

PROJECT SPECIAL PROVISIONS**SCOPE OF WORK****Location and Description of Bridge**

Bridge No. 7 Bertie County was built in 1968 and is located on NC 45 across the Roanoke, Middle, and Cashie Rivers between the towns of Plymouth and Midway, NC. The bridge has an overall length of 5841 feet and consists of 95 total spans with 92 spans 60' long consisting of 4 lines of 45" prestressed girders, and a 3-span continuous unit 320' long consisting of 4 lines of 60" plate girders.

Description of Work

This work shall consist of furnishing all labor, materials and equipment to make structural steel repairs to the webs, bottom flanges, stiffener/connector plates, and intermediate bent diaphragms; modify the bent diaphragms of the continuous span unit to allow jacking of the continuous spans; make concrete deck repairs at intermediate joints and replace two existing finger joints with armored elastomeric concrete and evazote; repair concrete spalls on caps, girders, diaphragms, and columns; encapsulate existing deteriorated concrete piles with fiberglass reinforced polymer pile jackets with a pumped epoxy grout fill material; and clean and paint the structural steel of the continuous spans as shown in the contract documents and plans. Contractor shall provide all necessary access; boats, underdeck platforms, scaffolding, ladders, etc.; provide all traffic control (both vehicular and navigational); coordinate all navigation channel work with the US Coast Guard; provide all staging area, material storage, boat storage and boat access; provide environmental controls to limit loss of materials into water and air; jacking equipment, sawing equipment, and chipping equipment; and all else necessary to complete the work.

The contractor shall be responsible for fulfilling all requirements of the NCDOT Standard Specifications for Roads and Structures dated July 2006, except as otherwise specified herein.

SECURING OF VESSELS**(10-12-01)**

Secure vessels in accordance with Section 107 of the Standard Specifications and the following provision.

When utilizing barges, tugboats or other vessels, take all necessary precautions to ensure that such vessels are securely anchored or moored when not in active operation. Take all necessary measures to ensure that the vessels are operated in a manner that avoids damage to or unnecessary contact with bridges and other highway structures and attachments. If severe weather conditions are anticipated, or should be anticipated through reasonable monitoring of weather forecasts, take additional measures to protect bridges and other highway structures and attachments from extreme conditions. The Contractor is strictly liable for damages to any bridge or other highway structure or attachment caused by a vessel owned or controlled by the Contractor. The Contractor is also liable to third parties for property damages and loss of revenue caused by vessels under the Contractor's control.

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COORDINATION WITH THE U. S. COAST GUARD**(SPECIAL)**

At no time during work will the waterway be closed or narrowed to navigation without prior approval from the Coast Guard. The contractor is required to maintain close and regular contact with the Coast Guard, Sector North Carolina to keep them informed to activities in the waterway with Steve Lyons at (252)-247-4525 or email Stephen.w.lyons2@uscg.mil. Also must contact the 5th Coast Guard District with Bill Brazier at (757) 398-6422 or email at Bill.H.Brazier@uscg.mil.

All waterway narrowing or closures shall be requested in writing and shall be received by the District Commander of the Coast Guard at least 30 days in advance of the closure so that the appropriate marine notifications can be made.

All work shall be conducted so that free navigation of the waterway is not unreasonably interfered with and the present navigable depths are not impaired. Timely notice of any and all events that affect navigation shall be given to the District Commander during the work on the channel span. The channel shall be promptly cleared of all obstructions placed therein or caused by the contractor.

WORK IN, OVER OR ADJACENT TO NAVIGABLE WATERS:**(SPECIAL)**

All work in, over, or adjacent to navigable waters shall have no adverse effect on navigation of the waterway including traffic flow, navigational depths, and horizontal and vertical clearances without approval from the U.S. Coast Guard, U.S. Army Corps of Engineers, or other authority having jurisdiction.

The Contractor shall prepare drawings necessary to obtain any permits which may be required for his operations including but not limited to excavation and dumping, constructing wharves, piers, ramps, and other structures connecting to bank or shore, and drawings for constructing falsework, cofferdams, sheeting, temporary bridges, and any other construction within the waterway. Submittals shall show locations of such work with respect to the navigational opening. The Contractor shall coordinate the submittal of drawings with the Engineer.

All construction shall progress and be maintained in a safe and timely manner. Temporary construction facilities shall be removed completely and promptly upon discontinuation of their useful purpose

The Contractor shall immediately notify the appropriate authorities and take corrective measures as needed when any situation occurs that imposes a threat to the public. He shall also immediately correct any acts or occurrences that contradict or violate any requirements in the plans, special provisions, or permits when corrective measures can be performed in a safe manner. The Contractor shall notify the appropriate authorities when such corrective measures cannot be performed in a safe manner.

All costs incurred by the Contractor in complying with the above requirements shall be included in the prices bid for the various pay items and no additional payment will be made.

TRAFFIC CONTROL

(SPECIAL)

Scope of Work

The Contractor shall provide all traffic control for this project in accordance with the latest MUTCD and NCDOT standards, and the plans. Contractor shall also provide all notices, signs, buoys, lighting, communication equipment, and all else to provide safe passage to boat traffic.

Basis of Payment

Traffic Control will be paid at the lump sum contract price, which prices and payment will be full compensation for furnishing all material, labor, tools, and equipment necessary for furnishing, installing, and maintaining these traffic control for the project.

Payment will be made under:

Pay Item	Pay Unit
Traffic Control	Lump Sum

CRANE SAFETY

(8-15-05)

Comply with the manufacturer specifications and limitations applicable to the operation of any and all cranes and derricks. Prime contractors, sub-contractors, and fully operated rental companies shall comply with the current Occupational Safety and Health Administration regulations (OSHA).

Submit all items listed below to the Engineer prior to beginning crane operations involving critical lifts. A critical lift is defined as any lift that exceeds 75 percent of the manufacturer's crane chart capacity for the radius at which the load will be lifted or requires the use of more than one crane. Changes in personnel or equipment must be reported to the Engineer and all applicable items listed below must be updated and submitted prior to continuing with crane operations.

Crane Safety Submittal List

Competent Person: Provide the name and qualifications of the "Competent Person" responsible for crane safety and lifting operations. The named competent person will have the responsibility and authority to stop any work activity due to safety concerns.

Riggers: Provide the qualifications and experience of the persons responsible for rigging operations. Qualifications and experience should include, but not be limited to, weight calculations, center of gravity determinations, selection and inspection of sling and rigging equipment, and safe rigging practices.

Crane Inspections: Inspection records for all cranes shall be current and readily accessible for review upon request.

Certifications: By July 1, 2006, crane operators performing critical lifts shall be certified by NC CCO (National Commission for the Certification of Crane Operators), or satisfactorily complete the Carolinas AGC's Professional Crane Operator's Proficiency Program. Other approved nationally accredited programs will be considered upon request. All crane operators shall also have a current CDL medical card. Submit a list of anticipated critical lifts and corresponding crane operator(s). Include current certification for the type of crane operated (small hydraulic, large hydraulic, small lattice, large lattice) and medical evaluations for each operator.

SUBMITTAL OF WORKING DRAWINGS

(SPECIAL)

1. GENERAL

Submit working drawings in accordance with Article 105-2 of the *Standard Specifications* and this provision. For this provision, "submittals" refers to only those listed in this provision. The list of submittals contained herein does not represent a list of required submittals for the project. Submittals are only necessary for those items as required by the contract. Make submittals that are not specifically noted in this provision directly to the Resident Engineer. Either the Structure Design Unit or the State Bridge Management Unit or both units will jointly review submittals.

If a submittal contains variations from plan details or specifications or significantly affects project cost, field construction or operations, discuss the submittal with and submit all copies to the Resident Engineer. State the reason for the proposed variation in the submittal. To minimize review time, make sure all submittals are complete when initially submitted. Provide a contact name and information with each submittal. Direct any questions regarding submittal requirements to the Resident Engineer, Structure Design Unit contacts or the State Bridge Management Unit contacts noted below.

In order to facilitate in-plant inspection by NCDOT and approval of working drawings, provide the name, address and telephone number of the facility where fabrication will actually be done if different than shown on the title block of the submitted working drawings. This includes, but is not limited to, precast concrete items, prestressed concrete items and fabricated steel or aluminum items.

2. ADDRESSES AND CONTACTS

For submittals to the Structure Design Unit, use the following addresses:

Via US mail:

Mr. G. R. Perfetti, P. E.
 State Bridge Design Engineer
 North Carolina Department
 of Transportation
 Structure Design Unit
 1581 Mail Service Center
 Raleigh, NC 27699-1581
 Attention: Mr. P. D. Lambert, P.E.

Via other delivery service:

Mr. G. R. Perfetti, P. E.
 State Bridge Design Engineer
 North Carolina Department
 of Transportation
 Structure Design Unit
 1000 Birch Ridge Drive
 Raleigh, NC 27610
 Attention: Mr. P. D. Lambert, P.E.

Direct any questions concerning submittal review status, review comments or drawing markups to the following contacts:

Primary Structures Contact: Paul Lambert
 (919) 250 – 4041
 (919) 250 – 4082 facsimile
plambert@ncdot.gov

Secondary Structures Contacts: James Gaither (919) 250 – 4042
 David Stark (919) 250 – 4044

For submittals to the State Bridge Management Unit, use the following addresses:

Mr. Rick Nelson, PE
 Asst. State Bridge Management Engineer
 NC Dept. of Transportation
 State Bridge Management Unit
 4809 Beryl Drive
 Raleigh, NC 27606
 Fax: 919.733.2348
 Ph: 919.733.4362
 Email: enelson@ncdot.gov

3. SUBMITTAL COPIES

Furnish one complete copy of each submittal, including all attachments, to the Resident Engineer. At the same time, submit the number of hard copies shown below of the same complete submittal directly to the Structure Design Unit and/or the Geotechnical Engineering Unit.

The first table below covers “Structure Submittals”. The Resident Engineer will receive review comments and drawing markups for these submittals from the Structure Design Unit. The second table in this section covers “Geotechnical Submittals”. The Resident Engineer will receive review comments and drawing markups for these submittals from the Geotechnical Engineering Unit.

Unless otherwise required, submit one set of supporting calculations to either the Structure Design Unit or the Geotechnical Engineering Unit unless both units require submittal copies in which case submit a set of supporting calculations to each unit. Provide additional copies of any submittal as directed by the Engineer.

STRUCTURE SUBMITTALS

Submittal	Copies Required by Structure Design Unit	Copies Required by State Bridge Management Unit	Contract Reference Requiring Submittal ¹
Evazote Joint Seals ⁶	9	0	“Evazote Joint Seals”
Falsework & Forms ² (substructure)	0	5	Article 420-3 & “Falsework and Formwork”
Falsework & Forms (superstructure)	8	0	Article 420-3 & “Falsework and Formwork”
Maintenance and Protection of Traffic Beneath Proposed Structure	8	0	“Maintenance and Protection of Traffic Beneath Proposed Structure at Station ____”
Miscellaneous Metalwork ^{4,5}	7	0	Article 1072-10
Placement of Equipment on Structures (cranes, etc.)	7	0	Article 420-20
Structural Steel ⁴	2, then 7	0	Article 1072-10
Painting Platforms and Containment	0	5	SP

FOOTNOTES

1. References are provided to help locate the part of the contract where the submittals are required. References in quotes refer to the provision by that name. Articles and subarticles refer to the Standard Specifications.
2. Submittals for these items are necessary only when required by a note on plans.
3. Submittals for these items may not be required. A list of pre-approved sequences is available from the producer or the Materials & Tests Unit.
4. The fabricator may submit these items directly to the Structure Design Unit.
5. The two sets of preliminary submittals required by Article 1072-10 of the *Standard Specifications* are not required for these items.
6. Submittals for Fabrication Drawings are not required. Submittals for Catalogue Cuts of Proposed Material are required. See Section 5.A of the referenced provision.
7. Submittals are necessary only when the top slab thickness is 18” or greater.

