturer shall submit records demonstrating verifiable satisfactory performance under average daily traffic of at least 10,000 for at least five (5) years on at least three (3) bridges in any state.

(3) **Performance Guarantee:** The Contractor shall guarantee materials and workmanship against latent and patent defects arising from faulty materials, faulty workmanship or negligence for a period of five (5) years following the date of final acceptance of the work for maintenance and shall replace such defective materials and workmanship without cost to the Department. The Contractor will not be responsible for damage due to normal wear and tear, for negligence on the part of the Department, and/or for use in excess of the design.

Where items of equipment or material carry a manufacturer's guarantee for any period in excess of five years, then the manufacturer's guarantee shall apply for that particular piece of equipment or material. The Department's first remedy shall be through the manufacturer although the Contractor is responsible for invoking the warranted repair work with the manufacturer. The Contractor's responsibility shall be limited to the term of the manufacturer's guarantee. NCDOT would be afforded the same warranty as provided by the Manufacturer.

This guarantee provision shall be invoked for the following conditions:

(a) Any delaminations
(b) Excessive loss of aggregate
(c) Skid resistance less than 40 as measured by AASHTO T242

Payment and/or performance bonds shall cover the guarantee period.

4.0 Construction Methods

(A) Surface Preparation

Remove all existing asphalt overlays if applicable, and all loose, disintegrated, unsound or contaminated concrete from the bridge deck in accordance with the following surface preparation classifications shown below:

A. Class IB Surface Preparation: Scarify, or use other acceptable means, to remove all asphalt overlay from the existing bridge deck and, if applicable, the concrete approach pavement and make sure the concrete surface is not removed.

Clean and patch bridge deck prior to applying the two coat overlay system, in accordance with the manufacturer's recommendations, the special provision "Concrete Deck Repair for Epoxy and Asphalt Overlays", and the following.

Clean the entire deck surface by shot blasting and other means to remove asphaltic material, oils, dirt, rubber, curing compounds, paint carbonation, laitance, weak surface mortar and

other potentially detrimental materials that may interfere with the bonding or curing of the overlay. Acceptable cleaning is usually recognized by a significant change in the color of the concrete and mortar, and the beginning exposure of coarse aggregate particles. Mortar, that is sound and soundly bonded to the coarse aggregate, shall have open pores due to cleaning to be considered adequate for bond. Areas of asphalt larger than one inch in diameter, or smaller areas spaced less than six inches apart, shall be removed. Traffic paint lines shall be considered clean when the concrete has exposed aggregate showing through the paint stripe. Remove all dust and other loose material. Care shall be taken and methods used to fully collect the excess material and limit loss to the environment.

Epoxy based overlays shall not be placed on hydraulic cement concrete that is less than 28 days old. Patching and cleaning operations shall be inspected and approved prior to placing each layer of the overlay. Any contamination of the deck or intermediate courses, after initial cleaning, shall be removed. Both courses shall be applied within 24 hours following the final cleaning and prior to opening the area to traffic.

The deck shall be completely dry at the time of application of the epoxy concrete overlay.

(B) Equipment

Equipment shall consist of no less than an epoxy distribution system, aggregate spreader, application squeegee and vacuum trucks. The distribution system or distributor shall accurately blend the epoxy resin and hardening agent, and shall uniformly and accurately apply the epoxy materials at the specified rate to the bridge deck in such a manner as to cover 100% of the work area. The aggregate spreader shall be propelled in such a manner as to uniformly and accurately apply the aggregate to cover 100% of the epoxy material. The vacuum truck shall be self-propelled.

(C) Application

Handling and mixing of the epoxy resin and hardening agent shall be performed in a safe manner to achieve the desired result in accordance with the manufacturer's recommendations as approved and as directed by the Engineer. Epoxy concrete overlay materials shall not be placed when weather or surface conditions are such that the material cannot be properly handled, placed, spread and cured within the specified requirements of traffic control.

The epoxy overlay shall be applied in two separate courses in accordance with the following rate of application, and the total of the two applications shall not be less than 7.5 gals. per 100 sq. ft.

