STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH, N.C.

PROPOSAL

INCLUDES ADDENDUM No. 2 DATED 03-14-2017

INCLUDES ADDENDUM No. 1 DATED 02-24-2017

DATE AND TIME OF BID OPENING: **MARCH 21, 2017 AT 2:00 PM**

CONTRACT ID	C203930
WBS	46479.3.1

FEDERAL-AID NO.	STATE FUNDED
COUNTY	CURRITUCK, DARE
T.I.P. NO.	B-5937
MILES	2.830
ROUTE NO.	US 158
LOCATION	BRIDGE #16 OVER CURRITUCK SOUND ON US-158 EBL.

TYPE OF WORK BRIDGE REHABILITATION

NOTICE:

ALL BIDDERS SHALL COMPLY WITH ALL APPLICABLE LAWS REGULATING THE PRACTICE OF GENERAL CONTRACTING AS CONTAINED IN CHAPTER 87 OF THE GENERAL STATUTES OF NORTH CAROLINA WHICH REQUIRES THE BIDDER TO BE LICENSED BY THE N.C. LICENSING BOARD FOR CONTRACTORS WHEN BIDDING ON ANY NON-FEDERAL AID PROJECT WHERE THE BID IS $30,000 OR MORE, EXCEPT FOR CERTAIN SPECIALTY WORK AS DETERMINED BY THE LICENSING BOARD. BIDDERS SHALL ALSO COMPLY WITH ALL OTHER APPLICABLE LAWS REGULATING THE PRACTICES OF ELECTRICAL, PLUMBING, HEATING AND AIR CONDITIONING AND REFRIGERATION CONTRACTING AS CONTAINED IN CHAPTER 87 OF THE GENERAL STATUTES OF NORTH CAROLINA. NOTWITHSTANDING THESE LIMITATIONS ON BIDDING, THE BIDDER WHO IS AWARDED ANY FEDERAL - AID FUNDED PROJECT SHALL COMPLY WITH CHAPTER 87 OF THE GENERAL STATUTES OF NORTH CAROLINA FOR LICENSING REQUIREMENTS WITHIN 60 CALENDAR DAYS OF BID OPENING.

BIDS WILL BE RECEIVED AS SHOWN BELOW:

THIS IS A ROADWAY & STRUCTURE PROPOSAL

5% BID BOND OR BID DEPOSIT REQUIRED

_____

PROPOSAL FOR THE CONSTRUCTION OF

CONTRACT No. C203930 IN CURRITUCK AND DARE COUNTIES, NORTH CAROLINA

Date_____ 20_____

DEPARTMENT OF TRANSPORTATION,

RALEIGH, NORTH CAROLINA

The Bidder has carefully examined the location of the proposed work to be known as Contract No. **C203930**; has carefully examined the plans and specifications, which are acknowledged to be part of the proposal, the special provisions, the proposal, the form of contract, and the forms of contract payment bond and contract performance bond; and thoroughly understands the stipulations, requirements and provisions. The undersigned bidder agrees to be bound upon his execution of the bid and subsequent award to him by the Board of Transportation in accordance with this proposal to provide the necessary contract payment bond and contract performance bond within fourteen days after the written notice of award is received by him. The undersigned Bidder further agrees to provide all necessary machinery, tools, labor, and other means of construction; and to do all the work and to furnish all materials, except as otherwise noted, necessary to perform and complete the said contract in accordance with *the 2012 Standard Specifications for Roads and Structures* by the dates(s) specified in the Project Special Provisions and in accordance with the requirements of the Engineer, and at the unit or lump sum prices, as the case may be, for the various items given on the sheets contained herein.

The Bidder shall provide and furnish all the materials, machinery, implements, appliances and tools, and perform the work and required labor to construct and complete State Highway Contract No. **C203930** in **Currituck and Dare Counties**, for the unit or lump sum prices, as the case may be, bid by the Bidder in his bid and according to the proposal, plans, and specifications prepared by said Department, which proposal, plans, and specifications show the details covering this project, and hereby become a part of this contract.

The published volume entitled *North Carolina Department of Transportation, Raleigh, Standard Specifications for Roads and Structures, January 2012* with all amendments and supplements thereto, is by reference incorporated into and made a part of this contract; that, except as herein modified, all the construction and work included in this contract is to be done in accordance with the specifications contained in said volume, and amendments and supplements thereto, under the direction of the Engineer.

If the proposal is accepted and the award is made, the contract is valid only when signed either by the Contract Officer or such other person as may be designated by the Secretary to sign for the Department of Transportation. The conditions and provisions herein cannot be changed except over the signature of the said Contract Officer.

The quantities shown in the itemized proposal for the project are considered to be approximate only and are given as the basis for comparison of bids. The Department of Transportation may increase or decrease the quantity of any item or portion of the work as may be deemed necessary or expedient.

An increase or decrease in the quantity of an item will not be regarded as sufficient ground for an increase or decrease in the unit prices, nor in the time allowed for the completion of the work, except as provided for the contract.

Accompanying this bid is a bid bond secured by a corporate surety, or certified check payable to the order of the Department of Transportation, for five percent of the total bid price, which deposit is to be forfeited as liquidated damages in case this bid is accepted and the Bidder shall fail to provide the required payment and performance bonds with the Department of Transportation, under the condition of this proposal, within 14 calendar days after the written notice of award is received by him, as provided in the *Standard Specifications*; otherwise said deposit will be returned to the Bidder.

Administrator of Technical Services

DocuSigned by:
Rodger D. Rochelle
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3/14/2017

Proposals and Contracts Engineer

DocuSigned by:
Jonathan A. Gay
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PROJECT SPECIAL PROVISIONS

GENERAL

CONTRACT TIME AND LIQUIDATED DAMAGES:

(7-1-95) (Rev. 12-18-07) 108 SP1 G10 A

The date of availability for this contract is **May 1, 2017**.

The completion date for this contract is **November 1, 2019**.

Except where otherwise provided by the contract, observation periods required by the contract will not be a part of the work to be completed by the completion date and/or intermediate contract times stated in the contract. The acceptable completion of the observation periods that extend beyond the final completion date shall be a part of the work covered by the performance and payment bonds.

The liquidated damages for this contract are **Two Thousand Dollars ($ 2,000.00)** per calendar day.

INTERMEDIATE CONTRACT TIME NUMBER 1 AND LIQUIDATED DAMAGES:

(2-20-07) 108 SP1 G14 A

The Contractor shall complete the required work of installing, maintaining, and removing the traffic control devices for lane closures and restoring traffic to the existing traffic pattern. The Contractor shall not close or narrow a lane of traffic on **US 158** during the following time restrictions:

DAY AND TIME RESTRICTIONS

Monday thru Sunday
7:00 a.m. to 7:00 p.m.

In addition, the Contractor shall not close or narrow a lane of traffic on **US 158**, detain and/or alter the traffic flow on or during holidays, holiday weekends, special events, or any other time when traffic is unusually heavy, including the following schedules:

HOLIDAY AND HOLIDAY WEEKEND LANE CLOSURE RESTRICTIONS

1. For **unexpected occurrence** that creates unusually high traffic volumes, as directed by the Engineer.

2. For **New Year's Day**, between the hours of **7:00 a.m.** December 31st and **7:00 p.m.** January 2nd. If New Year's Day is on a Friday, Saturday, Sunday or Monday, then until **7:00 p.m.** the following Tuesday.

3. For **Easter**, between the hours of **7:00 a.m.** Thursday and **7:00 p.m.** Monday.

4. For **Memorial Day**, between the hours of **7:00 a.m.** Friday and **7:00 p.m.** Tuesday.

5. For **Independence Day**, between the hours of **7:00 a.m.** the day before Independence Day and **7:00 p.m.** the day after Independence Day.

   If **Independence Day** is on a Friday, Saturday, Sunday or Monday, then between the hours of **7:00 a.m.** the Thursday before Independence Day and **7:00 p.m.** the Tuesday after Independence Day.

6. For **Labor Day**, between the hours of **7:00 a.m.** Friday and **7:00 p.m.** Tuesday.

7. For **Thanksgiving Day**, between the hours of **7:00 a.m.** Tuesday and **7:00 p.m.** Monday.

8. For **Christmas**, between the hours of **7:00 a.m.** the Friday before the week of Christmas Day and **7:00 p.m.** the following Tuesday after the week of Christmas Day.

Holidays and holiday weekends shall include New Year's, Easter, Memorial Day, Independence Day, Labor Day, Thanksgiving, and Christmas. The Contractor shall schedule his work so that lane closures will not be required during these periods, unless otherwise directed by the Engineer.

The time of availability for this intermediate contract work shall be the time the Contractor begins to install all traffic control devices for lane closures according to the time restrictions listed herein.

The completion time for this intermediate contract work shall be the time the Contractor is required to complete the removal of all traffic control devices for lane closures according to the time restrictions stated above and place traffic in the existing traffic pattern.

The Day and Time Restrictions of this Intermediate Contract Time does <u>not</u> apply during Intermediate Contract Time #2; however, Holiday and Holiday Weekend Lane Closure Restrictions do apply throughout the entire duration of this Contract.

The liquidated damages are **Five Hundred Dollars** ($ **500.00**) per fifteen **(15)** minute time period.

<u>INTERMEDIATE CONTRACT TIME NUMBER 2 AND LIQUIDATED DAMAGES:</u>

The Contractor shall complete the work required of **Step #3 thru Step #7** as shown on Sheet **TMP-2** and shall place and maintain traffic on same.

The date of availability for this intermediate contract time **will be either October 2, 2017 or October 1, 2018, at the Contractor's discretion**.

The completion date for this intermediate contract time is the date which is **Two Hundred Twenty Five (225)** consecutive calendar days after and including the date of availability.

The liquidated damages are **Five Thousand Dollars ($ 5,000.00)** per calendar day. At the preconstruction conference the Contractor shall declare his expected date for beginning the work required of this intermediate contract time. Should the Contractor desire to revise this date after the preconstruction conference, he shall notify the Engineer in writing at least thirty (30) days prior to the revised date.

MANDATORY PRE-BID CONFERENCE (Prequalifying To Bid):

(7-18-06) (Rev. 3-25-13) SPI 1-14

In order for all prospective bidders to have an extensive knowledge of the project, all prospective bidders shall attend a mandatory pre-bid conference on **Tuesday, March 7th, 2017 at 10:00 A.M.** at:

Structures Conference Room C (near door A4)
Century Center Building A
1000 Birch Ridge Drive
Raleigh, NC 27610
(919)707-6900

The pre-bid conference will include a thorough discussion of the plans, contract pay items, special provisions, etc.

Only bidders who have attended and properly registered at the above scheduled pre-bid conference and who have met all other prequalification requirements will be considered prequalified to bid on this project. A bid received from a bidder who has not attended and properly registered at the above scheduled pre-bid conference will not be accepted and considered for award.

Attendance at the pre-bid conference will not meet the requirements of proper registration unless the individual attending has registered at the pre-bid conference in accordance with the following:

(A) The individual has signed his name on the official roster no later than thirty (30) minutes after the above noted time for the beginning of the conference.

(B) The individual has written in the name and address of the company he or she represents.

(C) Only one company has been shown as being represented by the individual attending.

(D) The individual attending is an officer or permanent employee of the company they are representing.

Attendance at any prior pre-bid conference will not meet the requirement of this provision.

MAJOR CONTRACT ITEMS:

(2-19-02) 104 SP1 G28

The following listed items are the major contract items for this contract (see Article 104-5 of the *2012 Standard Specifications*):

Line #	Description
34	Cathodic Protection Integral Pile Jacket (Non Structural), 16" To 30"
40	PPC Materials
47	Placing And Finishing PPC Overlay

SPECIALTY ITEMS:

(7-1-95)(Rev. 1-17-12) 108-6 SP1 G37

Items listed below will be the specialty items for this contract (see Article 108-6 of the *2012 Standard Specifications*).

Line #	Description
15-18, 21	Long-Life Pavement Markings
19-20	Removable Tape
24	Permanent Pavement Markers

FUEL PRICE ADJUSTMENT:

(11-15-05) (Rev. 2-18-14) 109-8 SP1 G43

Revise the *2012 Standard Specifications* as follows:

Page 1-83, Article 109-8, Fuel Price Adjustments, add the following:

The base index price for DIESEL #2 FUEL is **$ 1.6906** per gallon. Where any of the following are included as pay items in the contract, they will be eligible for fuel price adjustment.

The pay items and the fuel factor used in calculating adjustments to be made will be as follows:

Description	Units	Fuel Usage Factor Diesel
Unclassified Excavation	Gal/CY	0.29
Borrow Excavation	Gal/CY	0.29
Class IV Subgrade Stabilization	Gal/Ton	0.55
Aggregate Base Course	Gal/Ton	0.55
Sub-Ballast	Gal/Ton	0.55
Asphalt Concrete Base Course, Type ____	Gal/Ton	2.90
Asphalt Concrete Intermediate Course, Type ____	Gal/Ton	2.90
Asphalt Concrete Surface Course, Type ____	Gal/Ton	2.90
Open-Graded Asphalt Friction Course	Gal/Ton	2.90
Permeable Asphalt Drainage Course, Type ____	Gal/Ton	2.90
Sand Asphalt Surface Course, Type ____	Gal/Ton	2.90
Aggregate for Cement Treated Base Course	Gal/Ton	0.55

Portland Cement for Cement Treated Base Course	Gal/Ton	0.55
__" Portland Cement Concrete Pavement	Gal/SY	0.245
Concrete Shoulders Adjacent to __" Pavement	Gal/SY	0.245

SCHEDULE OF ESTIMATED COMPLETION PROGRESS:

(7-15-08) (Rev. 5-17-16) 108-2 SP1 G58

The Contractor's attention is directed to the Standard Special Provision entitled *Availability of Funds Termination of Contracts* included elsewhere in this proposal. The Department of Transportation's schedule of estimated completion progress for this project as required by that Standard Special Provision is as follows:

Fiscal Year		Progress (% of Dollar Value)
2017	(7/01/16 - 6/30/17)	**10**% of Total Amount Bid
2018	(7/01/17 - 6/30/18)	**51**% of Total Amount Bid
2019	(7/01/18 - 6/30/19)	**32**% of Total Amount Bid
2020	(7/01/19 - 6/30/20)	**7**% of Total Amount Bid

The Contractor shall also furnish his own progress schedule in accordance with Article 108-2 of the *2012 Standard Specifications*. Any acceleration of the progress as shown by the Contractor's progress schedule over the progress as shown above shall be subject to the approval of the Engineer.