FALSEWORK AND FORMWORK**(8-4-09)****1. DESCRIPTION**

Use this Special Provision as a guide to develop temporary works submittals required by the Standard Specifications or other provisions; no additional submittals are required herein. Such temporary works include, but are not limited to, falsework and formwork.

Falsework is any temporary construction used to support the permanent structure until it becomes self-supporting. Formwork is the temporary structure or mold used to retain plastic or fluid concrete in its designated shape until it hardens. Access scaffolding is a temporary structure that functions as a work platform that supports construction personnel, materials, and tools, but is not intended to support the structure. Scaffolding systems that are used to temporarily support permanent structures (as opposed to functioning as work platforms) are considered to be falsework under the definitions given. Shoring is a component of falsework such as horizontal, vertical, or inclined support members. Where the term “temporary works” is used, it includes all of the temporary facilities used in bridge construction that do not become part of the permanent structure.

Design and construct safe and adequate temporary works that will support all loads imposed and provide the necessary rigidity to achieve the lines and grades shown on the plans in the final structure.

2. MATERIALS

Select materials suitable for temporary works; however, select materials that also ensure the safety and quality required by the design assumptions. The Engineer has authority to reject material on the basis of its condition, inappropriate use, safety, or nonconformance with the plans. Clearly identify allowable loads or stresses for all materials or manufactured devices on the plans. Revise the plan and notify the Engineer if any change to materials or material strengths is required.

3. DESIGN REQUIREMENTS**A. Working Drawings**

Provide working drawings for items as specified in the contract, or as required by the Engineer, with design calculations and supporting data in sufficient detail to permit a structural and safety review of the proposed design of the temporary work.

When concrete placement is involved, include data such as the drawings of proposed sequence, rate of placement, direction of placement, and location of all construction joints. Submit the number of copies as called for by the contract.

When required, have the drawings and calculations prepared under the guidance of, and sealed by, a North Carolina Registered Professional Engineer who is knowledgeable in temporary works design.

Design falsework and formwork requiring submittals in accordance with the 1995 AASHTO Guide Design Specifications for Bridge Temporary Works except as noted herein.

1. Wind Loads

Table 2.2 of Article 2.2.5.1 is modified to include wind velocities up to 110 mph (177 km/hr). In addition, Table 2.2A is included to provide the maximum wind speeds by county in North Carolina.

Table 2.2 - Wind Pressure Values

Height Zone feet (m) above ground	Pressure, lb/ft ² (kPa) for Indicated Wind Velocity, mph (km/hr)				
	70 (112.7)	80 (128.7)	90 (144.8)	100 (160.9)	110 (177.0)
0 to 30 (0 to 9.1)	15 (0.72)	20 (0.96)	25 (1.20)	30 (1.44)	35 (1.68)
30 to 50 (9.1 to 15.2)	20 (0.96)	25 (1.20)	30 (1.44)	35 (1.68)	40 (1.92)
50 to 100 (15.2 to 30.5)	25 (1.20)	30 (1.44)	35 (1.68)	40 (1.92)	45 (2.15)
over 100 (30.5)	30 (1.44)	35 (1.68)	40 (1.92)	45 (2.15)	50 (2.39)

2. Time of Removal

The following requirements replace those of Article 3.4.8.2.

Do not remove forms until the concrete has attained strengths required in Article 420-16 of the Standard Specifications and these Special Provisions.

Do not remove forms until the concrete has sufficient strength to prevent damage to the surface.

Table 2.2A - Steady State Maximum Wind Speeds by Counties in North Carolina

COUNTY	25 YR (mph) (km/hr)	COUNTY	25 YR (mph) (km/hr)	COUNTY	25 YR (mph) (km/hr)
Alamance	70 (112.7)	Franklin	70 (112.7)	Pamlico	100 (160.9)
Alexander	70 (112.7)	Gaston	70 (112.7)	Pasquotank	100 (160.9)
Alleghany	70 (112.7)	Gates	90 (144.8)	Pender	100 (160.9)
Anson	70 (112.7)	Graham	80 (128.7)	Perquimans	100 (160.9)
Ashe	70 (112.7)	Granville	70 (112.7)	Person	70 (112.7)
Avery	70 (112.7)	Greene	80 (128.7)	Pitt	90 (144.8)
Beaufort	100 (160.9)	Guilford	70 (112.7)	Polk	80 (128.7)
Bertie	90 (144.8)	Halifax	80 (128.7)	Randolph	70 (112.7)
Bladen	90 (144.8)	Harnett	70 (112.7)	Richmond	70 (112.7)
Brunswick	100 (160.9)	Haywood	80 (128.7)	Robeson	80 (128.7)
Buncombe	80 (128.7)	Henderson	80 (128.7)	Rockingham	70 (112.7)
Burke	70 (112.7)	Hertford	90 (144.8)	Rowan	70 (112.7)
Cabarrus	70 (112.7)	Hoke	70 (112.7)	Rutherford	70 (112.7)
Caldwell	70 (112.7)	Hyde	110 (177.0)	Sampson	90 (144.8)
Camden	100 (160.9)	Iredell	70 (112.7)	Scotland	70 (112.7)
Carteret	110 (177.0)	Jackson	80 (128.7)	Stanley	70 (112.7)
Caswell	70 (112.7)	Johnston	80 (128.7)	Stokes	70 (112.7)
Catawba	70 (112.7)	Jones	100 (160.9)	Surry	70 (112.7)
Cherokee	80 (128.7)	Lee	70 (112.7)	Swain	80 (128.7)
Chatham	70 (112.7)	Lenoir	90 (144.8)	Transylvania	80 (128.7)
Chowan	90 (144.8)	Lincoln	70 (112.7)	Tyrell	100 (160.9)
Clay	80 (128.7)	Macon	80 (128.7)	Union	70 (112.7)
Cleveland	70 (112.7)	Madison	80 (128.7)	Vance	70 (112.7)
Columbus	90 (144.8)	Martin	90 (144.8)	Wake	70 (112.7)
Craven	100 (160.9)	McDowell	70 (112.7)	Warren	70 (112.7)
Cumberland	80 (128.7)	Mecklenburg	70 (112.7)	Washington	100 (160.9)
Currituck	100 (160.9)	Mitchell	70 (112.7)	Watauga	70 (112.7)
Dare	110 (177.0)	Montgomery	70(112.7)	Wayne	80 (128.7)
Davidson	70 (112.7)	Moore	70 (112.7)	Wilkes	70 (112.7)
Davie	70 (112.7)	Nash	80 (128.7)	Wilson	80 (128.7)
Duplin	90 (144.8)	New Hanover	100 (160.9)	Yadkin	70 (112.7)
Durham	70 (112.7)	Northampton	80 (128.7)	Yancey	70 (112.7)
Edgecombe	80 (128.7)	Onslow	100 (160.9)		
Forsyth	70 (112.7)	Orange	70 (112.7)		

Note on the working drawings any anchorages, connectors, inserts, steel sleeves or other such devices used as part of the falsework or formwork that remains in the permanent structure. If the plan notes indicate that the structure contains the necessary corrosion protection required for a Corrosive Site, epoxy coat, galvanize or metalize these devices. Electroplating will not be allowed. Any coating required by the Engineer will be considered incidental to the various pay items requiring temporary works.

B. Review and Approval

The Engineer is responsible for the review and approval of temporary works' drawings. Submit the working drawings sufficiently in advance of proposed use to allow for their review, revision (if needed), and approval without delay to the work.

Do not start construction of any temporary work for which working drawings are required until the drawings have been approved. Such approval does not relieve the Contractor of the responsibility for the accuracy and adequacy of the working drawings.

The time period for review of the working drawings does not begin until complete drawings and design calculations, when required, are received by the Engineer.

On the drawings, show all information necessary to allow the design of any component to be checked independently as determined by the Engineer.

If requested by the Engineer, submit with the working drawings manufacturer's catalog data listing the weight of all construction equipment that will be supported on the temporary work. Show anticipated total settlements and/or deflections of falsework and forms on the working drawings. Include falsework footing settlements, joint take-up, and deflection of beams or girders. Falsework hangers that support concentrated loads and are installed at the edge of thin top flange concrete girders (such as bulb tee girders) shall be spaced so as not to exceed 75% of the manufacturer's stated safe working load. Use of dual leg hangers (such as Meadow Burke HF-42 and HF-43) are not allowed. Design the falsework and forms supporting deck slabs and overhangs on girder bridges so that there will be no differential settlement between the girders and the deck forms during placement of deck concrete.

4. CONSTRUCTION REQUIREMENTS

All requirements of Section 420 of the Standard Specifications apply.

Construct temporary works in conformance with the approved working drawings. Ensure that the quality of materials and workmanship employed is consistent with that assumed in the design of the temporary works. Do not weld falsework members to any portion of the permanent structure unless approved. Show any welding to the permanent structure on the approved construction drawings.

Provide tell-tales attached to the forms and extending to the ground, or other means, for accurate measurement of falsework settlement. Make sure that the anticipated compressive settlement and/or deflection of falsework does not exceed 1 inch (25 mm). For cast-in-place concrete structures, make sure that the calculated deflection of falsework flexural members does not exceed 1/240 of their span regardless of whether or not the deflection is compensated by camber strips.

A. Maintenance and Inspection

Inspect and maintain the temporary work in an acceptable condition throughout the period of its use. Certify that the manufactured devices have been maintained in a condition to allow them to safely carry their rated loads. Clearly mark each piece so that its capacity can be readily determined at the job site.

Perform an in-depth inspection of an applicable portion(s) of the temporary works, in the presence of the Engineer, not more than 24 hours prior to the beginning of each concrete placement. Inspect other temporary works at least once a month to ensure that they are functioning properly. Have a North Carolina Registered Professional Engineer inspect the cofferdams, shoring, sheathing, support of excavation structures, and support systems for load tests prior to loading.

B. Foundations

Determine the safe bearing capacity of the foundation material on which the supports for temporary works rest. If required by the Engineer, conduct load tests to verify proposed bearing capacity values that are marginal or in other high-risk situations.

The use of the foundation support values shown on the contract plans of the permanent structure is permitted if the foundations are on the same level and on the same soil as those of the permanent structure.

Allow for adequate site drainage or soil protection to prevent soil saturation and washout of the soil supporting the temporary works supports.

If piles are used, the estimation of capacities and later confirmation during construction using standard procedures based on the driving characteristics of the pile is permitted. If preferred, use load tests to confirm the estimated capacities; or, if required by the Engineer conduct load tests to verify bearing capacity values that are marginal or in other high risk situations.

The Engineer reviews and approves the proposed pile and soil bearing capacities.

5. REMOVAL

Unless otherwise permitted, remove and keep all temporary works upon completion of the work. Do not disturb or otherwise damage the finished work.

Remove temporary works in conformance with the contract documents. Remove them in such a manner as to permit the structure to uniformly and gradually take the stresses due to its own weight.

6. METHOD OF MEASUREMENT

Unless otherwise specified, temporary works will not be directly measured.

7. BASIS OF PAYMENT

Payment at the contract unit prices for the various pay items requiring temporary works will be full compensation for the above falsework and formwork.