Course	Rate Gal./100 Sq. Ft.	Aggregate Lbs./Sq. Yd*
1	No less than 2.5	10+
2	No less than 5.0	14+

*Application of aggregate shall be of sufficient quantity to completely cover the epoxy.

After the epoxy mixture has been prepared for the epoxy concrete overlay, it shall be immediately and uniformly applied to the surface of the bridge deck with a squeegee. The temperature of the bridge deck surface and all epoxy and aggregate components shall be 55°F or above at the time of application. Epoxy shall not be applied if the air temperature is expected to drop below 55°F within 8 hours after application, or when high temperatures would cause the gel time to be less than 10 minutes. The dry aggregate shall be applied in such a manner as to cover the epoxy mixture completely within 5 minutes. First course applications that do not receive enough aggregate prior to gel shall be removed and replaced. A second course insufficiently covered with aggregate may be left in place, but will require additional applications before opening to traffic. Each course of epoxy concrete overlay shall be cured until vacuuming or brooming can be performed without tearing or damaging the surface. Traffic or equipment shall not be permitted on the overlay surface during the curing period. After the course one curing period, all loose aggregate shall be removed by vacuuming or brooming and the next overlay course applied to completion. The minimum curing periods shall be as follows:

Course: Average temperature of deck, epoxy and aggregate components in °F

	60-64	65-69	70-74	75-79	80-84	85+
1	4 hrs.	3 hrs.	2.5 hrs.	2 hrs.	1.5 hrs.	1 hr.
2	6.5 hrs.*	5 hrs.	4 hrs.	3 hrs.	3 hrs.	3 hrs.

*Course 2 shall be cured for 8 hrs. if the air temperature drops below 60°F during the curing period.

The Contractor shall plan and prosecute the work to provide the curing periods as specified herein, or other longer minimum curing periods as prescribed by the manufacturer prior to opening to public or construction traffic, unless otherwise permitted. Course one applications shall not be opened to traffic.

Do not apply epoxy concrete overlay courses over modular joints, metal expansion joints, or evazote joint seals.

In the event the Contractor's operation damages or mars the epoxy concrete overlay, the Contractor shall remove the damaged areas by saw-cutting in rectangular sections to the top of the concrete deck surface and replacing the various courses in accordance with this Specification at no additional cost to the Department.

5.0 Measurement and Payment

Placement of Epoxy Overlay will be measured and paid for in square feet, which price shall be full compensation for deck preparation, pre-treatment, furnishing and placing the two coat overlay system, providing a 5 year guarantee, and all tools, labor, materials, maintenance and incidentals necessary to complete the work.

Payment will be made under:

Pay Item	**Pay Unit**
Placement of Epoxy Overlay	Square Foot

VII. ASPHALT OVERLAY

1.0 Description

This work consists of repairing existing bridge decks by removing all existing asphalt overlays and deteriorated or contaminated concrete, and overlaying with asphalt surface course; together with other work necessary to restore structural integrity to the deck in accordance with this provision, applicable parts of the *Standard Specifications*, and to the dimensions, lines and grades shown on the plans or established by the Engineer.

2.0 Equipment

Use the following surface preparation equipment:

- Milling machine.
- Sawing equipment capable of sawing concrete to the specified depth.
- Scarifying equipment that is a power-operated, mechanical scarifier or grinder capable of removing at least 1/4 inch (6 mm) for each pass.
- Sandblasting equipment capable of removing rust scale from reinforcing steel, or removing small chips of concrete partially loosened by the scarifying or chipping operation, and of removing rehydrated dust left from scarification.
- Power driven hand tools for removal of unsound concrete are required that meet the following requirements:
- Pneumatic hammers weighing a nominal 35 lb (16 kg) or less.
- Pneumatic hammer chisel-type bits that do not exceed the diameter of the shaft in width.
- Hand tools such as hammers and chisels for removal of final particles of unsound concrete.
- Vibratory screed for overlays, except as noted herein.