MINORITY BUSINESS ENTERPRISE AND WOMEN BUSINESS ENTERPRISE:

(10-16-07)(Rev. 1-17-17) 102-15(J) SP1 G66

Description

The purpose of this Special Provision is to carry out the North Carolina Department of Transportation's policy of ensuring nondiscrimination in the award and administration of contracts financed in whole or in part with State funds.

Definitions

Additional MBE/WBE Subcontractors - Any MBE/WBE submitted at the time of bid that will not be used to meet either the MBE or WBE goal. No submittal of a Letter of Intent is required, unless the additional participation is used for banking purposes.

Committed MBE/WBE Subcontractor - Any MBE/WBE submitted at the time of bid that is being used to meet either the MBE or WBE goal by submission of a Letter of Intent. Or any MBE or WBE used as a replacement for a previously committed MBE or WBE firm.

Contract Goals Requirement - The approved MBE and WBE participation at time of award, but not greater than the advertised contract goals for each.

Goal Confirmation Letter - Written documentation from the Department to the bidder confirming the Contractor's approved, committed MBE and WBE participation along with a listing of the committed MBE and WBE firms.

Manufacturer - A firm that operates or maintains a factory or establishment that produces on the premises, the materials or supplies obtained by the Contractor.

MBE Goal - A portion of the total contract, expressed as a percentage, that is to be performed by committed MBE subcontractor(s).

Minority Business Enterprise (MBE) - A firm certified as a Disadvantaged Minority-Owned Business Enterprise through the North Carolina Unified Certification Program.

Regular Dealer - A firm that owns, operates, or maintains a store, warehouse, or other establishment in which the materials or supplies required for the performance of the contract are bought, kept in stock, and regularly sold to the public in the usual course of business. A regular dealer engages in, as its principal business and in its own name, the purchase and sale or lease of the products in question. A regular dealer in such bulk items as steel, cement, gravel, stone, and petroleum products need not keep such products in stock, if it owns and operates distribution equipment for the products. Brokers and packagers are not regarded as manufacturers or regular dealers within the meaning of this section.

North Carolina Unified Certification Program (NCUCP) - A program that provides comprehensive services and information to applicants for MBE/WBE certification. The MBE/WBE program follows the same regulations as the federal Disadvantaged Business Enterprise (DBE) program in accordance with 49 CFR Part 26.

United States Department of Transportation (USDOT) - Federal agency responsible for issuing regulations (49 CFR Part 26) and official guidance for the DBE program.

WBE Goal - A portion of the total contract, expressed as a percentage, that is to be performed by committed WBE subcontractor(s).

Women Business Enterprise (WBE) - A firm certified as a Disadvantaged Women-Owned Business Enterprise through the North Carolina Unified Certification Program.

Forms and Websites Referenced in this Provision

Payment Tracking System - On-line system in which the Contractor enters the payments made to MBE and WBE subcontractors who have performed work on the project. https://apps.dot.state.nc.us/Vendor/PaymentTracking/

DBE-IS *Subcontractor Payment Information* - Form for reporting the payments made to all MBE/WBE firms working on the project. This form is for paper bid projects only. https://connect.ncdot.gov/business/Turnpike/Documents/Form%20DBE-IS%20Subcontractor%20Payment%20Information.pdf

RF-1 *MBE/WBE Replacement Request Form* - Form for replacing a committed MBE or WBE.

http://connect.ncdot.gov/projects/construction/Construction%20Forms/DBE%20MBE%20WBE%20Replacement%20Request%20Form.pdf

SAF *Subcontract Approval Form* - Form required for approval to sublet the contract.
http://connect.ncdot.gov/projects/construction/Construction%20Forms/Subcontract%20Approval%20Form%20Rev.%202012.zip

JC-1 *Joint Check Notification Form* - Form and procedures for joint check notification. The form acts as a written joint check agreement among the parties providing full and prompt disclosure of the expected use of joint checks.
http://connect.ncdot.gov/projects/construction/Construction%20Forms/Joint%20Check%20Notification%20Form.pdf

Letter of Intent - Form signed by the Contractor and the MBE/WBE subcontractor, manufacturer or regular dealer that affirms that a portion of said contract is going to be performed by the signed MBE/WBE for the amount listed at the time of bid.
http://connect.ncdot.gov/letting/LetCentral/Letter%20of%20Intent%20to%20Perform%20as%20a%20Subcontractor.pdf

Listing of MBE and WBE Subcontractors Form - Form for entering MBE/WBE subcontractors on a project that will meet this MBE and WBE goals. This form is for paper bids only.
http://connect.ncdot.gov/municipalities/Bid%20Proposals%20for%20LGA%20Content/09%20MBE-WBE%20Subcontractors%20(State).docx

Subcontractor Quote Comparison Sheet - Spreadsheet for showing all subcontractor quotes in the work areas where MBEs and WBEs quoted on the project. This sheet is submitted with good faith effort packages.
http://connect.ncdot.gov/business/SmallBusiness/Documents/DBE%20Subcontractor%20Quote%20Comparison%20Example.xls

MBE and WBE Goal

The following goals for participation by Minority Business Enterprises and Women Business Enterprises are established for this contract:

(A) Minority Business Enterprises **0.0 %**

(1) *If the MBE goal is more than zero,* the Contractor shall exercise all necessary and reasonable steps to ensure that MBEs participate in at least the percent of the contract as set forth above as the MBE goal.

(2) *If the MBE goal is zero,* the Contractor shall make an effort to recruit and use MBEs during the performance of the contract. Any MBE participation obtained shall be reported to the Department.

(B) Women Business Enterprises **1.0 %**

(1) *If the WBE goal is more than zero,* the Contractor shall exercise all necessary and reasonable steps to ensure that WBEs participate in at least the percent of the contract as set forth above as the WBE goal.

(2) *If the WBE goal is zero,* the Contractor shall make an effort to recruit and use WBEs during the performance of the contract. Any WBE participation obtained shall be reported to the Department.

Directory of Transportation Firms (Directory)

Real-time information is available about firms doing business with the Department and firms that are certified through NCUCP in the Directory of Transportation Firms. Only firms identified in the Directory as MBE and WBE certified shall be used to meet the MBE and WBE goals respectively. The Directory can be found at the following link. https:// www.ebs.nc.gov/VendorDirectory/default.html

The listing of an individual firm in the directory shall not be construed as an endorsement of the firm's capability to perform certain work.

Listing of MBE/WBE Subcontractors

At the time of bid, bidders shall submit <u>all</u> MBE and WBE participation that they anticipate to use during the life of the contract. Only those identified to meet the MBE goal and the WBE goal will be considered committed, even though the listing shall include both committed MBE/WBE subcontractors and additional MBE/WBE subcontractors. Any additional MBE/WBE subcontractor participation above the goal for which letters of intent are received will follow the banking guidelines found elsewhere in this provision. All other additional MBE/WBE subcontractor participation submitted at the time of bid will be used toward the Department's overall race-neutral goals. Only those firms with current MBE and WBE certification at the time of bid opening will be acceptable for listing in the bidder's submittal of MBE and WBE participation. The Contractor shall indicate the following required information:

(A) Electronic Bids

Bidders shall submit a listing of MBE and WBE participation in the appropriate section of Expedite, the bidding software of Bid Express®.

(1) Submit the names and addresses of MBE and WBE firms identified to participate in the contract. If the bidder uses the updated listing of MBE and WBE firms shown in Expedite, the bidder may use the dropdown menu to access the name and address of the firms.

(2) Submit the contract line numbers of work to be performed by each MBE and WBE firm. When no figures or firms are entered, the bidder will be considered to have no MBE or WBE participation.

(3) The bidder shall be responsible for ensuring that the MBE and WBE are certified at the time of bid by checking the Directory of Transportation Firms. If the firm is not certified at the time of the bid-letting, that MBE's or WBE's participation will not count towards achieving either the MBE or WBE goal.

(B) Paper Bids

(1) *If either the MBE or WBE goal is more than zero,*

(a) Bidders, at the time the bid proposal is submitted, shall submit a listing of MBE/WBE participation, including the names and addresses on *Listing of MBE and WBE Subcontractors* contained elsewhere in the contract documents in order for the bid to be considered responsive. Bidders shall indicate the total dollar value of the MBE and WBE participation for the contract.

(b) If bidders have no MBE or WBE participation, they shall indicate this on the *Listing of MBE and WBE Subcontractors* by entering the word "None" or the number "0." This form shall be completed in its entirety. **Blank forms will not be deemed to represent zero participation.** Bids submitted that do not have MBE and WBE participation indicated on the appropriate form will not be read publicly during the opening of bids. The Department will not consider these bids for award and the proposal will be rejected.

(c) The bidder shall be responsible for ensuring that the MBE/WBE is certified at the time of bid by checking the Directory of Transportation Firms. If the firm is not certified at the time of the bid-letting, that MBE's or WBE's participation will not count towards achieving the corresponding goal.

(2) *If either the MBE or WBE goal is zero,* entries on the *Listing of MBE and WBE Subcontractors* are not required for the zero goal, however any MBE or WBE participation that is achieved during the project shall be reported in accordance with requirements contained elsewhere in the special provision.

MBE or WBE Prime Contractor

When a certified MBE or WBE firm bids on a contract that contains MBE and WBE goals, the firm is responsible for meeting the goals or making good faith efforts to meet the goals, just like any other bidder. In most cases, a MBE or WBE bidder on a contract will meet one of the goals by virtue of the work it performs on the contract with its own forces. However, all the work that is performed by the MBE or WBE bidder and any other similarly certified subcontractors will

count toward the goal. The MBE or WBE bidder shall list itself along with any MBE or WBE subcontractors, if any, in order to receive credit toward the goals.

For example, on a proposed contract, the WBE goal is 10%, and the MBE goal is 8%. A WBE bidder puts in a bid where they will perform 40% of the contract work and have a WBE subcontractor which will perform another 5% of the work. Together the two WBE firms submit on the *Listing of MBE and WBE Subcontractors* a value of 45% of the contract which fulfills the WBE goal. The 8% MBE goal shall be obtained through MBE participation with MBE certified subcontractors or documented through a good faith effort. It should be noted that you cannot combine the two goals to meet an overall value. The two goals shall remain separate.

MBE/WBE prime contractors shall also follow Sections A and B listed under *Listing of MBE and WBE Subcontractor* just as a non-MBE/WBE bidder would.

Written Documentation – Letter of Intent

The bidder shall submit written documentation for each MBE/WBE that will be used to meet the MBE and WBE goals of the contract, indicating the bidder's commitment to use the MBE/WBE in the contract. This documentation shall be submitted on the Department's form titled *Letter of Intent*.

The documentation shall be received in the office of the State Contractor Utilization Engineer or at DBE@ncdot.gov no later than 10:00 a.m. of the sixth calendar day following opening of bids, unless the sixth day falls on an official state holiday. In that situation, it is due in the office of the State Contractor Utilization Engineer no later than 10:00 a.m. on the next official state business day.

If the bidder fails to submit the Letter of Intent from each committed MBE and WBE to be used toward the MBE and WBE goals, or if the form is incomplete (i.e. both signatures are not present), the MBE/WBE participation will not count toward meeting the MBE/WBE goal. If the lack of this participation drops the commitment below either the MBE or WBE goal, the Contractor shall submit evidence of good faith efforts for the goal not met, completed in its entirety, to the State Contractor Utilization Engineer or DBE@ncdot.gov no later than 10:00 a.m. on the eighth calendar day following opening of bids, unless the eighth day falls on an official state holiday. In that situation, it is due in the office of the State Contractor Utilization Engineer no later than 10:00 a.m. on the next official state business day.

Banking MBE/WBE Credit

If the bid of the lowest responsive bidder exceeds $500,000 and if the committed MBE/WBE participation submitted by Letter of Intent exceeds the algebraic sum of the MBE or WBE goal by $1,000 or more, the excess will be placed on deposit by the Department for future use by the bidder. Separate accounts will be maintained for MBE and WBE participation and these may accumulate for a period not to exceed 24 months.

When the apparent lowest responsive bidder fails to submit sufficient participation by MBE firms to meet the contract goal, as part of the good faith effort, the Department will consider allowing the bidder to withdraw funds to meet the MBE goal as long as there are adequate funds available from the bidder's MBE bank account.

When the apparent lowest responsive bidder fails to submit sufficient participation by WBE firms to meet the contract goal, as part of the good faith effort, the Department will consider allowing the bidder to withdraw funds to meet the WBE goal as long as there are adequate funds available from the bidder's WBE bank account.

Submission of Good Faith Effort

If the bidder fails to meet or exceed either the MBE or the WBE goal, the apparent lowest responsive bidder shall submit to the Department documentation of adequate good faith efforts made to reach that specific goal(s).

A hard copy and an electronic copy of this information shall be received in the office of the State Contractor Utilization Engineer or at DBE@ncdot.gov no later than 10:00 a.m. on the sixth calendar day following opening of bids unless the sixth day falls on an official state holiday. In that situation, it would be due in the office of the State Contractor Utilization Engineer no later than 10:00 a.m. on the next official state business day. If the contractor cannot send the information electronically, then one complete set and 9 copies of this information shall be received under the same time constraints above.

Note: Where the information submitted includes repetitious solicitation letters, it will be acceptable to submit a representative letter along with a distribution list of the firms that were solicited. Documentation of MBE/WBE quotations shall be a part of the good faith effort submittal. This documentation may include written subcontractor quotations, telephone log notations of verbal quotations, or other types of quotation documentation.

