

PROJECT SPECIAL PROVISIONS

Roadway

7-1-95

SP1R01

II. REPAIR OF BRIDGE DECKS WITH LATEX MODIFIED CONCRETE

(10-12-01)

1.0 Description

This work consists of pavement marking, repairing existing bridge decks by removing existing asphalt patches and loose, deteriorated or contaminated concrete and resurfacing with latex modified concrete overlayment 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 the dimensions, lines and grades shown on the plans or established by the Engineer.

2.0 Equipment

Use the following Surface Preparation Equipment:

- Hydro-demolition 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.
- 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.

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:

- A. Class A Surface Preparation: Scarify and remove the entire concrete surface of the deck to a uniform depth of at least 1/2 inch (13 mm), but not below the top mat of reinforcing steel. Remove and dispose of concrete, and thoroughly clean the scarified surface. **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 Class A Surface Preparation. 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.**

In areas where reinforcing steel is located in the depth to be scarified, use another method with the Engineer's approval.

- B. Class B Surface Preparation (Partial Depth): Remove by chipping with hand tools or hydro-demolition all loose, unsound and contaminated deck concrete and in areas where reinforcing steel is exposed by scarifying to a uniform depth of 1 7/8 inch (48 mm) from the original deck surface. Dispose of the removed concrete, clean, repair or replace rusted or loose reinforcing steel, and thoroughly clean the newly exposed surface.

All expansion joints subjected to run-off water from the hydro-demolition process shall be covered with 6mm polyethylene sheeting or other material approved by the Engineer and covered with gravel aggregate dams to slow the run-off water down and to strain the run-off. This should be done prior to beginning the Class B Surface Preparation. The expansion joints shall remain covered until water from the hydro-demolition process no longer passes over them. The contractor shall take all steps necessary to minimize the flow of water through the expansion joints.

When chipping, be careful not to cut, stretch, or damage any exposed reinforcing steel.

In overhangs, removing concrete areas of less than 0.60 ft²/ft (0.2 m²/m) length of bridge without overhang support is permitted unless the Engineer directs otherwise. For concrete areas greater than 0.60 ft²/ft (0.2 m²/m) length of bridge, approval of the overhang support is required.

- C. Class C Surface Preparation (Partial Depth): Remove by chipping with hand tools or hydro-demolition all loose, unsound and contaminated deck concrete and in areas where reinforcing steel is exposed by scarifying to an average depth of approximately one-half the deck thickness, but no less than 3/4 inch (19 mm) 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 (19 mm) below the bar. Dispose of the removed concrete, clean, repair or replace rusted or loose reinforcing steel, and thoroughly clean the newly exposed surface.

When chipping, be careful not to cut, stretch, or damage any exposed reinforcing steel.

In overhangs, removing concrete areas of less than 0.60 ft²/ft (0.2 m²/m) length of bridge without overhang support is permitted unless the Engineer directs otherwise. For concrete areas greater than 0.60 ft²/ft (0.2 m²/m) length of bridge, approval of the overhang support is required.

- D. **Class D Surface Preparation (Full Depth)**: Remove by chipping with hand tools or hydro-demolition all loose, unsound and contaminated deck concrete to the full slab depth. Thoroughly clean the routed out area 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. 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 D repair is permitted if any of the following conditions are met:

- The reinforcing steel cover is 1½ inches (38 mm) or less.
- The area being repaired is less than 1 yd² (1 m²).
- The Engineer directs the fill.

For areas of less than 3 ft² (0.3 m²), suspending forms from existing reinforcing steel using wire ties is permitted. For larger areas, support forms by blocking from the beam flanges.

Submit for approval detailed plans for Class D Surface Preparation. Detail how waste and debris is kept from falling below. When Class D repairs adjacent to the rail are necessary, support the rail in a manner approved by the Engineer. The entire cost of the above work will be included in the lump sum price for Deck Rehabilitation for Bridge No. 7 in Bertie County.