ADHESIVELY ANCHORED ANCHOR BOLTS OR DOWELS

(6-11-07)

1. GENERAL

Installation and Testing of Adhesively anchored anchor bolts and dowels shall be in accordance with Section 420-13, 420-21 and 1081-1 of the Standard Specifications except as modified in this provision.

2. INSTALLATION

Installation of the adhesive anchors shall be in accordance with manufacturer's recommendations and shall occur when the concrete is above 40 degrees Fahrenheit and has reached its 28 day strength.

The anchors shall be installed before the adhesive's initial set ('gel time').

3. FIELD TESTING

Replace the third paragraph of Section 420-13 (C) with the following:

"In the presence of the Engineer, field test the anchor bolt or dowel in accordance with the test level shown on the plans and the following:

Level One Field testing: Test a minimum of 1 anchor but not less than 10% of all anchors to 50% of the yield load shown on the plans. If less than 60 anchors are to be installed, install and test the required number of anchors prior to installing the remaining anchors. If more than 60 anchors are to be installed, test the first 6 anchors prior to installing the remaining anchors, then test 10% of the number in excess of 60 anchors.

Level Two Field testing: Test a minimum of 2 anchors but not less than 10% of the all anchors to 80% of the yield load shown on the plans. If less than 60 anchors are to be installed, install and test the required number of anchors prior to installing the remaining anchors. If more than 60 anchors are to be installed, test the first 6

anchors prior to installing the remaining anchors, then test 10% of the number in excess of 60 anchors.

Testing should begin only after the Manufacturer's recommended cure time has been reached. For testing, apply and hold the test load for three minutes. If the jack experiences any drop in gage reading, the test must be restarted. For the anchor to be deemed satisfactory, the test load must be held for three minutes with no movement or drop in gage reading."

4. REMOVAL AND REPLACEMENT OF FAILED TEST SPECIMENS:

Remove all anchors and dowels that fail the field test without damage to the surrounding concrete. Redrill holes to remove adhesive bonding material residue and clean the hole in accordance with specifications. For reinstalling replacement anchors or dowels, follow the same procedures as new installations. Do not reuse failed anchors or dowels unless approved by the Engineer.

5. USAGE

The use of adhesive anchors for overhead installments is not permitted without written permission from the Engineer.

6. BASIS OF PAYMENT

No separate measurement or payment will be made for furnishing, installing, and testing anchor bolts/dowels. Payment at the contract unit prices for the various pay items will be full compensation for all materials, equipment, tools, labor, and incidentals necessary to complete the work.

PARTIAL REMOVAL OF EXISTING STRUCTURE

(SPECIAL)

Scope of Work

Work to repair deck, joints, girders, diaphragms, and bearings includes removing sections of the bridge deck at the slab expansion joints as well as portions of the existing diaphragms at these locations; and removing finger joints, diaphragms, connector plates and rocker bearings at the bridge expansion joint locations. Upon removal of deck sections make necessary repairs to diaphragms and connector plates; install deck forms and reinforcing steel; and place Class AA concrete up to the original deck surface. The surface of the concrete shall be tined.

Measurement and Payment

Partial Removal of Existing Structure will be paid for at the lump sum contract price and will be full compensation for all materials, shop drawings, equipment, tools, labor, and incidentals necessary to remove the existing deck, finger joints, diaphragms, connector plates, rocker bearings and other portions of the existing structure as indicated in the plans.

All costs to replace the sections of deck removed, including placement of reinforcing steel, formwork, and placement of Class AA concrete shall be paid for by the contract bid price per square foot of *Reinforced Concrete Deck Slab*.

Payment will be made under:

Pay Item	Pay Unit
Partial Removal of Existing Structure	Lump Sum
Reinforced Concrete Deck Slab	Square Feet

STRUCTURAL STEEL REPAIR

(SPECIAL)

General

The continuous steel plate girder spans of the bridge have section loss to various members. The deck is non-composite and has five slab expansion joints at mid span and over the bents with steel finger type joints at the two expansion bents. The existing expansion bearings are steel rocker type.

Scope of Work

Work to repair girders and diaphragms includes welding ½” steel plate to the girder webs and bolting steel angles to girder flanges at various locations to repair section loss; installing bent diaphragms to allow jacking of the bridge; installing intermediate diaphragms; and all sole plates and anchor bolts.

Measurement and Payment

Structural Steel Repair will be measured and paid for at the unit price per pound bid for Structural Steel repairs and shall be full compensation for all materials, fabrication, bolting, welding, equipment, tools, labor, and incidentals necessary to complete the work including any miscellaneous steel.

Payment will be made under:

Pay Item	Pay Unit
Structural Steel Repair, Approx. Lbs.	Pound

DIRECT TENSION INDICATORS

(6-12-09)

The 2006 Standard Specifications shall be revised as follows:

Replace Section 440-8(C)(6) – **Direct Tension Indicators** with the following:

Supply direct tension indicators in accordance with the requirements of ASTM F959 and Article 1072-7.

Furnish the Engineer with at least one metal feeler gage for each container of direct tension indicators shipped before beginning installation.

Make sure that the lot number on the containers of direct tension indicators is for the same lot number tested as indicated on the test documents.

Furnish to the Engineer three samples of load indicating washers from each lot number, each size and type for tests and two each of the metal feeler gages required for performing the tests.

Install the direct tension indicator under the bolt head. If it is necessary to install the direct tension indicator under the nut, or if the bolt head shall be turned, install additional hardened washers between the nut or bolt head and the direct tension indicator.

Provide a tension indicating device on the project for determining the tension imposed on a fastener when the protrusions on direct tension indicator are properly compressed.

Test 3 samples from each lot of direct tension indicators in the presence of the Engineer. Achieve a minimum bolt tension of 5% greater than that required by Table 440-1 of Article 440-8.

Do not substitute direct tension indicators for hardened steel washers required with short slotted or oversized holes. If desired, use direct tension indicators in conjunction with hardened steel washers.

Install direct tension indicators initially to a snug tight condition as specified in Subarticle 440-8(C)(3). After initial tightening, fully tighten beginning at the most rigid part of the joint and continuing toward its free edges.

For tightening fasteners containing direct tension indicators, use a clean and lubricated wrench. Maintain air supply and hoses in good condition and provide air pressure of at least 100 psi at the wrench.

When tightening the fasteners, ensure that the part of the fastener being restrained from turning does not rotate during the tightening process. Ensure that no portion of the direct tension indicator protrusions is accidentally partially flattened before installing in the structural steel joints.

Do not reuse direct tension indicators. If it is necessary to loosen a bolt previously tensioned, discard and replace the direct tension indicator.

BRIDGE JACKING

(SPECIAL)

Scope of Work

Work includes jacking the bridge at the expansion bents to remove existing rocker bearings. Install blocking while the bridge is in the raised condition. While in the raised condition, remove existing rocker bearings; install concrete pedestals, sole plates, and elastomeric bearing pads.

Measurement and Payment

Bridge Jacking will be paid for at the lump sum contract price and will be full compensation for all materials, shop drawings, equipment, tools, labor, and incidentals necessary to jack the bridge.

Elastomeric Bearings will be paid for at the lump sum contract price and will be full compensation for all materials, shop drawings, equipment, tools, labor, and incidentals necessary to furnish and install the bearings.

All costs to form and pour concrete pedestals, including all tools, labor, equipment, and reinforcing steel will be paid for by the contract bid price per cubic yard of *Class A Concrete*.

Payment will be made under:

Pay Item	Pay Unit
Bridge Jacking	Lump Sum
Elastomeric Bearings	Lump Sum
Class A Concrete	Cubic Yard

UNDER STRUCTURE WORK PLATFORM (SPECIAL)

Description

Prior to any painting operations on the structure, the Contractor shall design and install an understructure work platform which will be used to provide access to the work to be done as well as serve as the platform for the cleaning and painting of the bridge. The Contractor shall determine the capacity of the platform which will be required, but the capacity shall not be less than that required by State or Federal regulations. Platform shall be constructed of materials capable of withstanding damage from any of the work required on this project. The platform shall be fireproof. Drawings of the platform and loads supported by the platform shall be sealed by a North Carolina Registered Professional Engineer. Submit drawings to the Engineer for approval prior to beginning work on the platform. Platform shall be cleaned after each work day to prevent materials from falling or washing into the river.

Payment

Under Structure Work Platform will be paid for at the lump sum contract price and will be full compensation for the design, installation, maintenance, and removal of the platform

Payment will be made under:

Pay Item	Pay Unit
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Under Structure Work Platform

Lump Sum

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.

EVAZOTE JOINT SEALS

(8-13-04)

1. 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) \pm wide by 1/8" (3 mm) \pm 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 \pm 15%
Tensile strength, psi (kPa)	ASTM D3575	110 \pm 15 (755 \pm 100)
Compression Recovery (% of original width)	AASHTO T42 50% compr. for 22 hr. @ 73°F (23°C) 1/2 hr. recovery	87 \pm 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 \pm 3 (110 \pm 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. 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. 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. 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. PREPARATION FOR ARMORED JOINTS

When the plans call for armored joints, form the joint and blockout openings in accordance with the plans. If preferred, wrap the temporary form with polyethylene sheets to allow for easier removal. Do not use form release agents.

A. Submittals

Submitting detailed working drawings is not required; however, submitting catalog cuts of the proposed material is required. In addition, direct the joint supplier to provide an angle segment placing plan.

B. Surface Preparation

Prepare the surface within the 48 hours prior to placing the elastomeric concrete. Do not place the elastomeric concrete until the surface preparation is completed and approved.

1.0 Angle Assembly

Clean and free metalized steel of all foreign contaminants and blast the non-metalized steel surfaces to SSPC SP-10. Blast-cleaning anchor studs is not required.

2.0 Concrete

Prior to placing the elastomeric concrete, thoroughly clean and dry all concrete surfaces. Sandblast the concrete surface in the blockout and clear the surface of all loose debris.

C. Elastomeric Concrete Placement

Make sure that a manufacturer's representative is present when placing elastomeric concrete. Do not place elastomeric concrete if the ambient air temperature is below 45°F (7°C).

Prepare and apply a primer, as per manufacturer's recommendations, to all vertical concrete faces, all steel components to be in contact with elastomeric concrete, and to areas specified by the manufacturer. Align the angles with the joint opening.

Prepare, batch, and place the elastomeric concrete in accordance with the manufacturer's instructions. Place the elastomeric concrete in the areas specified on the plans while the primer is still tacky and within 2 hours after applying the primer. Pay careful attention to properly consolidate the concrete around the steel and anchors. Trowel the elastomeric concrete to a smooth finish.

D. Joint Preparation

Prior to installing the seal, the Engineer thoroughly inspects the armored joint opening for proper alignment and full consolidation of elastomeric concrete under the angle assemblies. Make all necessary repairs prior to cleaning the joint opening and installing the seal.

Clean the armored joint opening with a pressure washer rated at 3000 psi (20.7 MPa) minimum at least 24 hours after placing the elastomeric concrete. Dry the cleaned surface prior to installing the seal.

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

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

6. 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.

7. 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.

Payment will be made under:

Pay Item	Pay Unit
Evazote Joint Seals	Lump Sum

THERMAL SPRAYED COATINGS (METALLIZATION)

(6-07-05)

1. DESCRIPTION

Apply a thermal sprayed coating (TSC) and sealer to metal surfaces as specified herein when called for on the plans or by other Special Provisions, or when otherwise approved by the Engineer in accordance with the SSPC-CS 23.00/AWS C2.23/NACE No. 12 Specification. Only Arc Sprayed application methods are used to apply TSC coatings, the Engineer must approve other methods of application.