Consideration of Good Faith Effort for Projects with MBE/WBE Goals More Than Zero

Adequate good faith efforts mean that the bidder took all necessary and reasonable steps to achieve the goal which, by their scope, intensity, and appropriateness, could reasonably be expected to obtain sufficient MBE/WBE participation. Adequate good faith efforts also mean that the bidder actively and aggressively sought MBE/WBE participation. Mere *pro forma* efforts are not considered good faith efforts.

The Department will consider the quality, quantity, and intensity of the different kinds of efforts a bidder has made. Listed below are examples of the types of actions a bidder will take in making a good faith effort to meet the goals and are not intended to be exclusive or exhaustive, nor is it intended to be a mandatory checklist.

(A) Soliciting through all reasonable and available means (e.g. attendance at pre-bid meetings, advertising, written notices, use of verifiable electronic means through the use of the NCDOT Directory of Transportation Firms) the interest of all certified MBEs/WBEs that

are also prequalified subcontractors. The bidder must solicit this interest within at least 10 days prior to bid opening to allow the MBEs/WBEs to respond to the solicitation. Solicitation shall provide the opportunity to MBEs/WBEs within the Division and surrounding Divisions where the project is located. The bidder must determine with certainty if the MBEs/WBEs are interested by taking appropriate steps to follow up initial solicitations.

(B) Selecting portions of the work to be performed by MBEs/WBEs in order to increase the likelihood that the MBE and WBE goals will be achieved.

(1) Where appropriate, break out contract work items into economically feasible units to facilitate MBE/WBE participation, even when the prime contractor might otherwise prefer to perform these work items with its own forces.

(2) Negotiate with subcontractors to assume part of the responsibility to meet the contract MBE/WBE goals when the work to be sublet includes potential for MBE/WBE participation (2^{nd} and 3^{rd} tier subcontractors).

(C) Providing interested certified MBEs/WBEs that are also prequalified subcontractors with adequate information about the plans, specifications, and requirements of the contract in a timely manner to assist them in responding to a solicitation.

(D) (1) Negotiating in good faith with interested MBEs/WBEs. It is the bidder's responsibility to make a portion of the work available to MBE/WBE subcontractors and suppliers and to select those portions of the work or material needs consistent with the available MBE/WBE subcontractors and suppliers, so as to facilitate MBE/WBE participation. Evidence of such negotiation includes the names, addresses, and telephone numbers of MBEs/WBEs that were considered; a description of the information provided regarding the plans and specifications for the work selected for subcontracting; and evidence as to why additional agreements could not be reached for MBEs/WBEs to perform the work.

(2) A bidder using good business judgment would consider a number of factors in negotiating with subcontractors, including MBE/WBE subcontractors, and would take a firm's price and capabilities as well as contract goals into consideration. However, the fact that there may be some additional costs involved in finding and using MBEs/WBEs is not in itself sufficient reason for a bidder's failure to meet the contract MBE or WBE goals, as long as such costs are reasonable. Also, the ability or desire of a prime contractor to perform the work of a contract with its own organization does not relieve the bidder of the responsibility to make good faith efforts. Bidding contractors are not, however, required to accept higher quotes from MBEs/WBEs if the price difference is excessive or unreasonable.

(E) Not rejecting MBEs/WBEs as being unqualified without sound reasons based on a thorough investigation of their capabilities. The bidder's standing within its industry,

membership in specific groups, organizations, or associates and political or social affiliations (for example, union vs. non-union employee status) are not legitimate causes for the rejection or non-solicitation of bids in the bidder's efforts to meet the project goal.

(F) Making efforts to assist interested MBEs/WBEs in obtaining bonding, lines of credit, or insurance as required by the recipient or bidder.

(G) Making efforts to assist interested MBEs/WBEs in obtaining necessary equipment, supplies, materials, or related assistance or services.

(H) Effectively using the services of available minority/women community organizations; minority/women contractors' groups; Federal, State, and local minority/women business assistance offices; and other organizations as allowed on a case-by-case basis to provide assistance in the recruitment and placement of MBEs/WBEs. Contact within 7 days from the bid opening the Business Opportunity and Work Force Development Unit at DBE@ncdot.gov to give notification of the bidder's inability to get MBE or WBE quotes.

(I) Any other evidence that the bidder submits which shows that the bidder has made reasonable good faith efforts to meet the MBE and WBE goal.

In addition, the Department may take into account the following:

(1) Whether the bidder's documentation reflects a clear and realistic plan for achieving the MBE and WBE goals.

(2) The bidders' past performance in meeting the MBE and WBE goals.

(3) The performance of other bidders in meeting the MBE and WBE goals. For example, when the apparent successful bidder fails to meet the goals, but others meet it, you may reasonably raise the question of whether, with additional reasonable efforts the apparent successful bidder could have met the goals. If the apparent successful bidder fails to meet the MBE and WBE goals, but meets or exceeds the average MBE and WBE participation obtained by other bidders, the Department may view this, in conjunction with other factors, as evidence of the apparent successful bidder having made a good faith effort.

If the Department does not award the contract to the apparent lowest responsive bidder, the Department reserves the right to award the contract to the next lowest responsive bidder that can satisfy to the Department that the MBE and WBE goals can be met or that an adequate good faith effort has been made to meet the MBE and WBE goals.

Non-Good Faith Appeal

The State Contractual Services Engineer will notify the contractor verbally and in writing of non-good faith. A contractor may appeal a determination of non-good faith made by the Goal Compliance Committee. If a contractor wishes to appeal the determination made by the

Committee, they shall provide written notification to the State Contractual Services Engineer or at DBE@ncdot.gov. The appeal shall be made within 2 business days of notification of the determination of non-good faith.

Counting MBE/WBE Participation Toward Meeting MBE/WBE Goals

(A) Participation

The total dollar value of the participation by a committed MBE/WBE will be counted toward the contract goal requirements. The total dollar value of participation by a committed MBE/WBE will be based upon the value of work actually performed by the MBE/WBE and the actual payments to MBE/WBE firms by the Contractor.

(B) Joint Checks

Prior notification of joint check use shall be required when counting MBE/WBE participation for services or purchases that involves the use of a joint check. Notification shall be through submission of Form JC-1 *(Joint Check Notification Form)* and the use of joint checks shall be in accordance with the Department's Joint Check Procedures.

(C) Subcontracts (Non-Trucking)

A MBE/WBE may enter into subcontracts. Work that a MBE subcontracts to another MBE firm may be counted toward the MBE contract goal requirement. The same holds for work that a WBE subcontracts to another WBE firm. Work that a MBE subcontracts to a non-MBE firm does <u>not</u> count toward the MBE contract goal requirement. Again, the same holds true for the work that a WBE subcontracts to a non-WBE firm. If a MBE or WBE contractor or subcontractor subcontracts a significantly greater portion of the work of the contract than would be expected on the basis of standard industry practices, it shall be presumed that the MBE or WBE is not performing a commercially useful function. The MBE/WBE may present evidence to rebut this presumption to the Department. The Department's decision on the rebuttal of this presumption may be subject to review by the Office of Inspector General, NCDOT.

(D) Joint Venture

When a MBE or WBE performs as a participant in a joint venture, the Contractor may count toward its contract goal requirement a portion of the total value of participation with the MBE or WBE in the joint venture, that portion of the total dollar value being a distinct clearly defined portion of work that the MBE or WBE performs with its forces.

(E) Suppliers

A contractor may count toward its MBE or WBE requirement 60 percent of its expenditures for materials and supplies required to complete the contract and obtained from a MBE or

WBE regular dealer and 100 percent of such expenditures from a MBE or WBE manufacturer.

(F) Manufacturers and Regular Dealers

A contractor may count toward its MBE or WBE requirement the following expenditures to MBE/WBE firms that are not manufacturers or regular dealers:

(1) The fees or commissions charged by a MBE/WBE firm for providing a *bona fide* service, such as professional, technical, consultant, or managerial services, or for providing bonds or insurance specifically required for the performance of a DOT-assisted contract, provided the fees or commissions are determined to be reasonable and not excessive as compared with fees and commissions customarily allowed for similar services.

(2) With respect to materials or supplies purchased from a MBE/WBE, which is neither a manufacturer nor a regular dealer, count the entire amount of fees or commissions charged for assistance in the procurement of the materials and supplies, or fees or transportation charges for the delivery of materials or supplies required on a job site (but not the cost of the materials and supplies themselves), provided the fees are determined to be reasonable and not excessive as compared with fees customarily allowed for similar services.

Commercially Useful Function

(A) MBE/WBE Utilization

The Contractor may count toward its contract goal requirement only expenditures to MBEs and WBEs that perform a commercially useful function in the work of a contract. A MBE/WBE performs a commercially useful function when it is responsible for execution of the work of the contract and is carrying out its responsibilities by actually performing, managing, and supervising the work involved. To perform a commercially useful function, the MBE/WBE shall also be responsible with respect to materials and supplies used on the contract, for negotiating price, determining quality and quantity, ordering the material and installing (where applicable) and paying for the material itself. To determine whether a MBE/WBE is performing a commercially useful function, the Department will evaluate the amount of work subcontracted, industry practices, whether the amount the firm is to be paid under the contract is commensurate with the work it is actually performing and the MBE/WBE credit claimed for its performance of the work, and any other relevant factors.

(B) MBE/WBE Utilization in Trucking

The following factors will be used to determine if a MBE or WBE trucking firm is performing a commercially useful function:

(1) The MBE/WBE shall be responsible for the management and supervision of the entire trucking operation for which it is responsible on a particular contract, and there shall not be a contrived arrangement for the purpose of meeting the MBE or WBE goal.

(2) The MBE/WBE shall itself own and operate at least one fully licensed, insured, and operational truck used on the contract.

(3) The MBE/WBE receives credit for the total value of the transportation services it provides on the contract using trucks it owns, insures, and operates using drivers it employs.

(4) The MBE may subcontract the work to another MBE firm, including an owner-operator who is certified as a MBE. The same holds true that a WBE may subcontract the work to another WBE firm, including an owner-operator who is certified as a WBE. When this occurs, the MBE or WBE who subcontracts work receives credit for the total value of the transportation services the subcontracted MBE or WBE provides on the contract. It should be noted that every effort shall be made by MBE and WBE contractors to subcontract to the same certification (i.e., MBEs to MBEs and WBEs to WBEs), in order to fulfill the goal requirement. This, however, may not always be possible due to the limitation of firms in the area. If the MBE or WBE firm shows a good faith effort has been made to reach out to similarly certified transportation service providers and there is no interest or availability, and they can get assistance from other certified providers, the Engineer will not hold the prime liable for meeting the goal.

(5) The MBE/WBE may also subcontract the work to a non-MBE/WBE firm, including from an owner-operator. The MBE/WBE who subcontracts the work to a non-MBE/WBE is entitled to credit for the total value of transportation services provided by the non-MBE/WBE subcontractor not to exceed the value of transportation services provided by MBE/WBE-owned trucks on the contract. Additional participation by non-MBE/WBE subcontractors receives credit only for the fee or commission it receives as a result of the subcontract arrangement. The value of services performed under subcontract agreements between the MBE/WBE and the Contractor will not count towards the MBE/WBE contract requirement.

(6) A MBE/WBE may lease truck(s) from an established equipment leasing business open to the general public. The lease must indicate that the MBE/WBE has exclusive use of and control over the truck. This requirement does not preclude the leased truck from working for others during the term of the lease with the consent of the MBE/WBE, so long as the lease gives the MBE/WBE absolute priority for

use of the leased truck. This type of lease may count toward the MBE/WBE's credit as long as the driver is under the MBE/WBE's payroll.

(7) Subcontracted/leased trucks shall display clearly on the dashboard the name of the MBE/WBE that they are subcontracted/leased to and their own company name if it is not identified on the truck itself. Magnetic door signs are not permitted.

MBE/WBE Replacement

When a Contractor has relied on a commitment to a MBE or WBE firm (or an approved substitute MBE or WBE firm) to meet all or part of a contract goal requirement, the contractor shall not terminate the MBE/WBE for convenience. This includes, but is not limited to, instances in which the Contractor seeks to perform the work of the terminated subcontractor with another MBE/WBE subcontractor, a non-MBE/WBE subcontractor, or with the Contractor's own forces or those of an affiliate. A MBE/WBE may only be terminated after receiving the Engineer's written approval based upon a finding of good cause for the termination. The prime contractor must give the MBE/WBE firm five (5) calendar days to respond to the prime contractor's notice of termination and advise the prime contractor and the Department of the reasons, if any, why the firm objects to the proposed termination of its subcontract and why the Department should not approve the action. All requests for replacement of a committed MBE/WBE firm shall be submitted to the Engineer for approval on Form RF-1 *(Replacement Request).* If the Contractor fails to follow this procedure, the Contractor may be disqualified from further bidding for a period of up to 6 months.

The Contractor shall comply with the following for replacement of a committed MBE/WBE:

(A) Performance Related Replacement

When a committed MBE is terminated for good cause as stated above, an additional MBE that was submitted at the time of bid may be used to fulfill the MBE commitment. The same holds true if a committed WBE is terminated for good cause, an additional WBE that was submitted at the time of bid may be used to fulfill the WBE goal. A good faith effort will only be required for removing a committed MBE/WBE if there were no additional MBEs/WBEs submitted at the time of bid to cover the same amount of work as the MBE/WBE that was terminated.

If a replacement MBE/WBE is not found that can perform at least the same amount of work as the terminated MBE/WBE, the Contractor shall submit a good faith effort documenting the steps taken. Such documentation shall include, but not be limited to, the following:

(1) Copies of written notification to MBEs/WBEs that their interest is solicited in contracting the work defaulted by the previous MBE/WBE or in subcontracting other items of work in the contract.

(2) Efforts to negotiate with MBEs/WBEs for specific subbids including, at a minimum:

(a) The names, addresses, and telephone numbers of MBEs/WBEs who were contacted.