E. General

After scarification, the Engineer locates and marks structural cracks. Remove all concrete within 2 inches (50 mm) each side of the crack by chipping to a minimum depth of 3/4 inch (19 mm). Remove, chip, and dispose of the concrete, clean, repair, or replace reinforcing bars, and place Class AA or latex modified concrete.

Thoroughly clean exposed reinforcing steel by hand-held high velocity (7,500 psi minimum) water-jet equipment. Remove bar sections that have lost 25% or more of their original section dimension and splice new, same-size bars in their place. 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. Maintain 1½ inches (38 mm) concrete cover over the reinforcing steel.

Provide a minimum overlay thickness of 1 7/8 inches (48 mm) and a final surface that is approximately the same as the original deck surface. Prior to placing the overlay, attach a 1 7/8 inch (48 mm) filler block to the bottom of the screed and pass it over the area to be repaired to check the thickness. Remove all concrete that the block does not clear.

Keep areas where unsound concrete has been removed free of slurry produced from wet sawing or scarifying by planning the work so that this slurry drains away from the completed area of preparation. Remove all slurry from prepared areas before placing any overlay. Use hand-held high velocity (7,500 psi minimum) water-jet equipment to scarify the edge of previously placed lanes of overlayment and to remove rust, oil, or other foreign materials detrimental to achieving bond.

4.0 Basis of Payment

Surface preparation of bridge decks will be included in the lump sum price for Deck Rehabilitation for Bridge No. 7 in Bertie County, which price will be full compensation for deck preparation, 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:

Deck Rehabilitation for Bridge No. 7 in Bertie County.....Lump Sum

III. LATEX MODIFIED CONCRETE (12-12-02)

1.0 Description

This work consists of furnishing and placing an overlay of latex modified concrete over conventional existing concrete or repair concrete on bridge decks . Perform this work in accordance with this Special Provision and the applicable parts of the Standard Specifications.

2.0 Materials

Use materials that meet the requirements for the respective items in the Standard Specifications with the following exceptions:

- A. Cement - The use of Type III (high early strength) is permitted
- B. Aggregate – Follow Section 1014 of the Standard Specifications, except provide coarse aggregate that meets the gradation for standard size No. 78M.
- C. Fine Aggregate – Follow the Standard Specifications.
- D. Reinforcing Bars and Tie Bars: ASTM A 615, Grade 60, deformed.
- E. Latex Emulsion Admixture – Use a formulated latex admixture that is a non-hazardous, film forming, polymeric emulsion in water and is homogeneous and uniform in composition. Add all stabilizers at the point of manufacture.

Use a latex modifier conforming to the following requirements:

Polymer Type	Styrene Butadiene
	68 ±4% Styrene
	32 ±4% Butadiene
Average Polymer Particle Size.....	1500 to 2500 Angstroms
Emulsion Stabilizers.....	Anionic and non-ionic surfactants
Percent Solids	46.5 to 49.0
Weight per gallon, lbs at 75°F.....	8.40 to 8.60
(per liter, kg at 25°C)	(1.007 to 1.031)
pH.....	9.5 to 11.0
Shelf Life.....	2 Years
Color.....	White

- F. Provide a Type 5 Supplier’s Certification for each load of latex emulsion admixture in accordance with Article 106-3 of the Standard Specifications. Test admixture samples to verify compliance with the specification requirements before use. Allow 7 days for sampling and testing after delivery to the project.
- G. Do not allow the temperature of latex emulsion admixture to fall below 35°F (2°C) at any time or exceed 85°F (29°C) after delivery to the project.
- H. For latex emulsion that has been in storage, use a transfer pump and lines to recirculate it before using.
- I. Latex Modified Concrete – Use a workable mixture that meets the following requirements:

Cement Content, lbs/yd ³ (kg/m ³)	658 (390)
Latex Emulsion Admixture, gal/yd ³ (liters/m ³).....	24.5 (121)
Air Content of Plastic Mix, %.....	3.5 - 6.5
Slump, inches (mm)	3 – 6 (75 – 150)
% Fine Aggregate as percent of total aggregate by weight.....	50 - 55
Minimum 28 day compressive strength, psi (MPa)	6000 (41.4)
Water-Cement Ratio by weight, maximum	0.40

Measure the slump 4 to 5 minutes after discharge from the mixer.