3.0 Construction Methods

Remove all existing asphalt overlays and all loose, disintegrated, unsound or contaminated concrete from the bridge deck in accordance with the following surface preparation classifications shown below:

A. Class IB Surface Preparation: Scarify, or use other acceptable means, to remove all asphalt overlay from the existing bridge deck and, if applicable, the concrete approach pavement. Limits for this removal are the same as for Class I and, when applicable,

Class IA Surface Preparation. Perform this work as a separate operation prior to the Class I or IA Surface Preparation and make sure the concrete surface is not removed.

4.0 General

After surface preparation, the Engineer locates and marks deck repair areas. Repair areas in accordance with the special provision for "Concrete Deck Repair for Epoxy or Asphalt Overlays".

5.0 Joints

Replace existing joints with elastomeric concrete and evazote. Install elastomeric concrete prior to placing the asphalt overlay. Evazote joints shall be installed in accordance with the contract documents.

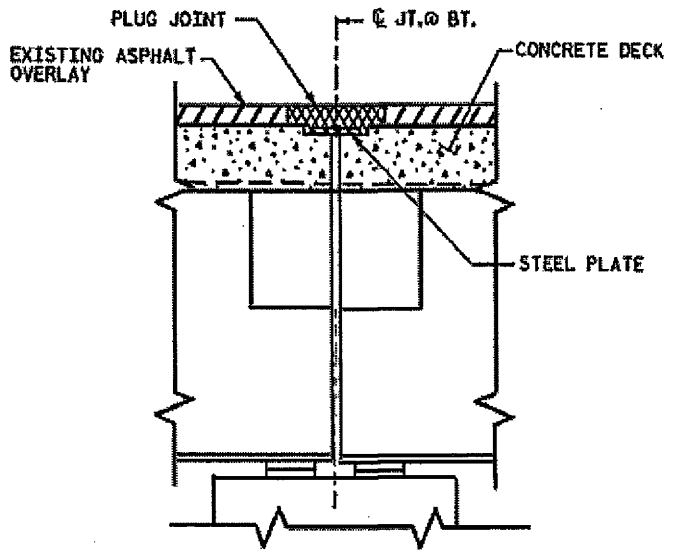
6.0 Measurement and Payment

Class IB Surface Preparation will be measured and paid for by the contract unit price per square yard and shall be full compensation for the milling of any existing asphalt wearing surface, repairing or replacing any damaged reinforcing steel, and the cleaning and disposal of all waste material generated.

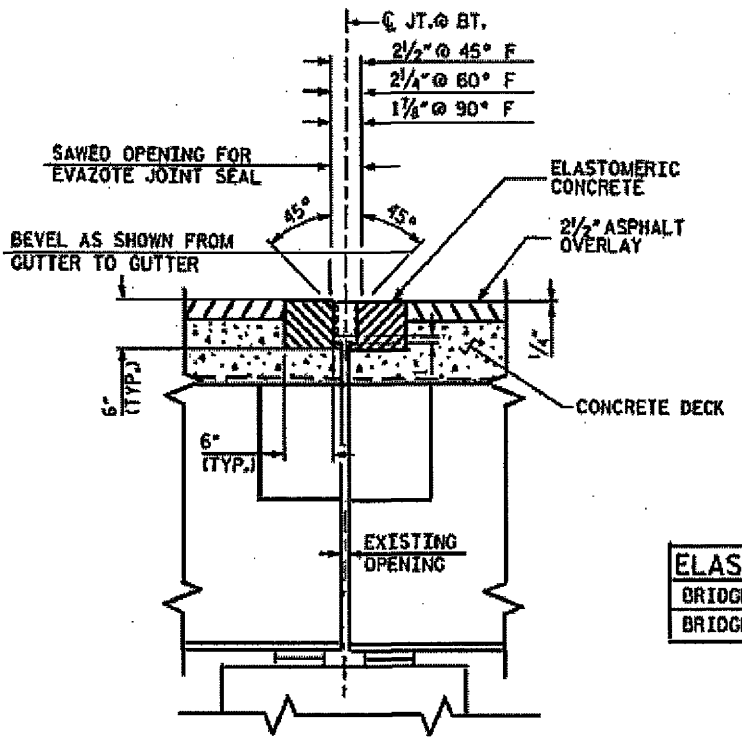
Asphalt Concrete Surface Course, Type SF9.5A will be measured and paid for by the contract unit price per ton and shall be full compensation for placing the asphalt wearing surface, and all tools, labor, materials, maintenance and incidentals necessary to complete the work.