(b) A description of the information provided to MBEs/WBEs regarding the plans and specifications for portions of the work to be performed.

(3) A list of reasons why MBE/WBE quotes were not accepted.

(4) Efforts made to assist the MBEs/WBEs contacted, if needed, in obtaining bonding or insurance required by the Contractor.

(B) Decertification Replacement

(1) When a committed MBE/WBE is decertified by the Department after the SAF (*Subcontract Approval Form*) has been received by the Department, the Department will not require the Contractor to solicit replacement MBE/WBE participation equal to the remaining work to be performed by the decertified firm. The participation equal to the remaining work performed by the decertified firm will count toward the contract goal requirement.

(2) When a committed MBE/WBE is decertified prior to the Department receiving the SAF (*Subcontract Approval Form*) for the named MBE/WBE firm, the Contractor shall take all necessary and reasonable steps to replace the MBE/WBE subcontractor with another similarly certified MBE/WBE subcontractor to perform at least the same amount of work to meet the MBE/WBE goal requirement. If a MBE/WBE firm is not found to do the same amount of work, a good faith effort must be submitted to NCDOT (see A herein for required documentation).

Changes in the Work

When the Engineer makes changes that result in the reduction or elimination of work to be performed by a committed MBE/WBE, the Contractor will not be required to seek additional participation. When the Engineer makes changes that result in additional work to be performed by a MBE/WBE based upon the Contractor's commitment, the MBE/WBE shall participate in additional work to the same extent as the MBE/WBE participated in the original contract work.

When the Engineer makes changes that result in extra work, which has more than a minimal impact on the contract amount, the Contractor shall seek additional participation by MBEs/WBEs unless otherwise approved by the Engineer.

When the Engineer makes changes that result in an alteration of plans or details of construction, and a portion or all of the work had been expected to be performed by a committed MBE/WBE, the Contractor shall seek participation by MBEs/WBEs unless otherwise approved by the Engineer.

When the Contractor requests changes in the work that result in the reduction or elimination of work that the Contractor committed to be performed by a MBE/WBE, the Contractor shall seek

additional participation by MBEs/WBEs equal to the reduced MBE/WBE participation caused by the changes.

Reports and Documentation

A SAF (*Subcontract Approval Form*) shall be submitted for all work which is to be performed by a MBE/WBE subcontractor. The Department reserves the right to require copies of actual subcontract agreements involving MBE/WBE subcontractors.

When using transportation services to meet the contract commitment, the Contractor shall submit a proposed trucking plan in addition to the SAF. The plan shall be submitted prior to beginning construction on the project. The plan shall include the names of all trucking firms proposed for use, their certification type(s), the number of trucks owned by the firm, as well as the individual truck identification numbers, and the line item(s) being performed.

Within 30 calendar days of entering into an agreement with a MBE/WBE for materials, supplies or services, not otherwise documented by the SAF as specified above, the Contractor shall furnish the Engineer a copy of the agreement. The documentation shall also indicate the percentage (60% or 100%) of expenditures claimed for MBE/WBE credit.

Reporting Minority and Women Business Enterprise Participation

The Contractor shall provide the Engineer with an accounting of payments made to all MBE and WBE firms, including material suppliers and contractors at all levels (prime, subcontractor, or second tier subcontractor). This accounting shall be furnished to the Engineer for any given month by the end of the following month. Failure to submit this information accordingly may result in the following action:

(A) Withholding of money due in the next partial pay estimate; or

(B) Removal of an approved contractor from the prequalified bidders' list or the removal of other entities from the approved subcontractors list.

While each contractor (prime, subcontractor, 2nd tier subcontractor) is responsible for accurate accounting of payments to MBEs/WBEs, it shall be the prime contractor's responsibility to report all monthly and final payment information in the correct reporting manner.

Failure on the part of the Contractor to submit the required information in the time frame specified may result in the disqualification of that contractor and any affiliate companies from further bidding until the required information is submitted.

Failure on the part of any subcontractor to submit the required information in the time frame specified may result in the disqualification of that contractor and any affiliate companies from being approved for work on future DOT projects until the required information is submitted.

Contractors reporting transportation services provided by non-MBE/WBE lessees shall evaluate the value of services provided during the month of the reporting period only.

At any time, the Engineer can request written verification of subcontractor payments.

The Contractor shall report the accounting of payments through the Department's Payment Tracking System.

Failure to Meet Contract Requirements

Failure to meet contract requirements in accordance with Subarticle 102-15(J) of the *2012 Standard Specifications* may be cause to disqualify the Contractor.

SUBSURFACE INFORMATION:

(7-1-95) 450 SP1 G112 A

There is **no** subsurface information available on this project. The Contractor shall make his own investigation of subsurface conditions.

LOCATING EXISTING UNDERGROUND UTILITIES:

(3-20-12) 105 SP1 G115

Revise the *2012 Standard Specifications* as follows:

Page 1-43, Article 105-8, line 28, after the first sentence, add the following:

Identify excavation locations by means of pre-marking with white paint, flags, or stakes or provide a specific written description of the location in the locate request.

VALUE ENGINEERING PROPOSAL:

(05-19-15) 104 SP01 G116

Revise the *2012 Standard Specifications* as follows:

Page 1-36, Subarticle 104-12(B) Evaluation of Proposals, lines 42-44, replace the fourth sentence of the second paragraph with the following:

Pending execution of a formal supplemental agreement implementing an approved VEP and transferal of final plans (hard copy and electronic) sealed by an engineer licensed in the State of North Carolina incorporating an approved VEP to the Resident Engineer and the State Value Management Engineer, the Contractor shall remain obligated to perform the work in accordance with the terms of the existing contract.

Page 1-37, Subarticle 104-12(D) Preliminary Review, lines 9-12, replace the first sentence of the first paragraph with the following:

Should the Contractor desire a preliminary review of a possible VEP, before expending considerable time and expense in full development, a copy of the Preliminary VEP shall be

submitted to the Resident Engineer and the State Value Management Engineer at ValueManagementUnit@ncdot.gov.

Page 1-37, Subarticle 104-12(E) Final Proposal, lines 22-23, replace the first sentence of the first paragraph with the following:

A copy of the Final VEP shall be submitted by the Contractor to the Resident Engineer and the State Value Management Engineer at ValueManagementUnit@ncdot.gov.

Page 1-38, Subarticle 104-12(F) Modifications, lines 2-8, replace the first paragraph with the following:

To facilitate the preparation of revisions to contract drawings, the Contractor may purchase reproducible copies of drawings for his use through the Department's Value Management Unit. The preparation of new design drawings by or for the Contractor shall be coordinated with the appropriate Design Branch through the State Value Management Engineer. The Contractor shall provide, at no charge to the Department, one set of reproducible drawings of the approved design needed to implement the VEP. Drawings (hard copy and electronic) which are sealed by an engineer licensed in the State of North Carolina shall be submitted to the State Value Management Engineer no later than ten (10) business days after acceptance of a VEP unless otherwise permitted.

Page 1-38, Subarticle 104-12(F) Modifications, line 17, add the following at the end of the third paragraph:

Supplemental agreements executed for design-bid-build contracts shall reflect any realized savings in the corresponding line items. Supplemental agreements executed for design-build contracts shall add one line item deducting the full savings from the total contract price and one line item crediting the Contractor with 50% of the total VEP savings.

Page 1-38, Subarticle 104-12(F) Modifications, lines 45-47, replace the eighth paragraph with the following:

Unless and until a supplemental agreement is executed and issued by the Department and final plans (hard copy and electronic) sealed by an engineer licensed in the State of North Carolina incorporating an approved VEP have been provided to the Resident Engineer and the State Value Management Engineer, the Contractor shall remain obligated to perform the work in accordance with the terms of the existing contract.

RESOURCE CONSERVATION AND ENV. SUSTAINABLE PRACTICES:

(5-21-13) (Rev. 5-19-15) 104-13 SP1 G118

In accordance with North Carolina Executive Order 156, NCGS 130A-309.14(3), and NCGS 136-28.8, it is the objective of the Department to aid in the reduction of materials that become a part of our solid waste stream, to divert materials from landfills, to find ways to recycle and reuse materials, to consider and minimize, where economically feasible, the environmental impacts associated with agency land use and acquisition, construction, maintenance and facility management for the benefit of the Citizens of North Carolina.

To achieve the mission of reducing environmental impacts across the state, the Department is committed to supporting the efforts to initiate, develop and use products and construction methods that incorporate the use of recycled, solid waste products and environmentally sustainable practices in accordance with Article 104-13 of the *Standard Specifications*.

Report the quantities of reused or recycled materials either incorporated in the project or diverted from landfills and any practice that minimizes the environmental impact on the project annually on the Project Construction Reuse and Recycling Reporting Form. The Project Construction Reuse and Recycling Reporting Form and a location tool for local recycling facilities are available at:
http://connect.ncdot.gov/resources/Environmental/Pages/North-Carolina-Recycling-Locations.aspx.

Submit the Project Construction Reuse and Recycling Reporting Form by August 1 annually to valuemanagementunit@ncdot.gov. For questions regarding the form or reporting, please contact the State Value Management Engineer at 919-707-4810.

DOMESTIC STEEL:

(4-16-13) 106 SP1 G120

Revise the *2012 Standard Specifications* as follows:

P**age 1-49, Subarticle 106-1(B) Domestic Steel, lines 2-7,** replace the first paragraph with the following:

All steel and iron products that are permanently incorporated into this project shall be produced in the United States except minimal amounts of foreign steel and iron products may be used provided the combined material cost of the items involved does not exceed 0.1% of the total amount bid for the entire project or $2,500, whichever is greater. If invoices showing the cost of the material are not provided, the amount of the bid item involving the foreign material will be used for calculations. This minimal amount of foreign produced steel and iron products permitted for use is not applicable to high strength fasteners. Domestically produced high strength fasteners are required.

REMOVABLE PAVEMENT MARKINGS - (Partial Payments for Materials):

(7-1-95) (Rev. 8-16-11) 1205-10 SP1 G124

When so authorized by the Engineer, partial materials payments will be made up to 95 percent of the delivered cost of pavement marking tape, provided that these materials have been delivered on or in the vicinity of the project, stored in an acceptable manner, not to exceed the shelf life recommended by the manufacturer, and further provided the documents listed in Subarticle 109-5(C) of the *2012 Standard Specifications* have been furnished to the Engineer.

The Contractor shall be responsible for the material and the satisfactory performance of the material when used in the work.

The provisions of Article 109-6 of the *2012 Standard Specifications* will not apply to removable pavement marking materials.

TWELVE MONTH GUARANTEE:

(7-15-03) 108 SP1 G145

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

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

This guarantee provision shall be invoked only for major components of work in which the Contractor would be wholly responsible for under the terms of the contract. Examples would include pavement structures, bridge components, and sign structures. This provision will not be used as a mechanism to force the Contractor to return to the project to make repairs or perform additional work that the Department would normally compensate the Contractor for. In addition, routine maintenance activities (i.e. mowing grass, debris removal, ruts in earth shoulders,) are not parts of this guarantee.

Appropriate provisions of the payment and/or performance bonds shall cover this guarantee for the project.

To ensure uniform application statewide the Division Engineer will forward details regarding the circumstances surrounding any proposed guarantee repairs to the Chief Engineer for review and approval prior to the work being performed.

OUTSOURCING OUTSIDE THE USA:

(9-21-04) (Rev. 5-16-06) SP1 G150

All work on consultant contracts, services contracts, and construction contracts shall be performed in the United States of America. No work shall be outsourced outside of the United States of America.

Outsourcing for the purpose of this provision is defined as the practice of subcontracting labor, work, services, staffing, or personnel to entities located outside of the United States.

The North Carolina Secretary of Transportation shall approve exceptions to this provision in writing.

IRAN DIVESTMENT ACT:
(5-17-16) SP01 G151

As a result of the Iran Divestment Act of 2015 (Act), Article 6E, N.C. General Statute § 147-86.55, the State Treasurer published the Final Divestment List (List) which includes the Final Divestment List-Iran, and the Parent and Subsidiary Guidance-Iran. These lists identify companies and persons engaged in investment activities in Iran and will be updated every 180 days. The List can be found at https://www.nctreasurer.com/inside-the-department/OpenGovernment/Pages/Iran-Divestment-Act-Resources.aspx

By submitting the Offer, the Contractor certifies that, as of the date of this bid, it is not on the then-current List created by the State Treasurer. The Contractor must notify the Department immediately if, at any time before the award of the contract, it is added to the List.

As an ongoing obligation, the Contractor must notify the Department immediately if, at any time during the contract term, it is added to the List. Consistent with § 147-86.59, the Contractor shall not contract with any person to perform a part of the work if, at the time the subcontract is signed, that person is on the then-current List.

During the term of the Contract, should the Department receive information that a person is in violation of the Act as stated above, the Department will offer the person an opportunity to respond and the Department will take action as appropriate and provided for by law, rule, or contract.

GIFTS FROM VENDORS AND CONTRACTORS:
(12-15-09) 107-1 SP1 G152

By Executive Order 24, issued by Governor Perdue, and *N.C.G.S.§ 133-32,* it is unlawful for any vendor or contractor (i.e. architect, bidder, contractor, construction manager, design professional, engineer, landlord, offeror, seller, subcontractor, supplier, or vendor), to make gifts or to give favors to any State employee of the Governor's Cabinet Agencies (i.e. Administration, Commerce, Correction, Crime Control and Public Safety, Cultural Resources, Environment and Natural Resources, Health and Human Services, Juvenile Justice and Delinquency Prevention, Revenue, Transportation, and the Office of the Governor). This prohibition covers those vendors and contractors who:

(A) Have a contract with a governmental agency; or
(B) Have performed under such a contract within the past year; or
(C) Anticipate bidding on such a contract in the future.

For additional information regarding the specific requirements and exemptions, vendors and contractors are encouraged to review Executive Order 24 and *N.C.G.S. § 133-32*.