2. QUALIFICATIONS

Only use NCDOT approved TSC Contractors meeting the following requirements:

1. Who have the capability of blast cleaning steel surfaces to SSPC SP-5 and SP-10 Finishes.
2. Who employ a Spray Operator(s) qualified in accordance with AWS C.16/C2.16M2002 and a Quality Control Inspector(s) who have documented training in the applicable test procedures of ASTM D-3276 and SSPC-CS 23.00.

A summary of the contractor's related work experience and the documents verifying each Spray Operator's and Quality Control Inspector's qualifications are submitted to the Engineer before any work is performed.

3. MATERIALS

Provide wire in accordance with the metallizing equipment manufacturer’s recommendations. Use the wire alloy specified on the plans which meets the requirements in Annex C of the SSPC-CS 23.00 Specification. Have the contractor provide a certified analysis (NCDOT Type 2 Certification) for each lot of wire material.

Apply an approved sealer to all metallized surfaces in accordance with Section 9 of SSPC- CS 23. The sealer must either meet SSPC Paint 27 or is an alternate approved by the Engineer.

4. SURFACE PREPARATION AND TSC APPLICATION

Grind flame cut edges to remove the carbonized surface prior to blasting. Bevel all flame cut edges in accordance with Article 442-10(D) regardless of included angle. Blast clean surfaces to be metallized with grit or mineral abrasive in accordance with Steel Structures Painting Council SSPC SP-5/10(as specified) to impart an angular surface profile of 2.5 - 4.0 mils (0.063 – 0.100 mm). Surface preparation hold times are in accordance with Section 7.32 of SSPC-CS 23. If flash rusting occurs prior to metallizing, blast clean the metal surface again. Apply the thermal sprayed coating only when the surface temperature of the steel is at least 5°F (3°C) above the dew point.

At the beginning of each work period or shift, conduct bend tests in accordance with Section 6.5 of SSPC-CS 23.00. Any disbonding or delamination of the coating that exposes the substrate requires corrective action, additional testing, and the Engineer’s approval before resuming the metallizing process.

Apply TSC with the alloy to the thickness specified on the plans or as provided in the table below. All spot results (the average of 3 to 5 readings) must meet the minimum requirement. No additional tolerance (as allowed by SSPC PA-2) is permitted. (For Steel Beams: For pieces with less than 200 ft² (18.6m²) measure 2 spots/surface per piece and for pieces greater than 200 ft² (18.6m²) add 1 additional spots/surface for each 500 ft² (46.5m²)).

Application	Thickness	Alloy	Seal Coat
Pot Bearings	8 mil	85/15 Zinc (W-Zn-Al-2)	0.5 mil
Armored Joint Angles	8 mil	85/15 Zinc (W-Zn-Al-2)	0.5 mil
Modular Joints	8 mil	99.99% Zn (W-Zn-1)	0.5 mil
Expansion Joint Seals	8 mil	99.99% Zn (W-Zn-1)	0.5 mil
Optional Disc Bearings	8 mil	85/15 Zinc (W-Zn-Al-2)	0.5 mil

When noted on the plans or as specified in the above chart, apply the sealer to all metallized surfaces in accordance with the manufacturer’s recommendations and these provisions. Apply the seal coat only when the air temperature is above 40°F (4°C) and the surface temperature of the steel is at least 5°F (3°C) above the dew point. If the sealer is not applied within eight hours after the final application of TSC, the applicator verifies acceptable TSC surfaces and obtains approval from the Engineer before applying the sealer.

5. INSPECTION FREQUENCY

The TSC Contractor must conduct the following tests at the specified frequency and the results documented in a format approved by the Engineer.

Test/Standard	Location	Frequency	Specification
Ambient Conditions	Site	Each Process	5°F (3°C) above the dew point
Abrasive Properties	Site	Each Day	Size, angularity, cleanliness
Surface Cleanliness SSPC Vis 1	All Surfaces	Visual All Surfaces	SSPC-SP-10 Atmospheric Service SSPC-SP - 5 Immersion Service
Surface Profile ASTM D-4417 Method C	Random Surfaces	3 per 500 ft ²	2.5 - 4.0 mils
Bend Test SSPC-CS 23.00	Site	5 per shift	Pass Visual
Thickness SSPC PA-2R SSPC-CS 23.00	Each Surface	Use the method in PA-2 Appendix 3 for Girders and Appendix 4 for frames and miscellaneous steel. See Note 1.	Zn - 8 mils minimum Al - 8 mils minimum Zn Al - 8 mils minimum Areas with more than twice the minimum thickness are inspected for compliance to the adhesion and cut testing requirements of this specification.
Adhesion ASTM 4541	Random Surfaces Splice Areas	1 set of 3 per 500 ft ²	Zn > 500 psi Al > 1000 psi Zn Al > 750 psi
Cut Test - SSPC-CS 23.00	Random Surfaces	3 sets of 3 per 500 ft ²	No peeling or delamination
Job Reference Std. SSPC-CS 23.00	Site	1 per job	Meets all the above requirements

6. REPAIRS

All Repairs are to be performed in accordance with the procedures below, depending on whether the repair surface is hidden or exposed. As an exception to the following, field welded splices on joint angles and field welding bearing plates to girders may be repaired in accordance with the procedures for hidden surfaces.

For hidden surfaces (including but not limited to interior girders, interior faces of exterior girders, and below-grade sections of piles):

1. Welding of metallized surfaces may be performed only if specifically permitted by the Engineer. Remove metallizing at the location of field welds by blast cleaning (SSPC SP-6 finish), or hand (SSPC SP-2 finish) or power tool cleaning (SSPC SP-3 finish) just prior

to welding. Clean sufficiently to prevent contamination of the weld. All repairs to welded connections are metallized in accordance with SSPC CS 23.00.

2. Minor areas less than or equal to 0.1 ft² (9300mm²) exposing the substrate are metallized in accordance with SSPC CS 23.00 or painted in accordance with ASTM A780, "Repair of Damaged and Uncoated Areas of Hot Dip Galvanized Coatings."
3. Large areas greater than 0.1 ft² (9300mm²) exposing the substrate are metallized in accordance with SSPC CS 23.00.
4. Damaged (burnished) areas not exposing the substrate with less than the specified coating thickness are metallized in accordance with SSPC CS 23.00 or painted in accordance with ASTM A780, "Repair of Damaged and Uncoated Areas of Hot Dip Galvanized Coatings."
5. Damaged (burnished) areas not exposing the substrate with more than the specified coating thickness are not repaired.
6. Defective coating is repaired by either method 2 or 3 depending on the area of the defect.

For Exposed Surfaces (including but not limited to exterior faces of exterior girders and above-grade sections of piles):

1. Welding of metallized surfaces may be performed only if specifically permitted by the Engineer. Remove metallization at the location of field welds by blast cleaning (SSPC SP-6 finish), or hand (SSPC SP-2 finish) or power tool cleaning (SSPC SP-3 finish) just prior to welding. Clean sufficiently to prevent contamination of the weld. All repairs to welded connections are metallized in accordance with SSPC CS 23.00.
2. All areas exposing the substrate are metallized in accordance with SSPC CS 23.00
3. Defective coating is repaired by either method 2 or 3 depending on the area of the defect.

7. TWELVE MONTH OBSERVATION PERIOD

The contractor maintains responsibility for the coating system for a twelve (12) month observation period beginning upon the satisfactory completion of all the work required in the plans or as directed by the engineer. The contractor must guarantee the coating system under the payment and performance bond (refer to article 109-10). To successfully complete the observation period, the coating system must meet the following requirements after twelve (12) months service:

- No visible rust, contamination or application defect is observed in any coated area.
- Painted surfaces have a uniform color and gloss.
- Surfaces have an adhesion of no less than 500 psi (3.45 MPa) when tested in accordance with ASTM D-4541.

8. BASIS OF PAYMENT

The contract price bid for the bridge component to which the coating is applied will be full compensation for the thermal sprayed coating.

CLEAN AND PAINT EXISTING BEARINGS**(SPECIAL)**

Thoroughly clean the exposed surfaces of all prestressed girder bearing plates and the fixed bearings of the continuous steel spans including sole plates, anchor bolts, nuts and washers in the existing structure in accordance with the Subarticle 442-8(B) of the Standard Specifications. Have the Engineer approve the cleaning of each unit before beginning painting. After cleaning, apply a touch up coat of natural color organic zinc repair paint to the steel followed by a complete coat of the same paint.

Measurement and Payment

Clean and Paint Existing Bearings will be measured and paid for at the contract unit price bid per each and will be full compensation for the above work required for cleaning and painting existing bearing plates including the cost of materials, labor, tools, equipment and incidentals.

Payment will be made under:

Pay Item	Pay Unit
Clean and Paint Existing Bearings	Each

HIGH STRENGTH BOLTS

In Section 440-8(A) of the Standard Specifications, revise the third paragraph and insert a new paragraph four, respectively, as follows:

“Make sure that plain bolts and washers have a thin coat of lubricant at the time of installation”.

“Use nuts that are pre-waxed by the producer/supplier prior to shipping to the project”.

No separate measurement or payment will be made for furnishing and installing High Strength Bolts; the cost of which shall be included in “Repairs to Structural Steel” pay item.

CONCRETE REPAIRS TO CAPS, DIAPHRAGMS, AND COLUMNS**(SPECIAL)****Description**

Work includes removal of concrete in spalled areas of the existing caps, diaphragms, and columns in reasonably close conformity with the lines, depth, and details shown on the plans, described herein and as established by the Engineer. This work also includes straightening, cleaning, and replacement of reinforcing steel, dowelling new reinforcing steel, removing all loose materials, removing and disposing of debris, applying repair material, and protecting adjacent areas of the bridge and environment from material leakage. The repair material shall be one of the below described materials unless otherwise noted in the plans or provisions.

The location and extent of repairs shown on the plans described herein are general in nature. The Engineer determines the exact extent of removal in the field based on an evaluation of the condition of the exposed surfaces.

Repair, to the Engineer's satisfaction, any portion of the structure that is damaged from construction operations. No extra payment is provided for these repairs.

A. Polymer Modified Concrete Repair Material

Materials

Repair material shall be polymer modified cement mortar for vertical or overhead applications and shall be suitable for applications in marine environments. Material shall be approved for use by NCDOT. Submit repair material to the Engineer for review and approval prior to beginning the work. Color of repair material shall be concrete gray.

Surface Preparation

Prior to the application of repair mortar, square up edges in repair areas, thoroughly clean surfaces to be repaired and remove all loose materials. Remove grease, wax, salt, and oil contaminants by scrubbing with an industrial grade detergent or degreasing compound followed by a mechanical cleaning. Remove weak or deteriorated concrete to sound concrete by bush hammering, gritblasting, scarifying, waterblasting, or other approved methods. Remove dirt, dust, laitance and curing compounds by gritblasting, sanding, or etching with 15% hydrochloric acid. Only acid etch if approved and follow it by scrubbing and flushing with copious amounts of clean water. Check the cleaning using moist pH paper. Water cleaning is complete when the paper reads 10 or higher. Follow all mechanical cleaning with vacuum cleaning.

Application

When surface preparation is completed, mix and apply repair mortar in accordance with manufacturer's recommendations. Use aggregate that is washed, kiln-dried, and bagged. Apply bonding agent to all repair areas immediately prior to placing repair mortar. Repair areas shall be formed unless otherwise approved by the Engineer. Form areas to establish the original neat lines of the member being repaired.