Payment will be made under:

Pay Item	**Pay Unit**
Class IB Surface Preparation	Square Yard
Asphalt Concrete Surface Course, Type SF9.5A	Ton



EXISTING PLUG JOINT DETAIL FOR BENTS 1 &2
BUNCOMBE COUNTY BRIDGES #337 & #338
(SECTION @ BENT)



ELASTOMERIC CONCRETE		
BRIDGE #337	18.0	(CU. FT.)
BRIDGE #338	25.0	(CU. FT.)

PROPOSED EVAZOTE JOINT DETAIL FOR BENTS 1 &2
BUNCOMBE COUNTY BRIDGES #337 & #338
(SECTION @ BENT)

NOTES

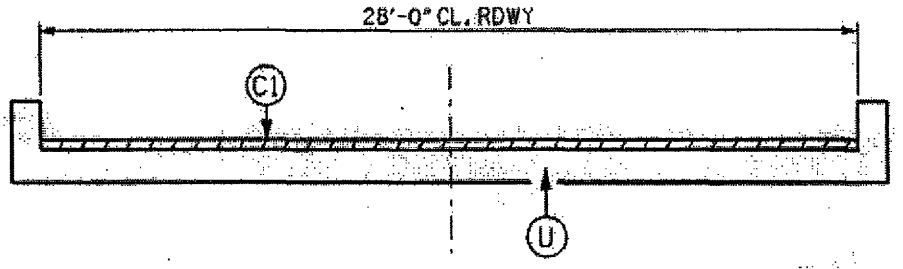
JOINTS AT BENTS #1 & #2 SHALL BE REPLACED WITH AN EVAZOTE SEAL.

FOR EVAZOTE JOINT SEAL AND ELASTOMERIC CONRETE, SEE SPECIAL PROVISIONS.

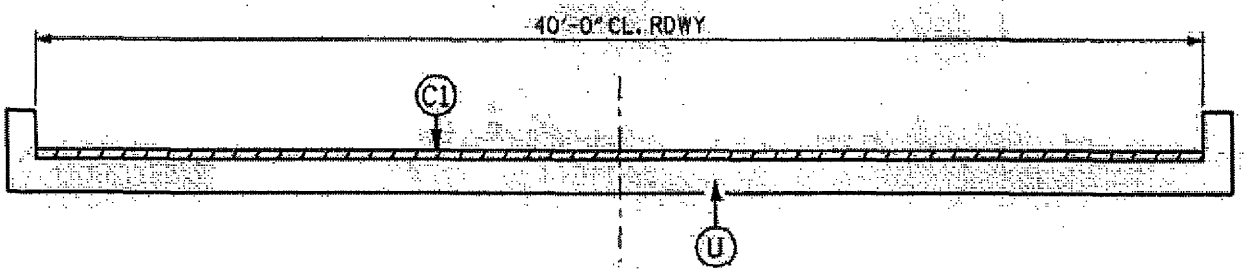
THE INSTALLED EVAZOTE JOINT SEALS SHALL BE WATERTIGHT.

NOMINAL UNCOMPRESSED SEAL WIDTH OF EVAZOTE JOINT SEAL SHALL BE 3" AT BENTS #1 & #2.

THE CONTRACTOR WILL NOT BE PERMITTED TO FORM THE JOINT FOR THE EVAZOTE JOINT SEAL IN LIEU OF SAWING THE JOINT.