Executive Order 24 also encouraged and invited other State Agencies to implement the requirements and prohibitions of the Executive Order to their agencies. Vendors and contractors should contact other State Agencies to determine if those agencies have adopted Executive Order 24.

LIABILITY INSURANCE:

(5-20-14) SP1 G160

Revise the *2012 Standard Specifications* as follows:

Page 1-60, Article 107-15 LIABILITY INSURANCE, line 16, add the following as the second sentence of the third paragraph:

Prior to beginning services, all contractors shall provide proof of coverage issued by a workers' compensation insurance carrier, or a certificate of compliance issued by the Department of Insurance for self-insured subcontractors, irrespective of whether having regularly in service fewer than three employees.

EMPLOYMENT:

(11-15-11) (Rev. 1-17-12) 108, 102 SP1 G184

Revise the *2012 Standard Specifications* as follows:

Page 1-20, Subarticle 102-15(O), delete and replace with the following:

(O) Failure to restrict a former Department employee as prohibited by Article 108-5.

Page 1-65, Article 108-5 Character of Workmen, Methods, and Equipment, line 32, delete all of line 32, the first sentence of the second paragraph and the first word of the second sentence of the second paragraph.

STATE HIGHWAY ADMINISTRATOR TITLE CHANGE:

(9-18-12) SP1 G185

Revise the *2012 Standard Specifications* as follows:

Replace all references to "State Highway Administrator" with "Chief Engineer".

SUBLETTING OF CONTRACT:

(11-18-2014) 108-6 SP1 G186

Revise the *2012 Standard Specifications* as follows:

Page 1-66, Article 108-6 Subletting of Contract, line 37, add the following as the second sentence of the first paragraph:

All requests to sublet work shall be submitted within 30 days of the date of availability or prior to expiration of 20% of the contract time, whichever date is later, unless otherwise approved by the Engineer.

Page 1-67, Article 108-6 Subletting of Contract, line 7, add the following as the second sentence of the fourth paragraph:

Purchasing materials for subcontractors is not included in the percentage of work required to be performed by the Contractor. If the Contractor sublets items of work but elects to purchase material for the subcontractor, the value of the material purchased will be included in the total dollar amount considered to have been sublet.

PROJECT SPECIAL PROVISIONS

ROADWAY

ASPHALT PAVEMENTS - SUPERPAVE:

(6-19-12) (Rev. 8-16-16) 605, 609, 610, 650 SP6 R01

Revise the *2012 Standard Specifications* as follows:

Page 6-3, Article 605-7, APPLICATION RATES AND TEMPERATURES, replace this article, including Table 605-1, with the following:

Apply tack coat uniformly across the existing surface at target application rates shown in Table 605-1.

TABLE 605-1
APPLICATION RATES FOR TACK COAT

Existing Surface	Target Rate (gal/sy)
	Emulsified Asphalt
New Asphalt	0.04 ± 0.01
Oxidized or Milled Asphalt	0.06 ± 0.01
Concrete	0.08 ± 0.01

Apply tack coat at a temperature within the ranges shown in Table 605-2. Tack coat shall not be overheated during storage, transport or at application.

TABLE 605-2
APPLICATION TEMPERATURE FOR TACK COAT

Asphalt Material	Temperature Range
Asphalt Binder, Grade PG 64-22	350 - 400°F
Emulsified Asphalt, Grade RS-1H	130 - 160°F
Emulsified Asphalt, Grade CRS-1	130 - 160°F
Emulsified Asphalt, Grade CRS-1H	130 - 160°F
Emulsified Asphalt, Grade HFMS-1	130 - 160°F
Emulsified Asphalt, Grade CRS-2	130 - 160°F

Page 6-6, Subarticle 607-5(A), Milled Asphalt Pavement, line 25, add the following to the end of the paragraph:

Areas to be paid under these items include mainline, turn lanes, shoulders, and other areas milled in conjunction with the mainline and any additional equipment necessary to remove pavement in the area of manholes, water valves, curb, gutter and other obstructions.

Page 6-6, Subarticle 607-5(C), Incidental Milling, lines 42-48, replace the paragraph with the following:

Incidental Milling to be paid will be the actual number of square yards of surface milled where the

Contractor is required to mill butt joints, irregular areas and intersections milled as a separate operation from mainline milling and re-mill areas that are not due to the Contractor's negligence whose length is less than 100 feet. Measurement will be made as provided in Subarticle 607-5(A) for each cut the Contractor is directed to perform. Where the Contractor elects to make multiple cuts to achieve the final depth, no additional measurement will be made. Compensation will be made at the contract unit price per square yard for *Incidental Milling*.

Page 6-7, Article 609-3, FIELD VERIFICATION OF MIXTURE AND JOB MIX FORMULA ADJUSTMENTS, lines 35-37, delete the second sentence of the second paragraph.

Page 6-18, Article 610-1 DESCRIPTION, lines 40-41, delete the last sentence of the last paragraph.

Page 6-19, Subarticle 610-3(A), Mix Design-General, line 5, add the following as the first paragraph:

Warm mix asphalt (WMA) is allowed for use at the Contractor's option in accordance with the NCDOT Approved Products List for WMA Technologies available at:

https://connect.ncdot.gov/resources/Materials/MaterialsResources/Warm%20Mix%20Asphalt%20Approved%20List.pdf

Page 6-20, Subarticle 610-3(C), Job Mix Formula (JMF), lines 47-48, replace the last sentence of the third paragraph with the following:

The JMF mix temperature shall be within the ranges shown in Table 610-1 unless otherwise approved.

Page 6-21, Subarticle 610-3(C) Job Mix Formula (JMF), replace Table 610-1 with the following:

TABLE 610-1
MIXING TEMPERATURE AT THE ASPHALT PLANT

Binder Grade	JMF Mix Temperature
PG 58-28; PG 64-22	250 - 290ºF
PG 70-22	275- 305ºF
PG 76-22	300- 325ºF

Page 6-21, Subarticle 610-3(C) Job Mix Formula (JMF), lines 1-2, in the first sentence of the first paragraph, delete "and compaction". Lines 4-7, delete the second paragraph and replace with the following:

When RAS is used, the JMF mix temperature shall be established at 275ºF or higher.

Page 6-22, Article 610-4, WEATHER, TEMPERATURE AND SEASONAL LIMITATIONS FOR PRODUCING AND PLACING ASPHALT MIXTURES, lines 15-17, replace the second sentence of the first paragraph with the following:

Do not place asphalt material when the air or surface temperatures, measured at the location of the paving operation away from artificial heat, do not meet Table 610-5.

Page 6-23, Article 610-4, WEATHER, TEMPERATURE AND SEASONAL LIMITATIONS FOR PRODUCING AND PLACING ASPHALT MIXTURES, replace Table 610-5 with the following:

TABLE 610-5
PLACEMENT TEMPERATURES FOR ASPHALT

Asphalt Concrete Mix Type	Minimum Surface and Air Temperature
B25.0B, C	35°F
I19.0B, C, D	35°F
SF9.5A, S9.5B	40°F[A]
S9.5C, S12.5C	45°F[A]
S9.5D, S12.5D	50°F

A. For the final layer of surface mixes containing recycled asphalt shingles (RAS), the minimum surface and air temperature shall be 50ºF.

Page 6-23, Subarticle 610-5(A), General, lines 33-34, replace the last sentence of the third paragraph with the following:

Produce the mixture at the asphalt plant within ±25 ºF of the JMF mix temperature. The temperature of the mixture, when discharged from the mixer, shall not exceed 350ºF.

Page 6-26, Article 610-7, HAULING OF ASPHALT MIXTURE, lines 22-23, in the fourth sentence of the first paragraph replace “so as to overlap the top of the truck bed and” with “to”. Line 28, in the last paragraph, replace “+15 ºF to -25 ºF of the specified JMF temperature.” with “±25 ºF of the specified JMF mix temperature.”

Page 6-26, Article 610-8, SPREADING AND FINISHING, **line 34**, add the following new paragraph:

As referenced in Section 9.6.3 of the *HMA/QMS Manual*, use the automatic screed controls on the paver to control the longitudinal profile. Where approved by the Engineer, the Contractor has the option to use either a fixed or mobile string line.

Page 6-29, Article 610-13, FINAL SURFACE TESTING AND ACCEPTANCE, line 39, add the following after the first sentence in the first paragraph:

Smoothness acceptance testing using the inertial profiler is not required on ramps, loops and turn lanes.

Page 6-30, Subarticle 610-13(A), Option 1 – Inertial Profiler, lines 15-16, replace the fourth sentence of the fourth paragraph with the following:

The interval at which relative profile elevations are reported shall be 2”.

Page 6-30, Subarticle 610-13(A), Option 1 – Inertial Profiler, lines 25-28, replace the ninth paragraph with the following:

Operate the profiler at any speed as per the manufacturer's recommendations to collect valid data.

Page 6-30, Subarticle 610-13(A), Option 1 – Inertial Profiler, lines 30-31, delete the third sentence of the tenth paragraph.

Page 6-31, Subarticle 610-13(A), Option 1 – Inertial Profiler, lines 11-13, replace the first sentence of the third paragraph with the following:

After testing, transfer the profile data from the profiler portable computer's hard drive to a write once storage media (Flash drive, USB, DVD-R or CD-R) or electronic media approved by the Engineer.

Page 6-31, Subarticle 610-13(A), Option 1 – Inertial Profiler, lines 17-18, replace the first sentence of the fourth paragraph with the following:

Submit a report with the documentation and electronic data of the evaluation for each section to the Engineer within 10 days after completion of the smoothness testing. The report shall be in the tabular format for each 0.10 segment or a portion thereof with a summary of the MRI values and the localized roughness areas including corresponding project station numbers or acceptable reference points. Calculate the pay adjustments for all segments in accordance with the formulas in Sections (1) and (2) shown below. The Engineer shall review and approval all pay adjustments unless corrective action is required.

Page 6-31, Subarticle 610-13(A)(1), Acceptance for New Construction, lines 36-37, replace the third paragraph with the following:

The price adjustment will apply to each 0.10-mile section or prorated for a portion thereof, based on the Mean Roughness Index (MRI), the average IRI values from both wheel paths.

Page 6-32, Subarticle 610-13(A)(2), Localized Roughness, lines 12-16, replace the first paragraph with the following:

Areas of localized roughness shall be identified through the "Smoothness Assurance Module (SAM)" provided in the ProVAL software. Use the SAM report to optimize repair strategies by analyzing the measurements from profiles collected using inertial profilers. The ride quality threshold for localized roughness shall be 165 in/mile for any sections that are 15 ft. to 100 ft. in length at the continuous short interval of 25 ft. Submit a continuous roughness report to identify each section with project station numbers or reference points outside the threshold and identify all localized roughness, with the signature of the Operator included with the submitted IRI trace and electronic files.

Page 6-32, Subarticle 610-13(A)(2), Localized Roughness, line 21, add the following new paragraph:

If the Engineer does not require corrective action, the pay adjustment for each area of localized roughness shall be based on the following formula:

PA = (165 – LR#) 5

Where:

PA = Pay Adjustment (dollars)
LR# = The Localized Roughness number determined from SAM report for the ride quality threshold

Page 6-41, Subarticle 650-3(B), Mix Design Criteria, replace Table 650-1 with the following:

TABLE 650-1
OGAFC GRADATION CRITERIA

Sieve Size (mm)	*Type FC-1*	*Type FC-1 Modified*	*Type FC-2 Modified*
19.0	-	-	100
12.5	100	100	80 - 100
9.50	75 - 100	75 - 100	55 - 80
4.75	25 - 45	25 - 45	15 - 30
2.36	5 - 15	5 - 15	5 - 15
0.075	1.0 - 3.0	1.0 - 3.0	2.0 - 4.0

ASPHALT BINDER CONTENT OF ASPHALT PLANT MIXES:

(11-21-00) (Rev. 7-17-12) 609 SP6 R15

The approximate asphalt binder content of the asphalt concrete plant mixtures used on this project will be as follows:

Asphalt Concrete Base Course	Type B 25.0__	4.4%
Asphalt Concrete Intermediate Course	Type I 19.0__	4.8%
Asphalt Concrete Surface Course	Type S 4.75A	6.8%
Asphalt Concrete Surface Course	Type SA-1	6.8%
Asphalt Concrete Surface Course	Type SF 9.5A	6.7%
Asphalt Concrete Surface Course	Type S 9.5__	6.0%
Asphalt Concrete Surface Course	Type S 12.5__	5.6%

The actual asphalt binder content will be established during construction by the Engineer within the limits established in the *2012 Standard Specifications.*

PRICE ADJUSTMENT - ASPHALT BINDER FOR PLANT MIX:

(11-21-00) 620 SP6 R25

Price adjustments for asphalt binder for plant mix will be made in accordance with Section 620 of the *2012 Standard Specifications.*

The base price index for asphalt binder for plant mix is **$ 339.64** per ton.

This base price index represents an average of F.O.B. selling prices of asphalt binder at supplier's terminals on **February 1, 2017**.

FINAL SURFACE TESTING NOT REQUIRED:
(5-18-04) (Rev. 2-16-16) 610 SP6 R45

Final surface testing is not required on this project in accordance with Section 610-13, *Final Surface Testing and Acceptance*.

MATERIALS:
(2-21-12) (Rev. 11-22-16) 1000, 1002, 1005, 1016, 1018, 1024, 1050, 1074, 1078, 1080, 1081, 1086, 1084, 1087, 1092 SP10 R01

Revise the *2012 Standard Specifications* as follows:

Page 10-1, Article 1000-1, DESCRIPTION, lines 9-10, replace the last sentence of the first paragraph with the following:

Type IL, IP, IS or IT blended cement may be used instead of Portland cement.

Page 10-1, Article 1000-1, DESCRIPTION, line 14, add the following:

If any change is made to the mix design, submit a new mix design (with the exception of an approved pozzolan source change).

If any major change is made to the mix design, also submit new test results showing the mix design conforms to the criteria. Define a major change to the mix design as:

(1) A source change in coarse aggregate, fine aggregate or cement.