Apply repair mortar to damp surfaces only when approved. In such instances, remove all free water by air-blasting. After applying the repair mortar, remove excessive material and provide a smooth, flush surface.

B. Shotcrete Repair Material**Shotcrete**

Qualification of Shotcrete Contractor

Shotcrete Contractors are not acceptable as a Prime Contractor or Subcontractor unless all of following requirements are met:

The Shotcrete Contractor furnishes proof that his or her company has a minimum of 5 years experience in shotcrete repair work on jobs of similar size and character.

The Shotcrete Contractor furnishes five references who were responsible for supervision of similar projects and testifies to the successful completion of these projects. Include name, address, and telephone number. Prior to starting work, the Contractor's nozzlemen are required to pass a test demonstrating their competence. This test is conducted at the job site and approximates actual working conditions as near as possible. For test requirements, see ACI 506.3R, Chapters 2.5 and 3. Only workmanship demonstration is tested.

General

When shotcreting, meet all requirements of ACI 506.2, published by the American Concrete Institute, Detroit, Michigan, except as modified by the requirements of this Special Provision.

Prior to beginning any repair work, provide a sufficiently sized temporary work platform at each repair location as required. Design steel members meeting the requirements of the American Institute of Steel Construction Manual. Design timber members in accordance with the "National Design Specification for Stress-Grade Lumber and Its Fastenings" of the National Forest Products Association. Submit the platform structure design for review and approval. Do not install the platform until the design is approved. Do not drill holes into the superstructure. When the platform is removed, remove all anchorages made in the substructure and repair the substructure at no additional cost to the Department.

Material

Use materials conforming to the requirements of the applicable sections of the Standard Specifications and the following provisions:

Use Type II Cement. Replace ten percent by weight of the cement with silica fume.

Do not use admixtures without approval.

Produce shotcrete cores with a compressive strength of 5000 psi (34.5 MPa) at 28 days. The provisions of ACI 506.2, Section 1.6.3.3, Paragraph 2, do not apply.

Submit the shotcrete mix design, including the source of the material, to the Engineer for acceptance before using it.

Use size 2S or 2MS fine aggregate unless otherwise approved.

Finish

Slightly build up and trim the shotcrete surface to the final surface by cutting with the leading edge of a sharp trowel. Use a rubber float to float any imperfections. Limit work on the finished surface to correcting imperfections caused by trowel cutting.

Testing

Each day shotcreting takes place, have each nozzleman shoot one 18" x 18" x 3" (460 mm x 460 mm x 75 mm) Test Panel. Shoot the panel in the same position as the repair work that is being done. The panel demonstrates whether the shotcrete is being properly applied and furnishes cores for testing compressive strength. Drill three 3" (76 mm) diameter cores from each test panel and also drill cores from the repair areas as directed by the Engineer. Do not take cores from repaired areas until the shotcrete has cured for 7 days. Drill a core that penetrates into the existing substructure concrete at least 2 inches (50 mm). These cores are inspected for delaminations and sand pockets and tested for bond strength and/or compressive strength. If a core taken from a repaired area indicates unsatisfactory application or performance of the shotcrete, take additional cores from the applicable repair area(s) for additional evaluation and testing as directed by the Engineer. No extra payment is provided for drilling extra cores. Patch all core holes in the repaired substructure units to the satisfaction of the Engineer.

All material, sample, and core testing is done by the Materials and Tests Unit of North Carolina Department of Transportation.

Mixture

Mix the shotcrete in the proportions of one part of portland cement to four parts of sand, and as directed by the Engineer.

Measure this mixture by volume in the dry loose state. Check batching equipment daily or at the discretion of the Engineer.

Repair Method and Operations

Prior to starting the repair operation, delineate all surfaces and areas assumed to be deteriorated by visually examining and by sounding the concrete surface with a hammer or any other alternative approved method. The Engineer is the sole judge in determining the limits of deterioration.

Remove all deteriorated concrete to sound concrete with a 17 lb (7.7 kg) (maximum) pneumatic hammer with points that do not exceed the width of the shank or with hand picks or chisels as directed by the Engineer. Do not cut or remove the existing reinforcing steel. Do not remove more existing concrete than required to expose the surface of the sound concrete. Unless specifically directed by the Engineer, do not remove concrete deeper than 6 inches (150 mm) or deeper than 1 inch (25 mm) below the reinforcing steel.

If sound concrete is encountered before existing reinforcing steel is exposed, prepare and repair the surface without removing any more concrete. However, if the reinforcing steel is wholly or partially exposed, remove the deteriorated and/or sound concrete to a minimum clearance of 1 inch (25 mm) all around the reinforcing steel.

Sandblast all exposed concrete surfaces and existing reinforcing steel in repair areas to remove all debris, loose concrete, loose mortar, rust, scale, etc. Use a wire brush to clean all exposed reinforcing steel surfaces facing away from the sandblast nozzle to remove all dust and loose particles.

All material removed becomes the Contractor's. Use an approved method to dispose of the material.

Restore all repaired members, including chamfered edges, as close as practicable to their original "As Built" dimensions and configuration. Provide a minimum of 2" (50 mm) shotcrete cover over reinforcing steel exposed during repair. Finish the shotcrete by cutting the surface to final grade with the leading edge of a trowel.

Provide welded wire fabric at each repair area larger than 1 ft² (0.1 m²). Provide a minimum 2" x 2" (50 mm x 50 mm) - 12 gage galvanized welded wire fabric. Rigidly secure the welded wire fabric to existing steel or to 3/16" (4.76 mm) minimum diameter adequately spaced galvanized hook fasteners to prevent sagging. Encase the welded wire fabric in shotcrete to a minimum depth of 1½ inches (38 mm).

If preferred, use steel or synthetic fiber reinforcement as an alternate to welded wire fabric.

Work only with experienced personnel. Always work under the direction of an experienced superintendent. The superintendent is required to show a certified experience record indicating at least 5 years experience on work of similar type. No nozzleman is deemed experienced unless they have worked on several other jobs similar to that specified herein and have passed the required pre-qualification test listed in this Special Provision.

Before applying the shotcrete to the surface, thoroughly clean the surface of all dirt, grease, oil or foreign matter, and remove all loose or weakened material.

Wash the roughened existing concrete surface with fresh potable water and an air blast, or with a "stiff" hose stream of fresh water until all loosened materials and salt water spray are removed. Perform this operation 30 minutes to 1 hour prior to applying the shotcrete.

Maximum time allowed between removal of deteriorated concrete and shotcrete application is 5 days. If the time allowance is exceeded it will be necessary to prepare the surface again using the methods described above before shotcrete can be applied.

Apply shotcrete in layers. The properties of the applied shotcrete determine the proper thickness of each layer or lift.

If a work stoppage longer than 2 hours takes place on any shotcrete layer prior to the time it has been built up to required thickness, thoroughly wash the surface with a fresh water stream and air hose as outlined previously, prior to continuing with the remaining shotcrete course. Do not apply shotcrete to a dry surface.

Have the nozzleman hold the nozzle 3 – 4 feet (0.9 to 1.2 m) from the surface being covered in a position that ensures the stream of flowing material strikes at approximately right angles to the surface being covered without excessive impact. Have the nozzleman control the water content so it never exceeds 3½ gallons (13.25 liters) per sack of cement. Direct the nozzlemen to maintain the water at a practicable minimum, dependent on weather conditions, so that the mix properly adheres. Control water content so that it does not become high enough to cause the mix to sag or fall from vertical or inclined surfaces, or to separate in horizontal layers.

Use shooting strips or guide wires that do not entrap rebound sand to bring the finished work to approximate shape. Use guide wires to provide a positive means of checking the total thickness of the shotcrete applied. Remove the guide wires prior to the final finish coat.

Blow or rake off sand that rebounds and does not fall clear of the work, or which collects in pockets in the work, to avoid leaving sand pockets in the shotcrete. Do not reuse rebound material in the work.

Apply shotcrete only when the air temperature is at least 40°F (4°C) and rising, but less than 95°F (35°C). Do not apply shotcrete to frosted surfaces. Maintain shotcrete at a minimum temperature of 40°F (4°C) for 3 days.

Testing Shotcrete Surfaces

Immediately after bringing shotcrete surfaces to final thickness, thoroughly check them for sags, bridging, and other deficiencies. Approximately 3 days after completing the final shotcrete placement, thoroughly test it again with a hammer. At this time, the shotcrete should have sufficient strength for all sound sections to ring sharply. Remove and replace any unsound portions of the work found during this 3 day old inspection period, or at any other time prior to the final inspection of the work. No additional compensation is provided for removal and replacement of concrete during or after the 3 day old inspection.

Curing

Begin curing as soon as the finished shotcrete surface withstands the curing operation without damage in accordance with Section 3.7 of ACI 506.2.

Measurement and Payment

Concrete Repairs to Caps, Diaphragms, and Columns will be measured and paid for at the contract unit price bid per cubic foot and will be full compensation for removal, containment and disposal off-site of unsound concrete including the cost of materials, labor, tools, equipment and incidentals necessary to accomplish removal. Depth will be measured from a place at the original outside concrete face. The Contractor and Engineer will measure repair quantities after removal of unsound concrete and before application of repair material. Such payment will also include the cost of sandblasting, surface cleaning and preparation, cleaning of reinforcing steel, cost of temporary work platform, testing of the soundness of the exposed concrete surface, furnishing and installation of repair mortar material, curing and sampling of concrete, and protection/cleaning of adjacent areas from splatter or leakage.

Reinforcing Steel that is required for the repairs will be in accordance with Section 425 of the *Standard Specifications*.

Payment will be made under:

Pay Item	Pay Unit
Concrete Repairs to Caps, Diaphragms, and Columns	Cubic Feet
Reinforcing Steel	Pound

REPAIRS TO PRESTRESSED CONCRETE GIRDERS (SPECIAL)

Description

Work includes removal of concrete in spalled areas of the existing prestressed concrete girders in reasonably close conformity with the lines, depth, and details shown on the plans, described herein and as established by the Engineer; removing all loose materials, removing and disposing of debris, applying repair material, and protecting adjacent areas of the bridge and environment from material leakage.

The location and extent of repairs shown on the plans described herein are general in nature. The Engineer determines the exact extent of removal in the field based on an evaluation of the condition of the exposed surfaces.

Repair, to the Engineer's satisfaction, any portion of the structure that is damaged from construction operations. No extra payment is provided for these repairs.

Materials

Repair material shall be polymer modified cement mortar for vertical or overhead applications and shall be suitable for applications in marine environments. Material shall be approved for use by NCDOT. Submit repair material to the Engineer for review and approval prior to beginning the work. Color of repair material shall be concrete gray.

Surface Preparation

Prior to the application of repair mortar, square up edges in repair areas, thoroughly clean surfaces to be repaired and remove all loose materials. Remove grease, wax, salt, and oil contaminants by scrubbing with an industrial grade detergent or degreasing compound followed by a mechanical cleaning. Remove weak or deteriorated concrete to sound concrete by bush hammering, gritblasting, scarifying, waterblasting, or other approved methods. Remove dirt, dust, laitance and curing compounds by gritblasting, sanding, or etching with 15% hydrochloric acid. Only acid etch if approved and follow it by scrubbing and flushing with copious amounts of clean water. Check the cleaning using moist pH paper. Water cleaning is complete when the paper reads 10 or higher. Follow all mechanical cleaning with vacuum cleaning.