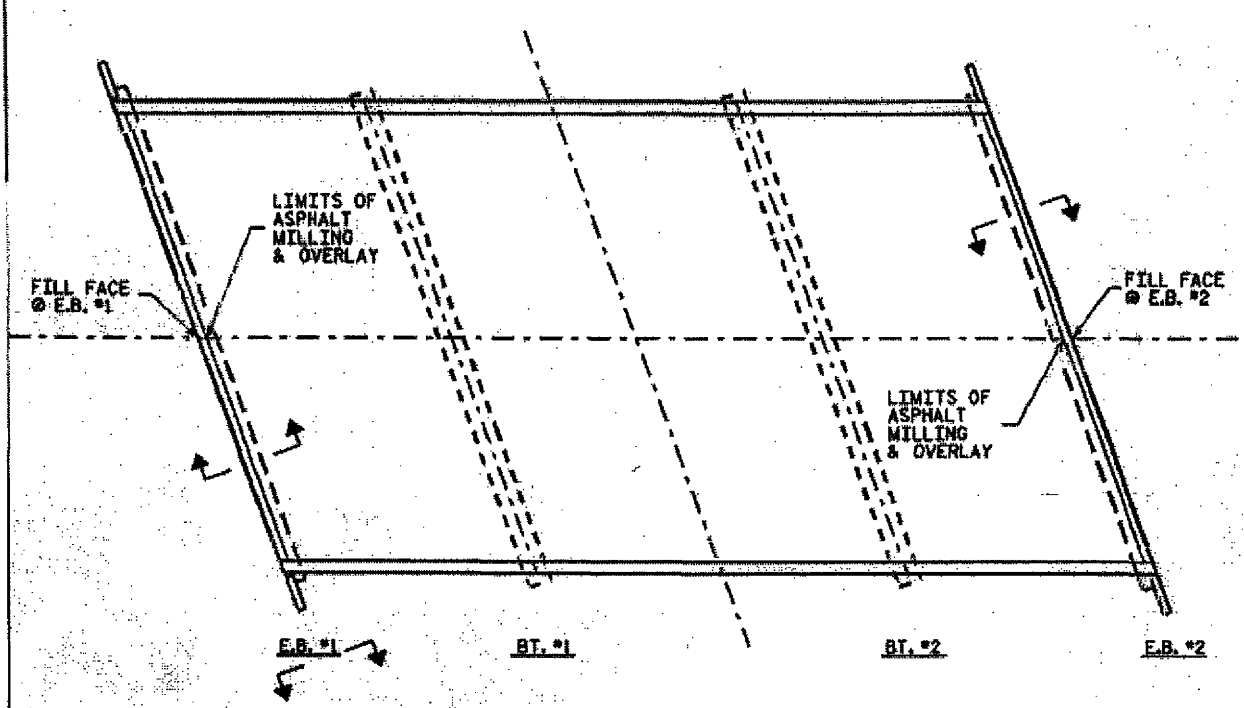
BUNCOMBE BRIDGE #337



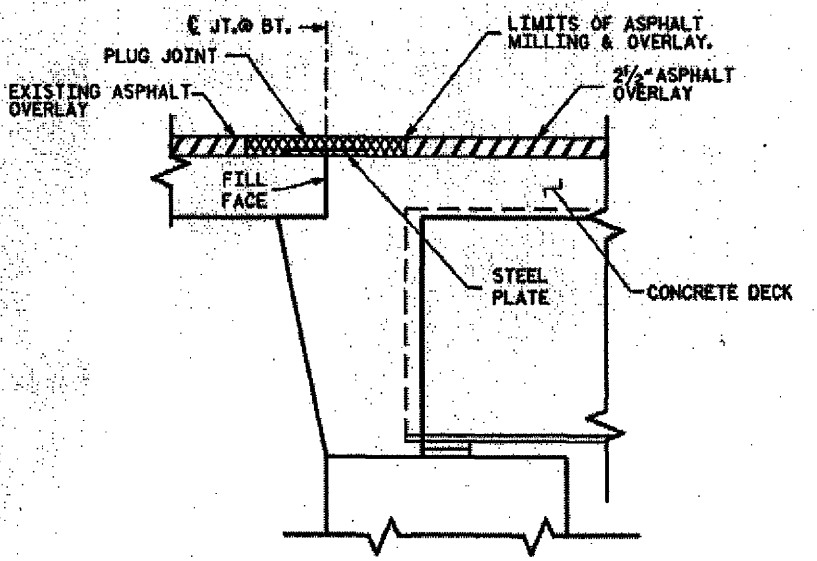
BUNCOMBE BRIDGE #338

C1	PROPOSED APPROXIMATE 2½" MIN. ASPHALT CONCRETE SURFACE COURSE, TYPE SF 9.5A, AT AN AVERAGE RATE OF 110 LBS. PER SQ. YD. IN EACH OF THE TWO LAYERS.
U	BRIDGE DECK.

TYPICAL SECTION OVERLAY ON BRIDGE DECK



PLAN



DETAIL SHOWING LIMITS OF MILLING & RESURFACING
BUNCOMBE COUNTY BRIDGES #337 & #338
(SECTION @ END BENT)

NOTES

ASPHALT MILLING & OVERLAY SHALL NOT DAMAGE EXISTING PLUG JOINTS AT END BENTS #1 & #2.

VIII. ELASTOMERIC CONCRETE FOR JOINT REPAIR (10-12-01)

1.0 Description

Elastomeric concrete is a mixture of a two-part polymer consisting of polyurethane and/or epoxy, and kiln-dried aggregate. Have the manufacturer supply it as a unit. Use the concrete in the blocked out areas on both sides of the bridge deck joints as indicated on the plans.

2.0 Materials

Provide materials that comply with the following minimum requirements at 14 days.

CONCRETE PROPERTIES	TEST METHOD	MINIMUM REQUIREMENT
Bond Strength to Concrete, psi (MPa)	ASTM D638 (D638M)	450 (3.1)
Brittleness by Impact, ft-lb (kg-m)	Ball Drop	7 (0.97)
Compressive Strength, psi (MPa)	ASTM D695 (D695M)	2800 (19.3)

BINDER PROPERTIES (without aggregate)	TEST METHOD	MINIMUM REQUIREMENT
Tensile Strength, psi (MPa)	ASTM D638 (D638M)	800 (5.5)
Ultimate Elongation	ASTM D638 (D638M)	150%
Tear Resistance, lb/in (kN/m)	ASTM D624	90 (15.7)

In addition to the requirements above, use elastomeric concrete that also resists water, chemical, UV, and ozone exposure and withstands extreme temperature (freeze-thaw) changes.