(2) A pozzolan class or type change (e.g. Class F fly ash to Class C fly ash).

(3) A quantitative change in coarse aggregate (applies to an increase or decrease greater than 5%), fine aggregate (applies to an increase or decrease greater than 5%), water (applies to an increase only), cement (applies to a decrease only), or pozzolan (applies to an increase or decrease greater than 5%).

Use materials which do not produce a mottled appearance through rusting or other staining of the finished concrete surface.

Page 10-1, Article 1000-2, MATERIALS, line 16; Page 10-8, Subarticle 1000-7(A), Materials, line 8; and Page 10-18, Article 1002-2, MATERIALS, line 9, add the following to the table of item references:

Item	**Section**
Type IL Blended Cement	1024-1

Page 10-1, Subarticle 1000-3(A), Composition and Design, lines 25-27, replace the second paragraph with the following:

Fly ash may be substituted for cement in the mix design up to 30% at a rate of 1.0 lb of fly ash to each pound of cement replaced.

Page 10-2, Subarticle 1000-3(A), Composition and Design, lines 12-21, delete the third paragraph through the sixth paragraph beginning with "If any change is made to the mix design, submit…" through "…(applies to a decrease only)."

Page 10-5, Table 1000-1, REQUIREMENTS FOR CONCRETE, replace with the following:

TABLE 1000-1
REQUIREMENTS FOR CONCRETE

Class of Concrete	Min. Comp. Strength at 28 days	Maximum Water-Cement Ratio				Consistency Max. Slump		Cement Content			
		Air-Entrained Concrete		Non Air-Entrained Concrete		Vibrated	Non-Vibrated	Vibrated		Non-Vibrated	
		Rounded Aggregate	Angular Aggregate	Rounded Aggregate	Angular Aggregate			Min.	Max.	Min.	Max.
Units	*psi*					*inch*	*inch*	*lb/cy*	*lb/cy*	*lb/cy*	*lb/cy*
AA	4,500	0.381	0.426	-	-	3.5	-	639	715	-	-
AA Slip Form	4,500	0.381	0.426	-	-	1.5	-	639	715	-	-
Drilled Pier	4,500	-	-	0.450	0.450	-	5-7 dry 7-9 wet	-	-	640	800
A	3,000	0.488	0.532	0.550	0.594	3.5	4	564	-	602	-
B	2,500	0.488	0.567	0.559	0.630	1.5 machine-placed 2.5 hand-placed	4	508	-	545	-
Sand Light-weight	4,500	-	0.420	-	-	4	-	715	-	-	-
Latex Modified	3,000 7 day	0.400	0.400	-	-	6	-	658	-	-	-
Flowable Fill excavatable	150 max. at 56 days	as needed	as needed	as needed	as needed	-	Flow-able	-	-	40	100
Flowable Fill non-excavatable	125	as needed	as needed	as needed	as needed	-	Flow-able	-	-	100	as needed
Pavement	4,500 design, field 650 flexural, design only	0.559	0.559	-	-	1.5 slip form 3.0 hand place	-	526	-	-	-
Precast	See Table 1077-1	as needed	as needed	-	-	6	as needed	as needed	as needed	as needed	as needed
Prestress	per contract	See Table 1078-1	See Table 1078-1	-	-	8	-	564	as needed	-	-

Page 10-6, Subarticle 1000-4(I), Use of Fly Ash, lines 36-2, replace the first paragraph with the following:

Fly ash may be substituted for cement in the mix design up to 30% at a rate of 1.0 lb of fly ash to each pound of cement replaced. Use Table 1000-1 to determine the maximum allowable water-cementitious material (cement + fly ash) ratio for the classes of concrete listed.

Page 10-7, Table 1000-3, MAXIMUM WATER-CEMENTITIOUS MATERIAL RATIO, delete the table.

Page 10-7, Article 1000-5, HIGH EARLY STRENGTH PORTLAND CEMENT CONCRETE, lines 30-31, delete the second sentence of the third paragraph.

Page 10-19, Article 1002-3, SHOTCRETE FOR TEMPORARY SUPPORT OF EXCAVATIONS, line 30, add the following at the end of Section 1002:

(H) Handling and Storing Test Panels

Notify the Area Materials Engineer when preconstruction or production test panels are made within 24 hours of shooting the panels. Field cure and protect test panels from damage in accordance with ASTM C1140 until the Department transports panels to the Materials and Tests Regional Laboratory for coring.

Page 10-23, Table 1005-1, AGGREGATE GRADATION-COARSE AGGREGATE, replace with the following:

TABLE 1005-1
AGGREGATE GRADATION - COARSE AGGREGATE

Std. Size #	Percentage of Total by Weight Passing											Remarks
	2"	1 1/2"	1"	3/4"	1/2"	3/8"	#4	#8	#10	#16	#40	#200	
4	100	90-100	20-55	0-15	-	0-5	-	-	-	-	-	A	Asphalt Plant Mix
467M	100	95-100	-	35-70	-	0-30	0-5	-	-	-	-	A	Asphalt Plant Mix
5	-	100	90-100	20-55	0-10	0-5	-	-	-	-	-	A	AST, Sediment Control Stone
57	-	100	95-100	-	25-60	-	0-10	0-5	-	-	-	A	AST, Structural Concrete, Shoulder Drain Stone, Sediment Control Stone
57M	-	100	95-100	-	25-45	-	0-10	0-5	-	-	-	A	AST, Concrete Pavement
6M	-	-	100	90-100	20-55	0-20	0-8	-	-	-	-	A	AST
67	-	-	100	90-100	-	20-55	0-10	0-5	-	-	-	A	Asphalt Plant Mix, AST, Structural Concrete
78M	-	-	-	100	98-100	75-100	20-45	0-15	-	-	-	A	Asphalt Plant Mix, AST, Structural Concrete, Weep Hole Drains
14M	-	-	-	-	100	98-100	35-70	5-20	-	0-8	-	A	Asphalt Plant Mix, AST, Structural Concrete, Weep Hole Drains
9M	-	-	-	-	100	98-100	85-100	10-40	-	0-10	-	A	AST
ABC	-	100	75-97	-	55-80	-	35-55	-	25-45	-	14-30	4-12[B]	Aggregate Base Course, Aggregate Stabilization
ABC(M)	-	100	75- 100	-	45-79	-	20-40	-	0- 25	-	-	0-12[B]	Maintenance Stabilization
Light-weight[C]	-	-	-	-	100	80-100	5- 40	0-20	-	0-10	-	0-2.5	AST

A. See Subarticle 1005-4(A).
B. See Subarticle 1005-4(B).
C. For Lightweight Aggregate used in Structural Concrete, see Subarticle 1014-2(E)(6).

Page 10-39, Article 1016-3, CLASSIFICATIONS , lines 27-32, replace with the following:

Select material is clean, unweathered durable, blasted rock material obtained from an approved source. While no specific gradation is required, the below criteria will be used to evaluate the materials for visual acceptance by the Engineer:

(A) At least 50% of the rock has a diameter of from 1.5 ft to 3 ft,

(B) 30% of the rock ranges in size from 2" to 1.5 ft in diameter, and

(C) Not more than 20% of the rock is less than 2" in diameter. No rippable rock will be permitted.

Page 10-40, Tables 1018-1 and 1018-2, PIEDMONT, WESTERN AND COASTAL AREA CRITERIA FOR ACCEPTANCE OF BORROW MATERIAL, under second column in both tables, replace second row with the following:

Acceptable, but not to be used in the top 3 ft of embankment or backfill

Page 10-46, Article 1024-1, PORTLAND CEMENT, line 33, add the following as the ninth paragraph:

Use Type IL blended cement that meets AASHTO M 240, except that the limestone content is limited to between 5 and 12% by weight and the constituents shall be interground. Class F fly ash can replace a portion of Type IL blended cement and shall be replaced as outlined in Subarticle 1000-4(I) for Portland cement. For mixes that contain cement with alkali content between 0.6% and 1.0% and for mixes that contain a reactive aggregate documented by the Department, use a pozzolan in the amount shown in Table 1024-1.

Page 10-46, Table 1024-1, POZZOLANS FOR USE IN PORTLAND CEMENT CONCRETE, replace with the following:

TABLE 1024-1
POZZOLANS FOR USE IN PORTLAND CEMENT CONCRETE

Pozzolan	Rate
Class F Fly Ash	20% - 30% by weight of required cement content with 1.0 lb Class F fly ash per lb of cement replaced
Ground Granulated Blast Furnace Slag	35%-50% by weight of required cement content with 1.0 lb slag per lb of cement replaced
Microsilica	4%-8% by weight of required cement content with 1.0 lb microsilica per lb of cement replaced

Page 10-47, Subarticle 1024-3(B), Approved Sources, lines 16-18, replace the second sentence of the second paragraph with the following:

Tests shall be performed by AASHTO's designated National Transportation Product Evaluation Program (NTPEP) laboratory for concrete admixture testing.

Page 10-65, Article 1050-1, GENERAL, line 41, replace the first sentence with the following:

All fencing material and accessories shall meet Section 106.

Page 10-115, Subarticle 1074-7(B), Gray Iron Castings, lines 10-11, replace the first two sentences with the following:

Supply gray iron castings meeting all facets of AASHTO M 306 excluding proof load. Proof load testing will only be required for new casting designs during the design process, and conformance to M306 loading (40,000 lb.) will be required only when noted on the design documents.

Page 10-126, Table 1078-1, REQUIREMENTS FOR CONCRETE, replace with the following:

TABLE 1078-1
REQUIREMENTS FOR CONCRETE

Property	**28 Day Design Compressive Strength 6,000 psi or less**	**28 Day Design Compressive Strength greater than 6,000 psi**
Maximum Water/Cementitious Material Ratio	0.45	0.40
Maximum Slump without HRWR	3.5"	3.5"
Maximum Slump with HRWR	8"	8"
Air Content (upon discharge into forms)	5 + 2%	5 + 2%

Page 10-151, Article 1080-4, INSPECTION AND SAMPLING, lines 18-22, replace (B), (C) and (D) with the following:

(B) At least 3 panels prepared as specified in 5.5.10 of AASHTO M 300, Bullet Hole Immersion Test.

(C) At least 3 panels of 4"x6"x1/4" for the Elcometer Adhesion Pull Off Test, ASTM D4541.

(D) A certified test report from an approved independent testing laboratory for the Salt Fog Resistance Test, Cyclic Weathering Resistance Test, and Bullet Hole Immersion Test as specified in AASHTO M 300.

(E) A certified test report from an approved independent testing laboratory that the product has been tested for slip coefficient and meets AASHTO M253, Class B.

Page 10-161, Subarticle 1081-1(A), Classifications, lines 29-33, delete first 3 sentences of the description for Type 2 and replace with the following:

Type 2 - A low-modulus, general-purpose adhesive used in epoxy mortar repairs. It may be used to patch spalled, cracked or broken concrete where vibration, shock or expansion and contraction are expected.

Page 10-162, Subarticle 1081-1(A), Classifications, lines 4-7, delete the second and third sentences of the description for Type 3A. **Lines 16-22,** delete Types 6A, 6B and 6C.

Page 10-162, Subarticle 1081-1(B), Requirements, lines 26-30, replace the second paragraph with the following:

For epoxy resin systems used for embedding dowel bars, threaded rods, rebar, anchor bolts and other fixtures in hardened concrete, the manufacturer shall submit test results showing that the bonding system will obtain 125% of the specified required yield strength of the fixture. Furnish certification that, for the particular bolt grade, diameter and embedment depth required, the anchor system will not fail by adhesive failure and that there is no movement of the anchor bolt. For certification and anchorage, use 3,000 psi as the minimum Portland cement concrete compressive strength used in this test. Use adhesives that meet Section 1081.

List the properties of the adhesive on the container and include density, minimum and maximum temperature application, setting time, shelf life, pot life, shear strength and compressive strength.

Page 10-163, Table 1081-1, PROPERTIES OF MIXED EPOXY RESIN SYSTEMS, replace with the following:

TABLE 1081-1
PROPERTIES OF MIXED EPOXY RESIN SYSTEMS

Property	Type 1	Type 2	Type 3	Type 3A	Type 4A	Type 4B	Type 5
Viscosity-Poises at 77°F ± 2°F	Gel	10-30	25-75	Gel	40-150	40-150	1-6
Spindle No.	-	3	4	--	4	4	2
Speed (RPM)	-	20	20	--	10	10	50
Pot Life (Minutes)	20-50	30-60	20-50	5-50	40-80	40-80	20-60
Minimum Tensile Strength at 7 days (psi)	1,500	2,000	4,000	4,000	1,500	1,500	4,000
Tensile Elongation at 7 days (%)	30 min.	30 min.	2-5	2-5	5-15	5-15	2-5
Min. Compressive Strength of 2". mortar cubes at 24 hours	3,000 (Neat)	4,000-	6,000-	6,000 (Neat)	3,000	3,000	6,000
Min. Compressive Strength of 2" mortar cubes at 7 days	5,000 (Neat)	-	-	-	-	5,000	-
Maximum Water Absorption (%)	1.5	1.0	1.0	1.5	1.0	1.0	1.0
Min. Bond Strength Slant Shear Test at 14 days (psi)	1,500	1,500	2,000	2,000	1,500	1,500	1,500

Page 10-164, Subarticle 1081-1(E), Prequalification, lines 31-33, replace the second sentence of the first paragraph with the following:

Manufacturers choosing to supply material for Department jobs must submit an application through the Value Management Unit with the following information for each type and brand name:

Page 10-164, Subarticle 1081-1(E)(3), line 37, replace with the following:

(3) Type of the material in accordance with Articles 1081-1 and 1081-4,

Page 10-165, Subarticle 1081-1(E)(6), line 1, in the first sentence of the first paragraph replace "AASHTO M 237" with "the specifications".

Page 10-165, Subarticle 1081-1(E), Prequalification, line 9-10, delete the second sentence of the last paragraph.

Page 10-165, Subarticle 1081-1(F), Acceptance, line 14, in the first sentence of the first paragraph replace "Type 1" with "Type 3".