Submit the latex modified concrete mix design, completed by the latex emulsion manufacturer, to the Engineer for review.

3.0 Equipment

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.

Use hand-held high velocity (7,500 psi minimum) water-jet equipment capable of removing all clay, salt deposits, oil and grease deposits and all other foreign matter. Provide traps or separators to remove oil and water from the compressed air. Use traps or separators of adequate size and drain them periodically during operations.

For proportioning and mixing, use self-contained, mobile, and continuously mixing equipment that meets the following requirements:

1. Use a self-propelled mixer that is capable of carrying sufficient unmixed dry, bulk cement, sand, coarse aggregate, latex modifier, and water to produce at least 6 yd³ (4.6 m³) of concrete on site.
2. Use a mixer that is capable of positive measurement of cement introduced into the mix. Use a recording meter that is visible at all times and equipped with a ticket printout to indicate the quantity of cement.

3. Calibrate the mixers to accurately proportion the specified mix. Prior to placing latex modified concrete, perform calibration and yield tests under the Engineer's supervision in accordance with the Department's written instructions. Copies of these written instructions are available from the Materials and Tests Unit. Perform the calibration and yield tests using the material to be used on the project. Recalibrate the mixer after any major maintenance operation, on the mixer, anytime the source of materials changes, or as directed. Furnish all materials and equipment necessary to perform the calibrations and yield tests.
4. Use a mixer that controls the flow of water and latex emulsion into the mix. Measure the flow rate of water and the latex emulsion with a calibrated flowmeter coordinated with both the cement and aggregate feeding mechanisms and the mixer. Adjust the flow rate, as necessary, to control the slump and ensure that the water-cement ratios are met. In addition to flowmeters, use mixers with accumulative water and latex meters capable of indicating the number of gallons (liters), to the nearest 0.1 gallon (0.4 liters), introduced into the mixer. Filter water and latex with a suitable mesh filter before it flows through the accumulative water and latex meters.
5. Calibrate the mixer to automatically proportion and blend all components of the indicated composition on a continuous or intermittent basis as the finishing operation requires. Provide a mixer that discharges mixed material through a conventional chute and is capable of spraying water over the placement width as it moves ahead to ensure that the surface to be overlaid is wet prior to receiving the modified material.
6. Mount a tachometer on the unit to indicate the drive shaft speed.

Use adequate hand tools for placing and leveling concrete down to approximately the correct level for striking off with the screed.

Use a finishing machine that meets the approval of the Engineer and the requirements of this Special Provision. Use a self-propelled finishing machine capable of forward and reverse movement under positive control. Use a machine with at least two finishing devices, one that is a vibrating screed and the other either a vibrating screed, oscillating screed, or one or more rotating cylindrical drums 48 inches (1.2 m) long or less and operating between 1500 and 2500 vpm. Make certain the finishing machine can finish the surface to within 1 foot (0.3 m) of the edges of the area being placed. Raise all screeds when the finishing machine is moving backwards over the screeded surface.

Use screeds with a vibration frequency that is variable between 3,000 and 6,000 vpm with positive controls. Use screeds with a metal covered bottom face not less than 4 inches (100 mm) wide. Provide screeds with positive control of the vertical position.

Use supporting rails for traveling of the finishing machine rigid enough to eliminate deflection from the weight of the machine.

4.0 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 2 hours immediately prior to placing the latex modified concrete. After soaking the surface for at least 2 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.