Furnish a manufacturer's certification verifying that the materials satisfy the above requirements. Provide samples of elastomeric concrete to the Engineer, if requested, to independently verify conformance with the above requirements.

Require a manufacturer's representative to be present on site during the installation of the elastomeric concrete.

3.0 Basis of Payment

No separate payment will be made for elastomeric concrete. The lump sum contract price bid for *Evazote Joint Seals* will be full compensation for furnishing and placing the Elastomeric Concrete.

IX. EVAZOTE JOINT SEALS

1.0 SEALS

Use preformed seals compatible with concrete and resistant to abrasion, oxidation, oils, gasoline, salt and other materials that are spilled on or applied to the surface. Use a low-density closed cell, cross-linked ethylene vinyl acetate polyethylene copolymer nitrogen blown material for the seal.

Use seals manufactured with grooves 1/8" (3 mm) ± wide by 1/8" (3 mm) ± deep and spaced between 1/4 (6 mm) and 1/2 inch (13 mm) apart along the bond surface running the length of the joint. Use seals sized so that the depth of the seal meets the manufacturer's recommendation, but is not less than 70% of the uncompressed width. Provide a seal designed so that, when compressed, the center portion of the top does not extend upward above the original height of the seal by more than 1/4 inch (6 mm). Splice the seal using the heat welding method by placing the joint material ends against a teflon heating iron of 350°F (177°C) for 7 - 10 seconds, then pressing the ends together tightly. Do not test the welding until the material has completely cooled. Use material that resists weathering and ultraviolet rays. Provide a seal that has a working range of 30% tension and 60% compression and is watertight along its entire length including the ends.