Page 10-169, Subarticle 1081-3(G), Anchor Bolt Adhesives, delete this subarticle.

Page 10-170, Article 1081-3, HOT BITUMEN, line 9, add the following at the end of Section 1081:

1081-4 EPOXY RESIN ADHESIVE FOR BONDING TRAFFIC MARKINGS

(A) General

This section covers epoxy resin adhesive for bonding traffic markers to pavement surfaces.

(B) Classification

The types of epoxies and their uses are as shown below:

Type I – Rapid Setting, High Viscosity, Epoxy Adhesive. This type of adhesive provides rapid adherence to traffic markers to the surface of pavement.

Type II – Standard Setting, High Viscosity, Epoxy Adhesive. This type of adhesive is recommended for adherence of traffic markers to pavement surfaces when rapid set is not required.

Type III – Rapid Setting, Low Viscosity, Water Resistant, Epoxy Adhesive. This type of rapid setting adhesive, due to its low viscosity, is appropriate only for use with embedded traffic markers.

Type IV – Standard Set Epoxy for Blade Deflecting-Type Plowable Markers.

(C) Requirements

Epoxies shall conform to the requirements set forth in AASHTO M 237.

(D) Prequalification

Refer to Subarticle 1081-1(E).

(E) Acceptance

Refer to Subarticle 1081-1(F).

Page 10-173, Article 1084-2, STEEL SHEET PILES, lines 37-38, replace first paragraph with the following:

Steel sheet piles detailed for permanent applications shall be hot rolled and meet ASTM A572 or ASTM A690 unless otherwise required by the plans. Steel sheet piles shall be coated as required

by the plans. Galvanized sheet piles shall be coated in accordance with Section 1076. Metallized sheet piles shall be metallized in accordance to the Project Special Provision "Thermal Sprayed Coatings (Metallization)" with an 8 mil, 99.9% aluminum alloy coating and a 0.5 mil seal coating. Any portion of the metallized sheet piling encased in concrete shall receive a barrier coat. The barrier coat shall be an approved waterborne coating with a low-viscosity which readily absorbs into the pores of the aluminum thermal sprayed coating. The waterborne coating shall be applied at a spreading rate that results in a theoretical 1.5 mil dry film thickness. The manufacturer shall issue a letter of certification that the resin chemistry of the waterborne coating is compatible with the 99.9% aluminum thermal sprayed alloy and suitable for tidal water applications.

Page 10-174, Subarticle 1086-1(B)(1), Epoxy, lines 18-24, replace with the following:

The epoxy shall meet Article 1081-4.

The 2 types of epoxy adhesive which may be used are Type I, Rapid Setting, and Type II, Standard Setting. Use Type II when the pavement temperature is above 60°F or per the manufacturer's recommendations whichever is more stringent. Use Type I when the pavement temperature is between 50°F and 60°F or per the manufacturer's recommendations whichever is more stringent. Epoxy adhesive Type I, Cold Set, may be used to attach temporary pavement markers to the pavement surface when the pavement temperature is between 32°F and 50°F or per the manufacturer's recommendations whichever is more stringent.

Page 10-175, Subarticle 1086-2(E), Epoxy Adhesives, line 27, replace "Section 1081" with "Article 1081-4".

Page 10-177, Subarticle 1086-3(E), Epoxy Adhesives, line 22, replace "Section 1081" with "Article 1081-4".

Page 10-179, Subarticle 1087-4(A), Composition, lines 39-41, replace the third paragraph with the following:

All intermixed and drop-on glass beads shall not contain more than 75 ppm arsenic or 200 ppm lead.

Page 10-180, Subarticle 1087-4(B), Physical Characteristics, line 8, replace the second paragraph with the following:

All intermixed and drop-on glass beads shall comply with NCGS § 136-30.2 and 23 USC § 109(r).

Page 10-181, Subarticle 1087-7(A), Intermixed and Drop-on Glass Beads, line 24, add the following after the first paragraph:

Use X-ray Fluorescence for the normal sampling procedure for intermixed and drop-on beads, without crushing, to check for any levels of arsenic and lead. If any arsenic or lead is detected, the sample shall be crushed and repeat the test using X-ray Fluorescence. If the X-ray Fluorescence test shows more than a LOD of 5 ppm, test the beads using United States Environmental Protection Agency Method 6010B, 6010C or 3052 for no more than 75 ppm arsenic or 200 ppm lead.

GROUT PRODUCTION AND DELIVERY:

(3-17-15) 1003 SP10 R20

Revise the *2012 Standard Specifications* as follows:

Replace Section 1003 with the following:

SECTION 1003
GROUT PRODUCTION AND DELIVERY

1003-1 DESCRIPTION

This section addresses cement grout to be used for structures, foundations, retaining walls, concrete barriers, embankments, pavements and other applications in accordance with the contract. Produce non-metallic grout composed of Portland cement and water and at the Contractor's option or as required, aggregate and pozzolans. Include chemical admixtures as required or needed. Provide sand cement or neat cement grout as required. Define "sand cement grout" as grout with only fine aggregate and "neat cement grout" as grout without aggregate.

The types of grout with their typical uses are as shown below:

Type 1 – A cement grout with only a 3-day strength requirement and a fluid consistency that is typically used for filling subsurface voids.

Type 2 – A nonshrink grout with strength, height change and flow conforming to ASTM C1107 that is typically used for foundations, ground anchors and soil nails.

Type 3 – A nonshrink grout with high early strength and freeze-thaw durability requirements that is typically used in pile blockouts, grout pockets, shear keys, dowel holes and recesses for concrete barriers and structures.

Type 4 – A neat cement grout with low strength, a fluid consistency and high fly ash content that is typically used for slab jacking.

Type 5 – A low slump, low mobility sand cement grout with minimal strength that is typically used for compaction grouting.

1003-2 MATERIALS

Refer to Division 10.

Item	Section
Chemical Admixtures	1024-3
Fine Aggregate	1014-1
Fly Ash	1024-5
Ground Granulated Blast Furnace Slag	1024-6
Portland Cement	1024-1
Silica Fume	1024-7
Water	1024-4

Do not use grout that contains soluble chlorides or more than 1% soluble sulfate. At the Contractor's option, use an approved packaged grout instead of the materials above except for water. Use packaged grouts that are on the NCDOT Approved Products List.

Use admixtures for grout that are on the NCDOT Approved Products List or other admixtures in accordance with Subarticle 1024-3(E) except do not use concrete additives or unclassified or other admixtures in Type 4 or 5 grout. Use Class F fly ash for Type 4 grout and Type II Portland cement for Type 5 grout.

Use well graded rounded aggregate with a gradation, liquid limit (LL) and plasticity index (PI) that meet Table 1003-1 for Type 5 grout. Fly ash may be substituted for a portion of the fines in the aggregate. Do not use any other pozzolans in Type 5 grout.

TABLE 1003-1
AGGREGATE REQUIREMENTS FOR TYPE 5 GROUT

Gradation		Maximum Liquid Limit	Maximum Plasticity Index
Sieve Designation per AASHTO M 92	**Percentage Passing (% by weight)**		
3/8"	100	N/A	N/A
No. 4	70 – 95		
No. 8	50 – 90		
No. 16	30 – 80		
No. 30	25 – 70		
No. 50	20 – 50		
No. 100	15 – 40		
No. 200	10 – 30	25	10

1003-3 COMPOSITION AND DESIGN

When using an approved packaged grout, a grout mix design submittal is not required. Otherwise, submit proposed grout mix designs for each grout mix to be used in the work. Mixes for all grout shall be designed by a Certified Concrete Mix Design Technician or an Engineer licensed by the State of North Carolina. Mix proportions shall be determined by a testing laboratory approved by the Department. Base grout mix designs on laboratory trial batches that meet Table 1003-2 and this section. With permission, the Contractor may

use a quantity of chemical admixture within the range shown on the current list of approved admixtures maintained by the Materials and Tests Unit.

Submit grout mix designs in terms of saturated surface dry weights on Materials and Tests Form 312U at least 35 days before proposed use. Adjust batch proportions to compensate for surface moisture contained in the aggregates at the time of batching. Changes in the saturated surface dry mix proportions will not be permitted unless revised grout mix designs have been submitted to the Engineer and approved.

Accompany Materials and Tests Form 312U with a listing of laboratory test results of compressive strength, density and flow or slump and if applicable, aggregate gradation, durability and height change. List the compressive strength of at least three 2" cubes at the age of 3 and 28 days.

The Engineer will review the grout mix design for compliance with the contract and notify the Contractor as to its acceptability. Do not use a grout mix until written notice has been received. Acceptance of the grout mix design or use of approved packaged grouts does not relieve the Contractor of his responsibility to furnish a product that meets the contract. Upon written request from the Contractor, a grout mix design accepted and used satisfactorily on any Department project may be accepted for use on other projects.

Perform laboratory tests in accordance with the following test procedures:

Property	**Test Method**
Aggregate Gradation[A]	AASHTO T 27
Compressive Strength	AASHTO T 106
Density (Unit Weight)	AASHTO T 121, AASHTO T 133[B], ANSI/API RP[C] 13B-1[B] (Section 4, Mud Balance)
Durability	AASHTO T 161[D]
Flow	ASTM C939 (Flow Cone)
Height Change	ASTM C1090[E]
Slump	AASHTO T 119

A. Applicable to grout with aggregate.
B. Applicable to Neat Cement Grout.
C. American National Standards Institute/American Petroleum Institute Recommended Practice.
D. Procedure A (Rapid Freezing and Thawing in Water) required.
E. Moist room storage required.

1003-4 GROUT REQUIREMENTS

Provide grout types in accordance with the contract. Use grouts with properties that meet Table 1003-2. The compressive strength of the grout will be considered the average compressive strength test results of three 2" cubes at each age. Make cubes that meet AASHTO T 106 from the grout delivered for the work or mixed on-site. Make cubes at

such frequencies as the Engineer may determine and cure them in accordance with AASHTO T 106.

TABLE 1003-2
GROUT REQUIREMENTS

Type of Grout	Minimum Compressive Strength at		Height Change at 28 days	Flow[A]/Slump[B]	Minimum Durability Factor
	3 days	28 days			
1	3,000 psi	–	–	10 – 30 sec	–
2	Table 1[C]			Fluid Consistency[C]	–
3	5,000 psi	–	0 – 0.2%	Per Accepted Grout Mix Design/ Approved Packaged Grout	80
4[D]	600 psi	1,500 psi	–	10 – 26 sec	–
5	–	500 psi	–	1 – 3"	–

A. Applicable to Type 1 through 4 grouts.
B. Applicable to Type 5 grout.
C. ASTM C1107.
D. Use Type 4 grout with proportions by volume of 1 part cement and 3 parts fly ash.

1003-5 TEMPERATURE REQUIREMENTS

When using an approved packaged grout, follow the manufacturer's instructions for grout and air temperature at the time of placement. Otherwise, the grout temperature at the time of placement shall be not less than 50°F nor more than 90°F. Do not place grout when the air temperature measured at the location of the grouting operation in the shade away from artificial heat is below 40°F.

1003-6 ELAPSED TIME FOR PLACING GROUT

Agitate grout continuously before placement. Regulate the delivery so the maximum interval between the placing of batches at the work site does not exceed 20 minutes. Place grout before exceeding the times in Table 1003-3. Measure the elapsed time as the time between adding the mixing water to the grout mix and placing the grout.

TABLE 1003-3 ELAPSED TIME FOR PLACING GROUT (with continuous agitation)		
Air or Grout Temperature, Whichever is Higher	**Maximum Elapsed Time**	
	No Retarding Admixture Used	**Retarding Admixture Used**
90°F or above	30 minutes	1 hr. 15 minutes
80°F through 89°F	45 minutes	1 hr. 30 minutes
79°F or below	60 minutes	1 hr. 45 minutes

1003-7 MIXING AND DELIVERY

Use grout free of any lumps and undispersed cement. When using an approved packaged grout, mix grout in accordance with the manufacturer's instructions. Otherwise, comply with Articles 1000-8 through 1000-12 to the extent applicable for grout instead of concrete.

TRUCK MOUNTED CHANGEABLE MESSAGE SIGNS:

(8-21-12) 1101.02 SP11 R10

Revise the *2012 Roadway Standard Drawings* as follows:

Drawing No. 1101.02, Sheet 12, TEMPORARY LANE CLOSURES, replace General Note #11 with the following:

11- TRUCK MOUNTED CHANGEABLE MESSAGE SIGNS (TMCMS) USED ON SHADOW VEHICLES FOR "IN LANE" ACTIVITIES SHALL BE A MINIMUM OF 43" X 73". THE DISPLAY PANEL SHALL HAVE FULL MATRIX CAPABILITY WITH THE CAPABILITY TO PROVIDE 2 MESSAGE LINES WITH 7 CHARACTERS PER LINE WITH A MINIMUM CHARACTER HEIGHT OF 18". FOR ADDITIONAL MESSAGING, CONTACT THE WORK ZONE TRAFFIC CONTROL SECTION.

12- TMCMS USED FOR ADVANCED WARNING ON VEHICLES LOCATED ON THE SHOULDER MAY BE SMALLER THAN 43" X 73". THE DISPLAY PANEL SHALL HAVE THE CAPABILITY TO PROVIDE 2 MESSAGE LINES WITH 7 CHARACTERS PER LINE WITH A MINIMUM CHARACTER HEIGHT OF 18". FOR ADDITIONAL MESSAGING, CONTACT THE WORK ZONE TRAFFIC CONTROL SECTION.

Drawing No. 1101.02, Sheet 13, TEMPORARY LANE CLOSURES, replace General Note #12 with the following:

12- TRUCK MOUNTED CHANGEABLE MESSAGE SIGNS (TMCMS) USED ON SHADOW VEHICLES FOR "IN LANE" ACTIVITIES SHALL BE A MINIMUM OF 43" X 73". THE DISPLAY PANEL SHALL HAVE FULL MATRIX CAPABILITY WITH THE CAPABILITY TO PROVIDE 2 MESSAGE LINES WITH 7 CHARACTERS PER LINE WITH A MINIMUM CHARACTER HEIGHT OF 18". FOR ADDITIONAL MESSAGING, CONTACT THE WORK ZONE TRAFFIC CONTROL SECTION.