5.0 Proportioning and Mixing of Modified Compositions

Meet the following requirements when proportioning and mixing modified materials:

Use mobile continuous mixers that accurately proportion all materials for the specified mixture. Operate the proportioning equipment at the manufacturer's recommended speed verified with the tachometer during calibration and normal operations.

Yield checks and other checks are permitted.

6.0 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 and/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.

Brush a latex cement mixture onto the wetted, prepared surface. Carefully give all vertical and horizontal surfaces a thorough, even coating and do not let the brushed material dry before it is covered with the additional material required for the final grade.

Construction joints other than those shown on the plans are not permitted.

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.

Do not allow more than 15 feet (4.5 m) of exposed latex concrete behind the screed. In the event of a delay of 10 minutes or more, temporarily cover all exposed latex concrete with wet burlap and white opaque polyethylene.

As soon as the surface supports burlap without deformations, cover the surface with a single layer of clean, wet burlap.

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.

Within 1 hour of covering with wet burlap, place a layer of 4 mil (0.100 mm) white opaque polyethylene film on the wet burlap and cure the surface for 48 hours. Then remove the curing material for an additional 96 hours air cure.

For high early strength concrete, within 1 hour of covering with wet burlap, place a layer of 4 mil (0.100 mm) white opaque polyethylene film on the wet burlap and cure the surface for 24 hours. Then remove the curing material and air cure until the concrete attains a compressive strength of 3000 psi.

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.

Unless otherwise indicated on the plans, groove the bridge floor in accordance with Article 420-15(B) of the Standard Specifications.

7.0 Limitations of Operations

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

No traffic is permitted on the finished latex modified concrete surface until the concrete reaches a minimum compressive strength of 3000 psi.

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).

If the National Weather Service predicts the air temperature at the site to be below 35°F (2°C) during the next 72 hours, curing shall involve the use of insulated blankets or other approved methods that will retain and supply moisture and maintain the temperature at the outermost surfaces of the concrete mass above 50°F for at least 72 hours and above 32°F for at least 48 additional hours immediately following concrete placement.

Use insulation that meets the requirements of Subarticle 420-9(C) and, if required, place it on the latex modified concrete as soon as initial set permits.

When using insulation to protect latex modified concrete during the wet curing period, do not remove the insulation until the ambient air temperature is at least 40°F (4°C) and rising. Leave the latex modified concrete uncovered for the air curing period.

Assume all risks connected with the placement of latex modified concrete under cold weather conditions referred to above.

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.

8.0 Basis of Payment

The item "Latex Modified Concrete Overlay" will be included in the lump sum price for Deck Rehabilitation for Bridge No. 7 in Bertie County, which price will be full compensation for furnishing all latex modified concrete.

The item "Placing and Finishing of Latex Modified Concrete Overlay" will be included in the lump sum price for Deck Rehabilitation for Bridge No. 7 in Bertie County, which price will be full compensation for furnishing all labor, materials, tools, equipment and incidentals required to complete the work in accordance with this Special Provision and applicable parts of the Standard Specifications.

The item "Grooving Bridge Floors" will be included in the lump sum price for Deck Rehabilitation for Bridge No. 7 in Bertie County.

Payment will be made under:

Deck Rehabilitation for Bridge No. 7 in Bertie County.....Lump Sum

IV. HYDRO-DEMOLITION

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. Rotary milling or mechanical abrading will be allowed above the top mat of steel. If reinforcing bars are pulled up or snagged during roto-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.

2.0 Equipment

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 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 to the depth of one-half inch below the top mat of steel (about 2 1/2 inches). 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 screening under the bridge deck 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 one-half inch of sound concrete, then re-test on deteriorated concrete.

If additional defective concrete is found, the depth of cut will increase in one-half 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.

Where plans so indicate, one pass of the hydro-demolition unit shall be made to remove all sound concrete within the limits shown and to the depth specified, along with all deteriorated or defective concrete within these limits. Care shall be exercised to avoid removing sound concrete beyond the specified depth. After the hydro-demolition operation has completed the first pass, and the deck is allowed to dry, the contractor's representative and the Engineer will resound the deck to assure that all unsound material has been removed and to identify any high areas of concrete. A second pass of the hydro-demolition unit shall then be made in these areas.