Provide seals that meet the requirements given below.

TEST	TEST METHOD	REQUIREMENT
Elongation at break	ASTM D3575	210 ± 15%
Tensile strength, psi (kPa)	ASTM D3575	110 ± 15 (755 ± 100)
Compression Recovery (% of original width)	AASHTO T42 50% compr. for 22 hr. @ 73°F (23°C) 1/2 hr. recovery	87 ± 3
Weather/Deterioration	AASHTO T42 Accelerated Weathering	No deterioration for 10 years min.
Compression/Deflection	@ 50% deflection of original width @ 50% deflection of original width	10 psi (69 kPa) min. 60 psi (414 kPa) max.
Tear Strength, psi (kPa)	ASTM D624	16 ± 3 (110 ± 20)
Density	ASTM D545	2.8 to 3.4
Water Absorption (% vol/vol)	ASTM D3575 Total immersion for 3 months	3

Have the top of the evazote seal clearly shop marked. Inspect the evazote seals upon receipt to ensure that the marks are clearly visible upon installation.

2.0 ADHESIVES

Use a two component, 100% solid, modified epoxy adhesive with the seal that meets the requirements of ASTM C881, Type 1, Grade 3, Class B & C and has the following physical properties:

Tensile strength..... 3500 psi (24.1 MPa) min.
Compressive strength..... 7000 psi (48.3 MPa) min.
Shore D Hardness ..... 75 psi (0.5 MPa) min.
Water Absorption..... 0.25% by weight

Use an adhesive that is workable to 40°F (4°C). When installing in temperatures below 40°F (4°C) or for application on moist, difficult to dry concrete surfaces, use an adhesive specified by the manufacturer of the joint material.

3.0 SAWING THE JOINTS

When sawing the joint to receive the evazote seal, always use a rigid guide to control the saw in the desired direction. To control the saw and to produce a straight line as indicated on the plans, anchor and positively connect a template or a track to the bridge deck. Do not saw the joint by visual means such as a chalk line. Fill the holes used for holding the template or track to the deck with an approved, flowable non-shrink, non-metallic grout.

Saw cut to the desired width and depth in one or two passes of the saw by placing and spacing two metal blades on the saw shaft to the desired width for compression seals.

The desired depth is the depth of the seal plus 1/4 inch (6 mm) above the top of the seal plus approximately 1 inch (25 mm) below the bottom of the seal. An irregular bottom of sawed joint is permitted as indicated on the plans. Grind exposed corners on saw cut edges to a 1/4" (6 mm) chamfer.

Remove any staining or deposited material resulting from sawing with a wet blade to the satisfaction of the Engineer.

Use extreme care to saw the joint straight to the desired width and to prevent any chipping or damage to sawed edges of the joint.

4.0 PREPARATION FOR SAWED JOINTS

When the plans call for sawing the joint, the Engineer thoroughly inspects the sawed joint opening for spalls, popouts, cracks, etc. Make all necessary repairs prior to blast cleaning and installing the seal.

Immediately before sealing, clean the joints by abrasive blasting with approved blasting medium. Abrasive blast to provide a firm, clean joint surface free of curing compound, loose material and any foreign matter. Abrasive blast without causing pitting or uneven surfaces. The aggregate in the elastomeric concrete may be exposed after sandblasting.

After blasting, either brush the surface with clean brushes made of hair, bristle or fiber, blow the surface with compressed air, or vacuum the surface until all traces of blast products and abrasives are removed from the surface, pockets, and corners.

If nozzle blasting, use compressed air that does not contain detrimental amounts of water or oil.

Examine the blast cleaned surface and remove any traces of oil, grease or smudge deposited in the cleaning operations.

Bond the seal to the blast cleaned surface on the same day the surface is blast cleaned.

5.0 SEAL INSTALLATION

Install the joint seal according to the manufacturer's procedures and recommendations and as recommended below. Do not install the joint seal if the ambient air temperature is below 45°F (7°C). Have a manufacturer's representative present during the installation of the first seal of the project.