Application

When surface preparation is completed, mix and apply repair mortar in accordance with manufacturer's recommendations. Use aggregate that is washed, kiln-dried, and bagged. Apply bonding agent to all repair areas immediately prior to placing repair mortar. Repair areas shall be formed unless otherwise approved by the Engineer. Form areas to establish the original neat lines of the member being repaired.

Apply repair mortar to damp surfaces only when approved. In such instances, remove all free water by air-blasting. After applying the repair mortar, remove excessive material and provide a smooth, flush surface.

Measurement and Payment

Repairs to Prestressed Concrete Girders will be measured and paid for at the contract unit price bid per cubic foot and will be full compensation for removal, containment and disposal off-site of unsound concrete including the cost of materials, labor, tools, equipment and incidentals necessary to accomplish removal. Depth will be measured from a place at the original outside concrete face. The Contractor and Engineer will measure repair quantities after removal of unsound concrete and before application of repair material. Such payment will also include the cost of sandblasting, surface cleaning and preparation, cleaning of reinforcing steel, addition of new reinforcing steel and/or dowels, cost of temporary work platform, testing of the soundness of the exposed concrete surface, furnishing and installation of repair mortar material, curing and sampling of concrete, and protection/cleaning of adjacent areas from splatter or leakage.

Payment will be made under:

Pay Item	Pay Unit
Repairs to Prestressed Concrete Girders	Cubic Feet

PILE ENCAPSULATION**(SPECIAL)****Description**

The work specified in this section consists of surface preparation of the pile, placement of a translucent, fiberglass reinforced plastic (FRP) jacket around the pile and injecting a water insensitive epoxy grout into the space between the jacket and the pile. The epoxy grout is batched, mixed and pumped by equipment, expressly designed for that purpose.

Materials**FRP Outer Jacket**

The FRP Outer Jacket shall be Translucent FRP Jacket, as described in this section. For a submission to be approved it must meet ALL requirements of this section and approved by the engineer prior to the bid.

The translucent outer jacket shall be a marine grade laminate of fiberglass reinforced plastic (FRP), constructed of layers of woven roving and mat. Construction by the spray-up process, using a chopper gun, is not acceptable. The glass content shall be sufficient to meet the strength requirements found in Section 3.1.6, herein, but shall not be less than 30% of the laminate. An Ultra-Violet (UV) screening ingredient shall be integrally bound within the polyester matrix.

The strength and thickness of the outer jacket shall be as required to provide adequate strength and rigidity to withstand the forces and stresses it may be subjected to during handling, installation and the injection of epoxy grout, but shall not be less than 1/8 inch (3 mm) thick.

The outer jacket shall be translucent to the extent that the progression of epoxy grout inside the jacket during injection can be visually monitored from outside the jacket.

The outer jacket shall be equipped with 1" NPT injection ports, spaced at intervals not to exceed five (5) feet, along its entire length. The injection ports shall be positioned on alternately opposite sides of the jacket to allow for more even distribution of grout. The injection ports shall be of all-polymer construction and be fitted into the jacket wall prior to jacket installation, except in special situations, approved by the engineer, where a port may be added to accommodate an unanticipated jobsite condition.

The outer jacket shall have a sufficient number of polymer stand-offs, adhered to its inside surface, to maintain a minimum space between the pile and the jacket of 3/8 inch (9.5 mm). When loss of pile section exists, it may be necessary to use adjustable stand-offs to keep the outer jacket in proper alignment with the pile. At an adjustable stand-off location, a polymer boss shall be adhered to the inside surface of the jacket to provide adequate thread length to accommodate the adjustable polymer screw.

The outer jacket material, exclusive of polymer stand-offs and injection ports, shall possess the following minimum physical properties.

1. Ultimate Tensile Strength per ASTM D-638: 10,000 PSI
2. IZOD Impact Strength per ASTM D-256: 15 ft-lbf/inch. (Notched Sample)
3. Barcol Hardness per ASTM D-2583: 30
4. Water Absorption per ASTM D-570: 1% Maximum
5. Ultra Violet (UV) Stability as demonstrated by Accelerated Weathering Tests per ASTM G-23: Samples of outer jacket subjected to 500 hour exposure in Twin Carbon Arc Weather-ometer (ASTM G-23, Type D) operated at 145 degrees F., shall not exhibit any chipping, flaking or peeling. Said test to be conducted in twenty (20) minute cycles, consisting of seventeen (17) minutes of arc light and three (3) minutes of water spray, throughout the 500 hour test duration.

The outer jacket shall be fabricated in sections. Each section shall not contain more than two (2) longitudinal joints. Sections of jacket may be placed one above the other and joined together with transverse joints. All joints in the outer jacket shall meet the following minimum requirements:

1. All joints shall have sufficient strength to assure that they will not open or separate when subjected to installation stresses, sea forces and epoxy grout injection pressures.
2. The longitudinal joint design shall be of overlapping configuration and shall allow for minor field adjustment to pile size. The design of all joints shall ensure that a minimum 3/8 inch annulus between jacket and pile is maintained.
3. Transverse joints (if any) shall be of overlapping configuration.

The lower end of each outer jacket shall be provided with a molded upset cavity to properly receive and contain a bottom seal gasket.

Epoxy Grout

The Epoxy Grout must meet ALL requirements of this section and approved by the engineer prior to the bid.

The epoxy grout shall be a manufactured, prepackaged, solvent-free, underwater curing, three component product, consisting of epoxy resin (component A), epoxy hardener (component B) and graded dry silica aggregate (component C). The ratio of the epoxy components A and B (collectively called the binder) shall be 1:1 by volume. The A and B components shall be of sharply contrasting colors, as supplied to the project, to minimize error in field proportioning and to assist in evaluating thoroughness of mixing. The grout shall be proportioned to meet the handling and placement requirements of this specification and the ratio of the filler to binder shall not exceed 3.5:1, by weight.

The mixed epoxy grout shall exhibit the following characteristics in the plastic state:

1. Viscosity of filled resin and filled curing agent shall be such that it may be pumped without segregation and be inject able into the space between the jacket and the pile without causing distortion or rupture of the jacket. The viscosity shall also be such that the blended grout completely fills the space between jacket and pile without voids and be reasonably self-leveling, once placed within the jacket.
2. The gel time or "Pot Life" of the blended grout shall be suitable for proper placement without voids, and allow sufficient time for reasonable self leveling within the jacket, yet in no case shall exceed 65 minutes after blending at a control temperature of 77 degrees F. (This requirement minimizes the possibility of the filler settling out of the liquid components.)
3. The blended grout shall be uniform in color and not contain any pockets or streaks of the original component colors.

The catalyzed Epoxy Grout, after curing under water, shall possess the following minimum physical properties in the hardened state.

1. 7 Day Compressive Strength per ASTM C-579: 7,000 PSI
2. 7 day Tensile Strength per ASTM C-307: 2,000 PSI
3. 7 day Bond/Shear Strength per ASTM C-882: 150 PSI
4. Shrinkage after 7 day's cure per ASTM C-531: 0.07% (Maximum)
5. Water Absorption after 7 day's cure per ASTM C-413: 0.45% (Maximum)

Marine Epoxy Pastes

The epoxy paste used to adhere the outer jacket seams and bottom seal gaskets, shall be a two component epoxy compound, capable of being applied underwater. The ratio of resin component to hardener component shall be 1:1 by volume and each component shall be of sharply contrasting color (e.g. black and white) to the other, to assist in evaluating the thoroughness of jobsite mixing.

The epoxy paste used to finish the tops of the encapsulations and to seal any in-situ bond test locations, shall be be a non-sag, two component epoxy compound, capable of being applied underwater. The ratio of resin component to hardener component shall be 1:1 by volume and each component shall be of sharply contrasting color (e.g. black and white) to the other, to assist in evaluating the thoroughness of jobsite mixing.

Epoxy Grout Hose Lubricant shall be approved by the manufacturer of the epoxy grout manufacturer. The lubricant must be an epoxy diluent, compatible with the chemistry of the epoxy grout used.

Equipment

The epoxy grout to be injected into the outer jackets shall be proportioned, mixed and pumped with equipment expressly designed for that purpose. The equipment shall be capable of delivering mixed grout into the jackets at the rate of 2 GPM or greater.

Temperature Control Equipment

When ambient and/or water temperatures are expected to fall below 70 degrees F., a source of heated water, such as a diver's water heater, shall be provided. The heated water shall be directed into water jackets surrounding the epoxy grout hoppers and injection hose(s). This equipment shall be capable of delivering a sufficient amount of heated water to maintain grout viscosity suitable for proper grout placement.

Materials Handling and Storage

Handling and storage of pile encapsulation materials shall strictly conform to the manufacturer's recommendations. A list of minimum handling and storage requirements follows:

Outer Jackets

Outer jackets shall be shipped in closed containers or covered with tarpaulins to prevent contamination by dirt or road films. Outer jackets shall be properly stored at the jobsite to minimize distortion and to prevent contamination by foot traffic and blown debris. If storage at project is to exceed 30 days, shaded storage shall be provided.

Epoxy Grout Components

The silica aggregate component of the epoxy grout shall be properly packaged and labeled to indicate point of origin and manufacturer's lot number. The aggregate shall be stored to assure that it is thoroughly dry when mixed in the epoxy grout.

All liquid epoxy components to be used in the work shall be delivered to the jobsite in tightly sealed unopened containers, clearly labeled to indicate:

Name of manufacturer.

Manufacturer's product name and component designation.

Manufacturer's lot number and "Use before" date.

ANSI (American National Standards institute) hazardous material rating and handling precautions.

Epoxy liquid epoxy components shall be stored in a covered, well ventilated space. The storage temperature of the liquid components shall not exceed 120 degrees F nor be less than 40 degrees F at any time after receipt by the contractor. (See Epoxy Grout Preparation)

Containers containing liquid epoxy components shall always be sealed and air tight from time of receipt by contractor until entering the proportioning and blending process. When containers are opened for sampling or other purposes and containers remain partially filled, their lids will be tightly closed to prevent contamination by moisture or other substances. After the seal has been broken on a container, its contents must be used within seven (7) days or removed from the project.

All project personnel handling the epoxy grout or its liquid components shall be properly alerted to the Epoxy Safety Requirements supplied by the manufacturer. A Material Safety Data Sheet (MSDS) shall be supplied with each shipment of liquid epoxy materials.

Submittals

Submit shop drawings and calculations to the Engineer for approval prior to start of fabrication. Submittal shall include:

1. Top and bottom elevations relative to project datum of each outer jacket to be installed.
2. Details and locations of typical longitudinal and transverse joints in the outer jackets, including a description of the joint sealing method(s).
3. Details of fixed and/or adjustable stand-offs and their location on the outer jackets.
4. Detail of typical outer jacket bottom seal.
5. Location and details of temporary bracing and outer jacket support required during placement and curing of epoxy grout.
6. Details of injection ports or other access points into outer jacket to facilitate placement of epoxy grout.
7. Details of installation sequence to be used to place the epoxy grout in the space between jacket and pile.
8. Detail of final finishing of epoxy grout at the top of the encapsulation.
9. Details of permanent closure of all injection ports and test locations in the outer jacket to be accomplished after epoxy grout placement is complete.

Material Certification

For materials to be used, the Supplier shall furnish a certificate to the Engineer attesting that the materials meet all the requirements contained herein and that they conform in all respects to the materials subjected to the tests required. Copies of current test reports shall be attached to the certificate. No test report for tests made more than one year prior to shipment will be accepted for the form material.