Only after the second pass will hand held water blasting equipment, pneumatic hammers, and hand tools 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 reinspect after each removal and require additional removals until compliance with plans and specifications are met.

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 recleaning if encased in concrete within seven (7) days. Rebar exposed for more than seven (7) days shall be cleaned by high velocity waterjets (7,500 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. 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 shielding 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 roto-milling operations.**

NCDOT will provide the site for disposal of the treated run-off captured during the hydro-demolition process. The proposed disposal site for this material is the waste pond at the NCDOT Asphalt Plant located in Washington County on SR 1313, approximately 0.3 mile North of the intersection with SR 1302. (SEE MAP ON SHEET 2 OF THE PLANS)

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.

The NCDOT will provide monitoring of the in-stream pH and temperature both upstream and downstream of the bridge while the water-jet is in use. The testing will be conducted at an interval to be determined by the Engineer and the Division of Water Quality (DWQ). If pH levels below 6.5 and above 8.5 are recorded, then the water-jet operation shall be stopped until the cause can be determined and a corrective course of action is identified.

All water used for hydro-demolition shall be potable. The Contractor is responsible for furnishing all of the water required for the project. The Cashie, Middle, and Roanoke Rivers may be used as a water source for this project. **The contractor shall insure that the siphoning device placed in the body of water has adequate means to protect the aquatic wildlife from the siphoning activity.**

The contractor shall provide for the collection, treatment, and disposal of all run-off water generated by the hydro-demolition process. **The contractor shall treat the run-off water collected during the hydro-demolition process such that it will have a pH between 6.5 and 8.5 before discharge at the approved disposal site.** The contractor shall comply with applicable regulation concerning such water disposal. The contractor also shall make provisions for the safe handling of run-off water insofar as the roadway surface (excess water will not accumulate on the bridge). The contractor shall take all steps necessary to minimize the volume of run-off water entering storm sewer, bridge drainage downspouts, expansion joints, roadway shoulders, wetlands or any other surface waters. The contractor shall exercise care to protect existing berm slopes from scour by run-off water from the water-jet. The contractor shall provide drawings and procedures as to how these requirements will be accomplished prior to any concrete removal.

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 hydroblast at night. He shall obtain the Engineer's approval for same, exercising care to avoid any hazardous glare in the direction of oncoming traffic.

4.0 Basis of Payment

The amount of completed and accepted work, shall be included in the lump sum price for Deck Rehabilitation for Bridge No. 7 in Bertie County, which shall include cleaning, repairing or replacing of reinforcing steel, removal and disposal of the bridge surface as designated. Price shall be full compensation for all labor, equipment, materials, tools, and incidentals necessary to complete the work.

Payment will be made under:

Deck Rehabilitation for Bridge No. 7 in Bertie County ..Lump Sum

V. 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 sandblasting with clean dry sand. Sandblast to provide a firm, clean joint surface free of curing compound, loose material and any foreign matter. Sandblast 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

Payment for all evazote joint seals will be included in the lump sum contract price for Deck Rehabilitation for Bridge No. 7 in Bertie County, 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.

Payment will be made under:

Deck Rehabilitation for Bridge No. 7 in Bertie County.....Lump Sum

VI. POLYUREA PAVEMENT MARKING MATERIAL WITH STANDARD GLASS BEADS

1.0 DESCRIPTION

This special provision covers machine applied Polyurea pavement marking material with both incorporated glass beads and drop-on glass beads. All remaining Articles in Section 1205 shall be as described in the 2002 Standard Specification for Roads and Structures with the exceptions below.

2.0 MATERIALS

(A) General

Replace Article (A) with the following:

Section 1087-Articles 1, 3, 5 & 6 (General, Color, Packaging for Shipment, and Storage Life) shall be as described in the 2002 Standard Specifications for Roads and Structures. The manufacturer may recommend any remaining information necessary for the placement of Polyurea pavement markings.