Begin installation at the low end of the joint after applying the mixed epoxy to the sides of both the joint material and both sides of the joint, making certain to completely fill the grooves with epoxy. With gloved hands, compress the material and with the help of a blunt probe, push it down into the joint until it is recessed approximately 1/4 inch (6 mm) below the surface. Do not push the seal at an angle that would stretch the material. Once work on a joint begins, do not stop until it is completed. Clean the excess epoxy off the surface of the joint material *quickly* and *thoroughly*. Do not use solvents to remove excess epoxy. Remove excess epoxy in accordance with the joint manufacturer's recommendations.

Install the seal so that it is watertight. Testing of the joint seal is not required, but it is observed until final inspection.

6.0 BASIS OF PAYMENT

Basis of payment for all expansion joint seals will be at the lump sum contract price for *Evazote Joint Seals*, which prices and payment will be full compensation for furnishing all material, including elastomeric concrete when required, labor, tools and equipment necessary for installing these units in place and accepted, including all materials, labor, tools and incidentals for performing the original watertight integrity test

Payment will be made under:

Pay Item	**Pay Unit**
Evazote Joint Seals	Lump Sum

X. CONCRETE DECK REPAIR FOR EPOXY OR ASPHALT OVERLAYS

1.0 Description

This work consists of concrete deck repairs prior to placing an epoxy based overlay system or asphalt overlay as designated by the Engineer. The Contractor shall begin work within 60 days of notification. After surface preparation, the Engineer sounds the deck and locates and marks areas to be repaired using a chain drag or other acceptable means.

2.0 Materials

Epoxy Overlays: Concrete deck repair material shall be epoxy based material with a minimum modulus of elasticity of 2,500 ksi, compatible with epoxy based overlay systems, free of magnesium phosphate, and approved for use by the NCDOT for concrete deck repair. Materials containing cement mortar are acceptable with the understanding that a 28 day curing period will be required after installation of the patch material before placing the epoxy overlay can begin. The Contractor shall submit the proposed repair material and schedule of repairs to the Engineer for approval prior to beginning the work.

Asphalt Overlays: Concrete deck repair material shall be approved for use by the NCDOT for concrete deck repair. The Contractor shall submit the proposed repair material and schedule of repairs to the Engineer for approval prior to beginning the work.

3.0 Construction Methods

Class II Surface Preparation (Partial Depth): Remove by chipping with hand tools (or hydrodemolition) all loose, unsound and contaminated deck concrete to an average depth of approximately one-half the deck thickness, but no less than 3/4 inch below the top mat of steel. In areas where the entire perimeter of the reinforcing steel bar is exposed, chip or use hand-held high velocity water-jet equipment to provide a minimum depth of 3/4 inch below the bar. Use a small chipping hammer (15 lb. class) to prepare the edges of the repair area to limit micro fractures. Dispose of the removed concrete, clean, repair or replace rusted or loose reinforcing steel, and thoroughly clean the newly exposed surface. Use a bonding agent in accordance with the manufacturer's recommendations.

Care shall be taken not to cut, stretch, or damage any exposed reinforcing steel.

In overhangs, removing concrete areas of less than 0.60 ft^2/ft length of bridge without overhang support will be permitted unless the Engineer directs otherwise. For concrete areas greater than 0.60 ft^2/ft length of bridge, approval of the overhang support will be required.

Refill areas where concrete was removed with repair material up to the finished deck surface and cure in accordance with the material manufacturer's recommendations. Provide a raked finish.

4.0 Measurement and Payment

Class II Concrete Deck Repair for Epoxy/Asphalt Overlay will be measured and paid for in square feet for the appropriate areas so prepared. The cost for concrete deck repair for epoxy or asphalt overlays including, but not limited to, materials, labor, maintenance, equipment, tools, and incidentals will be included in the unit price per square foot.

Payment will be made under:

Pay Item	**Pay Unit**
Class II Concrete Deck Repair for Epoxy/Asphalt Overlay	Square Foot