Construction MethodsPile Cleaning

Prior to application of the encapsulation process, all pile surfaces shall be thoroughly cleaned of marine growth, oil, grease, mud, rust, broken concrete, micro-organisms and any other deleterious material which might prevent proper bonding between the epoxy grout and the pile. Pile cleaning may be accomplished by grit blasting, water blasting, or by powered rotary abraders, and shall meet the satisfaction of the Engineer.

In environments where active marine growth occurs, it may be necessary to perform the pile cleaning in two (2) phases. In such environments, the first phase shall consist of removing marine growth, oil, grease, rust, broken concrete, etc., and shall occur not more than seven (7) days prior to the encapsulation. The second phase shall be a final surface preparation, removing all remaining deleterious substances including micro-organisms and shall occur not more than 48 hours prior to the placement of the epoxy grout in the outer pile jacket.

Outer Jacket Assembly

Only jackets with pre-fitted injection ports (by the contractor) are to be used.

The entire inside surface of the jacket shall be lightly grit blasted by the contractor to remove any bond breaking residue that may be present.

All fixed stand-offs or adjustable stand-off bosses shall be affixed to the jacket by the contractor in accordance with approved shop drawings. Maximum spacing between fixed stand-offs shall be 18" in the longitudinal direction and 12" in the transverse direction.

Jacket assembly and positioning around the pile shall be performed by the contractor in such a manner as to assure that no damage to stand-offs and/or set screws occurs and that there will be no detrimental movement of the joints while joint adhesive is curing.

Both the longitudinal and transverse seams, if any, shall be sealed by the contractor with marine epoxy paste as described above and fastened with 3/16" diameter stainless steel rivets. The spacing between individual fasteners shall not exceed 5".

The jacket shall be supported by temporary bracing or other means supplied by the contractor to assure that it will not move or distort during the epoxy grout placement and curing period and that the minimum annular space of 3/8 inch between pile and jacket is maintained throughout the entire encapsulation.

The contractor shall install a gasket to prevent the epoxy grout from leaving the bottom of the jacket during the injection process. The gasket shall be fitted into the molded cavity at the lower end of the jacket and adhered in place with marine epoxy paste. Any gasket material used in the bottom seal shall be contained within the molded cavity and shall not extend up into the jacket above the cavity.

Epoxy Grout Preparation

Proportioning and mixing of the epoxy grout shall be accomplished with equipment expressly designed for that purpose and shall be performed in a suitable work area within hose distance of the piles to be encapsulated.

Proportioning of the silica aggregate and the liquid epoxy components shall be performed in strict accordance with the manufacturer's recommendations, with particular regard to temperature control. When ambient and/or water temperatures are expected to fall below 70 degrees F., the day's supply of grout filler and liquid components shall be pre-heated to above 80 degrees F., but never greater than 120 degrees F., prior to being introduced into the grout handling equipment. In no case shall open flame be used in direct contact with the equipment or the epoxy components.

Epoxy Grout Placement (Injection)

Before the injection process begins, at least 2 gallons of an approved grout hose lubricant shall be placed in each grout hopper. This lubricant shall be pumped through the entire system to coat all wetted surfaces of the hopper(s), pump(s) and hoses. When the lubricant level has reached the bottom of the hopper(s), it may be immediately followed by the epoxy grout and the remaining

lubricant "chased" out of the hoses. All lubricant, that is not intermixed with the epoxy grout, may be collected at the downstream end of the hoses for re-use.

The premixed, aggregate filled epoxy grout shall be pumped through hoses to the jacket injection ports. If the plural component method of grout handling is used, the separate aggregate filled components shall be pumped through separate hoses to the mixer/blender assembly, where the components are then thoroughly blended and catalyzed, just prior to entering the pile jacket.

Grout injection shall begin at the bottom injection port. As the grout appears at the next higher port, and it has been determined that the space between the pile and the jacket is filled to that port, the lower port shall be capped off and the injection begun at the next higher port where the grout appeared. This process is repeated from port to port until the grout reaches the top of the jacket. NOTE: If project experience indicates that the grout can be injected from a lower port, past the next higher port or ports, without difficulty or undo stress on the jacket, the higher port or ports may be plugged and bypassed. The plugs shall be 1" NPT, Schedule 40, PVC, CPVC or Polypropylene.

At the contractor's option, he may inject a short lift of grout (six inches to 1 foot in height) into the bottom-most port and allow it to cure before proceeding with subsequent lifts. If this practice is used, the jackets shall be fitted with an additional injection port to coincide with the top of the first lift. Subsequent lifts of grout will follow the above procedures.

The injection process shall be continuous, except for brief interruptions when the injector is moved from port to port, and the speed of the injection process shall be controlled to prevent entrapment of water or air in the grout cavity being filled.

The maximum permissible voids in the epoxy grout within the jackets shall not exceed 0.01 square foot per one (1) square foot of encapsulation area. Any voids larger than two (2) inches in diameter shall be repaired by the contractor, using an approved method, at no expense to the owner.

Final Finishing and Inspection of the Completed Encapsulation

After the grouting process is completed and the grout has sufficiently cured, all temporary support for the jacket shall be removed.

The exposed epoxy grout at the top of each encapsulation shall be finished with the marine epoxy paste using the method shown in the approved shop drawings.

Measurement and Payment

Pile Encapsulation will be measured and paid for at the contract unit price bid per linear foot of encased pile and will be full compensation for removal, containment and disposal off-site of unsound concrete including the cost of materials, labor, tools, equipment and incidentals necessary to accomplish removal; shop drawings, cleaning the pile, jacket installation, falsework; furnishing and placement of epoxy grout including pumping equipment, pollution control, and all else required to repair deteriorated piles using pile encapsulation.

Payment will be made under:

Pay Item
Pile Encapsulation

Pay Unit
Linear Feet

CLEANING AND PAINTING EXISTING STRUCTURE

(SPECIAL)

GENERAL

This work shall consist of furnishing all labor, equipment, and materials to clean and paint the structural steel of the existing bridge. Work includes: removing, containment and disposal of the existing paint system; preparation of the surfaces to be painted; applying the new paint system; and portable lighting.

The spans to be cleaned and painted consist of 2-100' and 1-120' continuous spans of 4 lines of 60" plate girders. The clear deck width is 28' and the vertical clearance is approximately 49' to normal water surface. The existing paint system has red lead primer. The approximate steel area to be painted is 22,378 square feet.

Paint on the bridge (regardless of color) contains red lead and other hazardous constituents. All cleaning and surface preparation activities must prevent dispersion of debris into the environment.

Surface area shown is approximate and may vary from the actual quantity to be painted. The Contractor is responsible for determining the actual area to be painted.

SPECIALTY ITEMS:

Work Schedule – Prior to beginning work, the Contractor shall submit his work schedule to the Engineer. Schedule shall be kept up to date, with a copy of the revised schedule being provided to the Engineer in a timely manner.

SSPC QP-2 Certification - The existing paint systems include toxic substances such as red lead oxide, which are considered hazardous if improperly removed. Only contractors who are currently SSPC QP-2, Category A certified, and have successfully¹ completed lead paint removal on similar structures within 18 months prior to this bid, may perform this work. **The apparent low bidder or sub-contractor for the apparent low bidder shall complete and submit to the Assistant State Bridge Management Engineer a "Lead Abatement Affidavit" by 12:00 noon of the third day following the opening of bids. This form may be downloaded from:**

http://www.ncdot.gov/doh/operations/dp_chief_eng/maintenance/bridge/

Failure to provide the required affidavit by 12:00 noon of the third day following the opening of bids will cause the bid to be deemed irregular and may be cause for rejection.

¹ Successfully: Lead abatement work completed in accordance with contract specifications, free of citation from safety or environmental agencies. Lead abatement work shall include but not be limited to: abrasive blasting; waste handling, storage and disposal; worker safety during lead abatement activities (fall protection, PPE, etc.); and containment. This requirement is in addition to the contractor pre-qualification requirements covered by NCDOT Std. Specification, Section 102-2.

Twelve-month Observation Period - The Contractor maintains responsibility for the coating system for a twelve (12) month observation period beginning upon the satisfactory completion of all the work required in the plans or as directed by the Engineer. The Contractor must guarantee the coating system under the payment and performance bond (refer to Article 109-10). To successfully complete the observation period, the coating system must meet the following requirements after twelve (12) months service:

- No visible rust, contamination or application defect is observed in any coated area.
- Painted surfaces have a uniform color and gloss.
- Painted surfaces have an adhesion that meets an ASTM D-3359, 3A rating.

Final acceptance is made only after the paint system meets the above requirements.

Containment Plan - No work begins until the Contractor furnishes the Engineer with a containment plan for surface preparation and coating operations and the Engineer reviews and responds in writing about the acceptability of said plan. Such plan must meet or exceed the requirements of a Class 2A containment in accordance with SSPC Guide 6. Enclosure drawings and loads supported by the structure must be prepared, signed and sealed by a Registered North Carolina Professional Engineer.

In the containment plan describe how debris are contained and collected. Describe the type of tarpaulin and bracing materials and the maximum designed wind load. Describe the dust collection system and how a negative pressure of 0.03 inches of water column is maintained inside the enclosure while blasting operations are being conducted. Describe how the airflow inside the containment structure is designed to meet all applicable OSHA Standards. Describe how water run-off from rain will be routed by or through the enclosure. Describe how wash water will be contained and paint chips separated. Describe what physical containment will be provided during painting application to protect vehicles and areas not to be painted.

Wash water Sampling and Disposal Plan - No work begins until the Contractor furnishes the Engineer with a containment plan for surface preparation and coating operations and the Engineer reviews and approves in writing said plan. All wash water shall be collected and sampled prior to disposal. Representative sampling and testing methodology shall conform to 15A NCAC 02B.0103, "Analytical Procedures". Wash water shall be tested for pollutants listed in 15A NCAC 02B.0211 (3), 15A NCAC 02T.0505 (b)(1) and 15A NCAC 2T.0905 (h) (See NCDOT Guidelines for Managing Bridge Wash Water). Depending on the test results, wash water disposal methods shall be described in the disposal plan. Wash water shall be disposed of in accordance with all current state and federal regulations.

Waste Handling of Paint and Abrasives – Use a company from the below list of approved waste management companies. Immediately after award of the contract, the Contractor arranges for waste containers, transportation and disposal of all waste. No work begins until the Contractor furnishes the Engineer with a written waste disposal plan. Any alternative method for handling waste must be pre-approved by the Engineer.

Southern Logistics, Inc. – 312 Orvil Wright Blvd, Greensboro, NC 27409 (Ph. 336-662-0292)

A&D Environmental – 2718 Uwharrie Rd., Archdale, NC 27263 (Ph. 336-434-7750)

All removed paint shall be considered a hazardous waste. The Contractor has the option of furnishing the Engineer certified test reports showing Toxicity Characteristic Leaching Procedure (TCLP) results of the paint chips stored on site, with disposal being in accordance with “Flowchart on Lead Waste Identification and Disposal” (www.wastenotnc.org/hwhome/guidance/guidance.htm).

If the Contractor elects to have TCLP testing done, samples shall be taken from at least 10% of the barrels to be disposed of, with at least one sample being from each bridge.

Once the waste has been collected and the quantity determined, the Contractor prepares the appropriate shipping documents and manifests and presents them to the Engineer for waste shipment and disposal. The Engineer will verify the type and quantity of waste and obtain a Temporary Waste Disposal Identification Number (TWDIN) from the NC Hazardous Waste Section.