(B) Material Qualification

Replace Article (B) with the following:

Use only Polyurea pavement markings that have been pre-approved by the Traffic Control Section prior to application. Use both incorporated glass beads and drop-on glass beads according to the manufacturer’s recommendations in order to meet the retroreflectivity requirements as stated in Section 1205-3(G)(8) as measured by a LTL 2000, LTL-X or Department approved 30m mobile retroreflectometer.

Furnish a Type 3 Material Certification and Type 4 Material Certification in accordance with Article 106-3 as described in the 2002 Standard Specifications for Roads and Structures.

For more information, contact the Traffic Control Section at (919) 250-4159.

3.0 CONSTRUCTION METHODS

Section 1205-3(B) (1) General for all Application Equipment: Add the following sentence after the last paragraph:

Do not use handliners or any other non-truck mounted pavement marking machine to install Polyurea pavement markings on long-line applications.

Add the following Section immediately following Section 1205-3(G)(8)

Section 1205-3 (G) (9) Polyurea Application:

Produce Polyurea pavement marking lines that have a minimum dry thickness of 20 mils (0.50mm) when placed on concrete and asphalt pavements.

Using the Polyurea application equipment, apply the pavement materials simultaneously. Apply the Polyurea resin, mixed at the proper ratio according to the manufacturer's recommendations, to the pavement surfaces within the proper application temperatures as determined by the material manufacturer. Inject reflective glass beads into the molten (liquid) Polyurea pavement markings.

Apply glass beads according to manufacturer's recommendations. At the time of installation, provide in-place marking with the minimum reflectance values shown below, as obtained with a LTL 2000, LTL-X or Department approved 30m mobile retroreflectometer. Maintain the retroreflectance values shown below for a minimum of 30 days from the time of placement of marking material.

WHITE: 375 mcd/lux/m²
YELLOW: 250 mcd/lux/m²

Produce marking, which upon cooling, is uniformly reflectorized and has the ability to resist deformation caused by traffic throughout its entire length.

The manufacturer of the Polyurea pavement marking material shall certify the Contractor to place the material. Provide at least one member of each crew that completed this training. Furnish the Engineer written confirmation of the training from the material manufacturer prior to the beginning of work. The manufacturer's technical representative shall be onsite during the entire installation of product.

Provide a manufacturer's technical representative that is knowledgeable and familiar with the Contractor's application equipment prior to the installation of the Polyurea pavement markings.

Section 1205-3(H)(1) Observation Period for Polyurea Pavement Markings:

Replace the first paragraph with the following:

Thermoplastic, epoxy, and polyurea pavement markings are subject to a 180 day observation period.

Add the following just before the last paragraph:

Provide polyurea pavement marking materials that maintain minimum retroreflectance values throughout the 180 day observation period as follows:

- WHITE: 325 mcd/lux/m2
- YELLOW: 200 mcd/lux/m2

These measurements will be taken by the Department within 30 days prior to the end of the Observation Period. The reflectance values shall be taken with an LTL 2000. LTL-X or Department approved 30m mobile retroreflectometer.

Section 1205-3(I) Removal of Pavement Markings:

Add the following just before the last paragraph:

Do not apply Polyurea pavement marking over existing pavement marking materials having less adherence than Polyurea. Remove existing lines according to the manufacturer's recommendations.

4.0 BASIS OF PAYMENT

The quantity of completed and accepted pavement marking lines, measured as provided Article 1205-5 of the Standard Specifications, will be included in the lump sum contract price for Deck Rehabilitation for Bridge No. 7 in Bertie County, which prices and payment will be full compensation for furnishing all materials, labor, tools and equipment necessary to complete the work.

Payment will be made under:

Deck Rehabilitation for Bridge No. 7 in Bertie County.....Lump Sum