NC Hazardous Waste Section
PO Box 27687, Raleigh, NC 27611-7687
(919) 733-2178 FAX (919) 733-4810

At the time of shipping the Engineer will sign, date and add the TWDIN in the appropriate section on the manifest. The cost for waste disposal (including any lab fees) is included in the bid price for this contract. Note NC Hazardous Waste Management Rules (15A NCAC 13A) for more information.

Equipment Mobilization - The equipment used in any travel lanes and paved shoulder must be mobile equipment on wheels that has the ability to move on/off the roadway in less than 30 minutes. All work conducted in travel lanes must be from truck or trailer supported platforms and all equipment must be self propelled or attached to a tow vehicle at all times.

SUBLETTING OF CONTRACT:

Only contractors certified to meet SSPC QP-2, Category A, and have successfully completed lead paint removal on similar structures within 18 months prior to this bid are qualified for this work. Work is only sublet by approval of the Engineer.

SPECIFICATIONS:

The North Carolina Department of Transportation (NCDOT) Standard Specifications for Roads and Structures dated January 1, 2006, together with these Special Provisions apply to this project. Surface preparation and painting are performed in accordance with Section 442 except where otherwise noted in these Special Provisions. The Paint materials must meet the applicable materials specifications under Section 1080. Materials approvals are in accordance with 4.0 Materials of this Special Provision.

1.0 PREPARATION OF SURFACES:

- 1.1 Power washing with low pressure water – Before any other surface preparation are conducted, all surfaces shall be power washed to remove dust, salts, and other contaminants.
- 1.2 Blasting is done with recyclable steel grit meeting the requirements of Section 1080-15. The profile must be between 1.0 and 3.0 mils when measured on a smooth steel surface.
- 1.3 Before the contractor departs from the work site at the end of the work day, all debris generated during surface preparation are collected in approved containers.
- 1.4 The Contractor cleans a two square foot area at each structure to demonstrate the specified finish and the inspector preserves this area by covering it with tape, plastic or some other suitable means so that it can be retained as a site standard.
- 1.5 Any area of corroded steel (steel which has lost more than 50% of its original thickness) must not be painted until the Engineer observes its condition.
- 1.6 All parts of the bridges not to be painted, and the travelling public, shall be protected from overspray.
- 1.7 Minimum surface chloride levels for painting are 7 PPM or below.

2.0 PAINTING OF STEEL:

Paint System 1, as specified in these special provisions and Section 442 of NCDOT's Standard Specifications, is to be used for this work, with the following exception. **For this project, the IOZ primer shall be replaced with an approved Organic Zinc Primer (See section 3.0 Materials).** The top coats shall remain in accordance with Section 442.

Any area where newly applied paint fails to meet the specifications must be repaired or replaced by the Contractor. The Engineer approves all repair processes before the repair is made. Repaired areas must meet the specifications. The Contractor applies an additional finish coat of paint to areas where the tape adhesion test is conducted.

Do not apply any coating below 40 F or when a temperature of the air, surface, substrate or material is 40 F or below is predicted during the drying and curing period of the paint. Do not apply any coating above or below the manufacturers recommended application temperatures or during a period when an ambient temperature outside the recommended range is predicted during the drying and curing period of the paint. During adverse weather, use enclosures that control atmospheric conditions artificially inside within limits suitable for painting during the painting operation and until each coat of paint is cured or until weather conditions permit its exposure in the open.

Should the contractor elect to apply Organic Zinc Primer at or below 50 F the recoat window shall be a minimum of 24 hours or as necessary for the solvent to fully evaporate from the coating.

No application of acrylic coats (intermediate, stripe or top) shall be applied when the air or substrate is below 50 F.

3.0 MATERIALS:

All **Organic Zinc-Rich** coatings submitted for use shall be evaluated for performance through the National Transportation Product Evaluation program (NTPEP) for Structural Steel Coatings as part of a Coating System that appears on one of the North East Protective Coatings Committee's (NEPCOAT) Qualified Products Lists. Submission of products through AASHTO/NTPEP is a continuous process and manufacturers may submit systems at any time. Prior to the start of work, a 1 quart unmixed sample kit (including the zinc dust) of the Organic Zinc Primer shall be sent to the Materials and Tests Unit for verification testing.

Only paint suppliers that have a NCDOT qualified inorganic zinc primer may furnish paints for this project. Choose a pre-qualified paint supplier from the list at this web address:
<http://www.ncdot.org/doh/operations/materials/chemical/aproducts.html>.

Only companies with a "4" listed under NCDOT Paints Furnished have approved inorganic Zinc Primers. All paints applied to a structure must be from the same supplier. Before any paints are applied the Contractor provides the Engineer a manufacturer's certification that each batch of paint meets the requirements of the applicable Section 1080 of NCDOT's Standard Specifications.

The inspector randomly collects a one quart sample of each paint product used on the project. Additional samples may be collected as needed to verify compliance to the specifications.

4.0 INSPECTION:

Quality Assurance Inspection - The Contractor furnishes all necessary apparatus such as ladders, scaffolds and platforms as required for the inspector to have reasonable and safe access to all parts of the work. The contractor illuminates the surfaces to be inspected to a minimum of 50-foot candles of light.

Contractor must insure that chloride levels on the surfaces prior to each coat of paint are below 7 PPM using an acceptable sample method in accordance with SSPC Guide 15. The frequency of testing shall be 2 tests per span.

If the Contractor elects to use an approved organic zinc rich primer and is approved in accordance with "3.0 Materials" of this specification, verification of the cure of organic zinc rich primer shall be tested by the following:

ASTM D 3363- 2H
ASTM D 4541- 400 PSI

NCDOT reserves the right for ongoing QA (Quality Assurance) inspection to include but not limited to surface contamination testing, adhesion pull testing and DFT readings as necessary to assure quality.

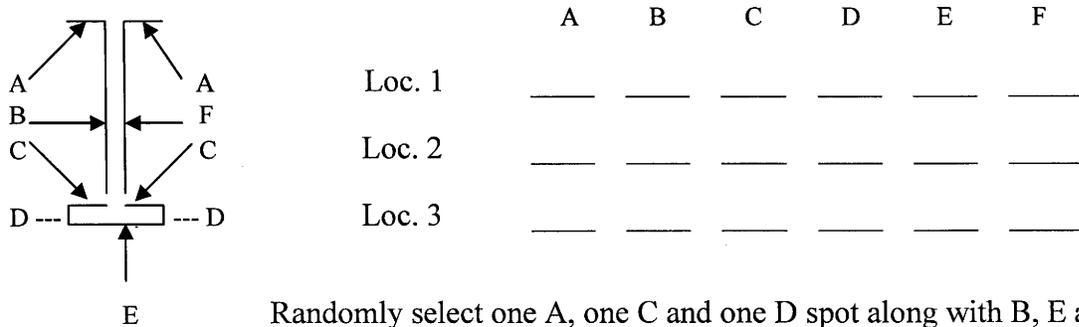
The contractor informs the Engineer of all scheduled and unannounced inspections from SSPC, OSHA, EPA and/or others that come on site.

Inspection Instruments - The Contractor furnishes at least the following calibrated instruments at site and conducts the quality control testing:

- Sling Psychrometer - ASTM E-337 – bulb type
- Surface Temperature Thermometer
- Wind Speed Indicator
- Tape Profile Tester – ASTM D-4417 Method C
- Surface Condition Standards – SSPC VIS-1 and VIS-3
- Wet Film Thickness Gage – ASTM D-4414
- Dry Film Thickness Gage – SSPC-PA2 Modified
- Solvent Rub Test Kit – ASTM D-4752
- Adhesion Test Kit – ASTM D-3359
- Elcometer and dollies
- Surface Contamination Analysis Kit or (Chloride Level Test Kit)

The contractor maintains a daily quality control record in accordance with Section 442-12 and such records must be available at the job site for review by the inspector and be submitted to the Engineer as directed. In addition to the information required on M&T-610, the Contractor shall submit all DFT readings as required on M&T611.

A. The dry film thickness is measured at each spot as indicated on the attached diagram at no less than three random locations along each girder in each span. Also dry film thickness is measured at no less than six random spots per span on diaphragms/“K” frames. Each spot is an average of three to five readings in accordance with SSPC PA-2.



B. Two random adhesion tests per span are conducted on interior surfaces after the paint has been properly cured, and will be touched up by the Contractor. One random Cut Tape adhesion test per span is conducted on interior surface after the finish coat is cured, and will be touched up by the Contractor.

5.0 SAFETY AND ENVIRONMENTAL COMPLIANCE PLANS:

Personnel access boundaries are delineated for each work site using signs, tape, cones or other approved means. Submit copies of safety and environmental compliance plans that comply with SSPC QP-2 Certification requirements.

6.0 ENVIRONMENTAL MONITORING:

Comply with Section 442–13(B) of NCDOT’s Standard Specifications.

A “Competent Person²” is on site during all surface preparation activities and monitors the effectiveness of containment and dust collection systems. Any visible emissions outside the containment enclosure or pump monitoring results exceeding the level of 30 µg/m³ TWA is justification to suspend the work. Before any work begins the Contractor provides a written summary of the responsible person’s safety training.

7.0 HEALTH AND SAFETY RESPONSIBILITY:

Comply with Section 442-13(C) of NCDOT’s Standard Specifications. Insure employee blood sampling test results are less than 50 micrograms per deciliter. Remove employees with a blood sampling test of 50 or more micrograms per deciliter from work activities involving any lead exposure.

An employee who has been removed with a blood level of 50 micrograms per deciliter or more shall have two consecutive blood sampling tests indicating that the employee’s blood lead level is at or below 40 micrograms per deciliter before returning to work activities involving any lead exposure.

8.0 STORAGE OF PAINT AND EQUIPMENT:

The Prime Contractor provides a location for materials, equipment and waste storage. Tarpaulins are spread over all pavements and surfaces underneath equipment utilized for abrasive recycling and other lead handling equipment or containers.

9.0 UTILITIES:

The Contractor protects all utility lines or mains which may be supported on, under, or adjacent to bridge work sites from damage and paint over-spray.

² **Competent Person** as defined in OSHA 29 CFR 1926.62 is one who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who have authorization to take prompt corrective measures to eliminate them.

10.0 PAYMENT:

The cost of inspection, surface preparation and repainting the existing structure is included in the lump sum price bid for *Cleaning and Painting Existing Structure*. This price is full compensation for furnishing all inspection equipment, all paint, cleaning abrasives, cleaning solvents and all other materials; preparing and cleaning surfaces to be painted; applying paint in the field; protecting work, traffic and property; and furnishing blast cleaning equipment, paint spraying equipment, brushes, rollers and any other hand or power tools and any other equipment.

Pollution Control will be paid for at the contract lump sum price which price will be full compensation for all collection, handling and disposal of debris and wash water, all personal protective equipment, and all personal hygiene requirements, and all equipment, material and labor necessary to fully contain the blast debris; daily collection of the blast debris into specified containers; and any measures necessary to ensure conformance to all safety and environments regulations as directed by the Engineer.

Payment will be made under:

Pay Item	Pay Unit
Cleaning and Painting Existing Structure	Lump Sum
Pollution Control	Lump Sum

MANAGING BRIDGE WASH WATER

1.0 Description

Collect and properly dispose of Bridge Wash Water from bridge decks.

2.0 Construction Methods

(A) Prepare a written Bridge Wash Water management plan in accordance with the Guidelines for Managing Bridge Wash 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 bridge cleaning operation.

(B) Prior to final payment, submit a paper copy of all completed records pertaining to disposal of Bridge Wash Water.

3.0 Measurement and Payment

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