13- TMCMS USED FOR ADVANCED WARNING ON VEHICLES LOCATED ON THE SHOULDER MAY BE SMALLER THAN 43" X 73". THE DISPLAY PANEL SHALL HAVE THE CAPABILITY TO PROVIDE 2 MESSAGE LINES WITH 7 CHARACTERS PER LINE WITH A MINIMUM CHARACTER HEIGHT OF 18". FOR ADDITIONAL MESSAGING, CONTACT THE WORK ZONE TRAFFIC CONTROL SECTION.

STANDARD SPECIAL PROVISION
AVAILABILITY OF FUNDS – TERMINATION OF CONTRACTS

(5-20-08) Z-2

General Statute 143C-6-11. (h) Highway Appropriation is hereby incorporated verbatim in this contract as follows:

(h) Amounts Encumbered. – Transportation project appropriations may be encumbered in the amount of allotments made to the Department of Transportation by the Director for the estimated payments for transportation project contract work to be performed in the appropriation fiscal year. The allotments shall be multiyear allotments and shall be based on estimated revenues and shall be subject to the maximum contract authority contained in *General Statute 143C-6-11(c)*. Payment for transportation project work performed pursuant to contract in any fiscal year other than the current fiscal year is subject to appropriations by the General Assembly. Transportation project contracts shall contain a schedule of estimated completion progress, and any acceleration of this progress shall be subject to the approval of the Department of Transportation provided funds are available. The State reserves the right to terminate or suspend any transportation project contract, and any transportation project contract shall be so terminated or suspended if funds will not be available for payment of the work to be performed during that fiscal year pursuant to the contract. In the event of termination of any contract, the contractor shall be given a written notice of termination at least 60 days before completion of scheduled work for which funds are available. In the event of termination, the contractor shall be paid for the work already performed in accordance with the contract specifications.

Payment will be made on any contract terminated pursuant to the special provision in accordance with Subarticle 108-13(E) of the *2012 Standard Specifications*.

STANDARD SPECIAL PROVISION

ERRATA

(1-17-12) (Rev. 04-21-15) Z-4

Revise the *2012 Standard Specifications* as follows:

Division 2

Page 2-7, line 31, Article 215-2 Construction Methods, replace "Article 107-26" with "Article 107-25".

Page 2-17, Article 226-3, Measurement and Payment, line 2, delete "pipe culverts,".

Page 2-20, Subarticle 230-4(B), Contractor Furnished Sources, change references as follows: **Line 1,** replace "(4) Buffer Zone" with "(c) Buffer Zone"; **Line 12,** replace "(5) Evaluation for Potential Wetlands and Endangered Species" with "(d) Evaluation for Potential Wetlands and Endangered Species"; and **Line 33,** replace "(6) Approval" with "(4) Approval".

Division 3

Page 3-1, after line 15, Article 300-2 Materials, replace "1032-9(F)" with "1032-6(F)".

Division 4

Page 4-77, line 27, Subarticle 452-3(C) Concrete Coping, replace "sheet pile" with "reinforcement".

Division 6

Page 6-7, line 31, Article 609-3 Field Verification of Mixture and Job Mix Formula Adjustments, replace "30" with "45".

Page 6-10, line 42, Subarticle 609-6(C)(2), replace "Subarticle 609-6(E)" with "Subarticle 609-6(D)".

Page 6-11, Table 609-1 Control Limits, replace "Max. Spec. Limit" for the Target Source of $P_{0.075}/P_{be}$ Ratio with "1.0".

Page 6-40, Article 650-2 Materials, replace "Subarticle 1012-1(F)" with "Subarticle 1012-1(E)"

Division 7

Page 7-1, Article 700-3, CONCRETE HAULING EQUIPMENT, line 33, replace "competion" with "completion".

Division 8

Page 8-23, line 10, Article 838-2 Materials, replace "Portland Cement Concrete, Class B" with "Portland Cement Concrete, Class A".

Division 10

Page 10-166, Article 1081-3 Hot Bitumen, replace "Table 1081-16" with "Table 1081-2", replace "Table 1081-17" with "Table 1081-3", and replace "Table 1081-18" with "Table 1081-4".

Division 12

Page 12-7, Table 1205-3, add "FOR THERMOPLASTIC" to the end of the title.
Page 12-8, Subarticle 1205-5(B), line 13, replace "Table 1205-2" with "Table 1205-4".
Page 12-8, Table 1205-4 and 1205-5, replace "THERMOPLASTIC" in the title of these tables with "POLYUREA".
Page 12-9, Subarticle 1205-6(B), line 21, replace "Table 1205-4" with "Table 1205-6".
Page 12-11, Subarticle 1205-8(C), line 25, replace "Table 1205-5" with "Table 1205-7".

Division 15

Page 15-4, Subarticle 1505-3(F) Backfilling, line 26, replace "Subarticle 235-4(C)" with "Subarticle 235-3(C)".
Page 15-6, Subarticle 1510-3(B), after line 21, replace the allowable leakage formula with the following: $\mathbf{W=LD\sqrt{P} \div 148{,}000}$
Page 15-6, Subarticle 1510-3(B), line 32, delete "may be performed concurrently or" and replace with "shall be performed".
Page 15-17, Subarticle 1540-3(E), line 27, delete "Type 1".

Division 17

Page 17-26, line 42, Subarticle 1731-3(D) Termination and Splicing within Interconnect Center, delete this subarticle.

Revise the *2012 Roadway Standard Drawings* as follows:

1633.01 Sheet 1 of 1, English Standard Drawing for Matting Installation, replace "1633.01" with "1631.01".

STANDARD SPECIAL PROVISION

PLANT AND PEST QUARANTINES
(Imported Fire Ant, Gypsy Moth, Witchweed, Emerald Ash Borer, And Other Noxious Weeds)

(3-18-03) (Rev. 12-20-16) Z-04a

Within Quarantined Area

This project may be within a county regulated for plant and/or pests. If the project or any part of the Contractor's operations is located within a quarantined area, thoroughly clean all equipment prior to moving out of the quarantined area. Comply with federal/state regulations by obtaining a certificate or limited permit for any regulated article moving from the quarantined area.

Originating in a Quarantined County

Obtain a certificate or limited permit issued by the N.C. Department of Agriculture/United States Department of Agriculture. Have the certificate or limited permit accompany the article when it arrives at the project site.

Contact

Contact the N.C. Department of Agriculture/United States Department of Agriculture at 1-800-206-9333, 919-707-3730, or *http://www.ncagr.gov/plantindustry/* to determine those specific project sites located in the quarantined area or for any regulated article used on this project originating in a quarantined county.

Regulated Articles Include

1. Soil, sand, gravel, compost, peat, humus, muck, and decomposed manure, separately or with other articles. This includes movement of articles listed above that may be associated with cut/waste, ditch pulling, and shoulder cutting.
2. Plants with roots including grass sod.
3. Plant crowns and roots.
4. Bulbs, corms, rhizomes, and tubers of ornamental plants.
5. Hay, straw, fodder, and plant litter of any kind.
6. Clearing and grubbing debris.
7. Used agricultural cultivating and harvesting equipment.
8. Used earth-moving equipment.
9. Any other products, articles, or means of conveyance, of any character, if determined by an inspector to present a hazard of spreading imported fire ant, gypsy moth, witchweed, emerald ash borer, or other noxious weeds.

STANDARD SPECIAL PROVISION

MINIMUM WAGES

(7-21-09) Z-5

FEDERAL: The Fair Labor Standards Act provides that with certain exceptions every employer shall pay wages at the rate of not less than SEVEN DOLLARS AND TWENTY FIVE CENTS ($7.25) per hour.

STATE: The North Carolina Minimum Wage Act provides that every employer shall pay to each of his employees, wages at a rate of not less than SEVEN DOLLARS AND TWENTY FIVE CENTS ($7.25) per hour.

The minimum wage paid to all skilled labor employed on this contract shall be SEVEN DOLLARS AND TWENTY FIVE CENTS ($7.25) per hour.

The minimum wage paid to all intermediate labor employed on this contract shall be SEVEN DOLLARS AND TWENTY FIVE CENTS ($7.25) per hour.

The minimum wage paid to all unskilled labor on this contract shall be SEVEN DOLLARS AND TWENTY FIVE CENTS ($7.25) per hour.

This determination of the intent of the application of this act to the contract on this project is the responsibility of the Contractor.

The Contractor shall have no claim against the Department of Transportation for any changes in the minimum wage laws, Federal or State. It is the responsibility of the Contractor to keep fully informed of all Federal and State Laws affecting his contract.

STANDARD SPECIAL PROVISION

AWARD OF CONTRACT

(6-28-77)(Rev 2/16/2016) Z-6

"The North Carolina Department of Transportation, in accordance with the provisions of *Title VI of the Civil Rights Act of 1964* (78 Stat. 252) and the Regulations of the Department of Transportation (*49 C.F.R., Part 21*), issued pursuant to such act, hereby notifies all bidders that it will affirmatively insure that the contract entered into pursuant to this advertisement will be awarded to the lowest responsible bidder without discrimination on the ground of race, color, or national origin".

TITLE VI AND NONDISCRIMINATION

I. Title VI Assurance

During the performance of this contract, the contractor, for itself, its assignees and successors in interest (hereinafter referred to as the "contractor") agrees as follows:

(1) Compliance with Regulations: The contractor shall comply with the Regulation relative to nondiscrimination in Federally-assisted programs of the Department of Transportation (hereinafter, "DOT") Title 49, Code of Federal Regulations, Part 21, as they may be amended from time to time, (hereinafter referred to as the Regulations), which are herein incorporated by reference and made a part of this contract.

(2) Nondiscrimination: The Contractor, with regard to the work performed by it during the contract, shall not discriminate on the grounds of race, color, or national origin in the selection and retention of subcontractors, including procurements of materials and leases of equipment. The contractor shall not participate either directly or indirectly in the discrimination prohibited by section 21.5 of the Regulations, including employment practices when the contract covers a program set forth in Appendix B of the Regulations.

(3) Solicitations for Subcontractors, Including Procurements of Materials and Equipment: In all solicitations either by competitive bidding or negotiation made by the contractor for work to be performed under a subcontract, including procurements of materials or leases of equipment, each potential subcontractor or supplier shall be notified by the contractor of the contractor's obligations under this contract and the Regulations relative to nondiscrimination on the grounds of race, color, or national origin.

(4) Information and Reports: The contractor shall provide all information and reports required by the Regulations or directives issued pursuant thereto, and shall permit access to its books, records, accounts, other sources of information, and its facilities as may be determined by the North Carolina Department of Transportation (NCDOT) or the Federal Highway Administration (FHWA) to be pertinent to ascertain compliance with such Regulations, orders and instructions. Where any information required of a contractor is in the exclusive possession of another who fails or refuses to furnish this information the contractor shall so certify to the NCDOT, or the FHWA as appropriate, and shall set forth what efforts it has made to obtain the information.

(5) Sanctions for Noncompliance: In the event of the contractor's noncompliance with the nondiscrimination provisions of this contract, the NCDOT shall impose such contract sanctions as it or the FHWA may determine to be appropriate, including, but not limited to:

(a) Withholding of payments to the contractor under the contract until the contractor complies, and/or

(b) Cancellation, termination or suspension of the contract, in whole or in part.

(6) Incorporation of Provisions: The contractor shall include the provisions of paragraphs (1) through (6) in every subcontract, including procurements of materials and leases of equipment, unless exempt by the Regulations, or directives issued pursuant thereto.

The contractor shall take such action with respect to any subcontractor procurement as the NCDOT or the FHWA may direct as a means of enforcing such provisions including sanctions for noncompliance: provided, however, that, in the event a contractor becomes involved in, or is threatened with, litigation with a subcontractor or supplier as a result of such direction, the contractor may request the NCDOT to enter into such litigation to protect the interests of the NCDOT, and, in addition, the contractor may request the United States to enter into such litigation to protect the interests of the United States.

II. Title VI Nondiscrimination Program

Title VI of the 1964 Civil Rights Act, 42 U.S.C. 2000d, provides that: "No person in the United States shall, on the grounds of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance." The broader application of nondiscrimination law is found in other statutes, executive orders, and regulations (see Section III, Pertinent Nondiscrimination Authorities), which provide additional protections based on age, sex, disability and religion. In addition, the 1987 Civil Rights Restoration Act extends nondiscrimination coverage to all programs and activities of federal-aid recipients and contractors, including those that are not federally-funded.

Nondiscrimination Assurance

The North Carolina Department of Transportation (NCDOT) hereby gives assurance that no person shall on the ground of race, color, national origin, sex, age, and disability, be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity conducted by the recipient, as provided by Title VI of the Civil Rights Act of 1964, the Civil Rights Restoration Act of 1987, and any other related Civil Rights authorities, whether those programs and activities are federally funded or not.

Obligation

During the performance of this contract, the Contractor and its subcontractors are responsible for complying with NCDOT's Title VI Program. The Contractor must ensure that NCDOT's Notice of Nondiscrimination is posted in conspicuous locations accessible to all employees and subcontractors on the jobsite, along with the Contractor's own Equal Employment Opportunity (EEO) Policy Statement. The Contractor shall physically incorporate this "**TITLE VI AND NONDISCRIMINATION**" language, in its entirety, into all its subcontracts on federally-assisted and state-funded NCDOT-owned projects, and ensure its inclusion by subcontractors into all subsequent lower tier subcontracts. The Contractor and its subcontractors shall also physically incorporate the **FHWA-1273**, in its entirety, into all subcontracts and subsequent lower tier subcontracts on **Federal-aid highway** construction contracts only. The Contractor is also

responsible for making its subcontractors aware of NCDOT's Discrimination Complaints Process, as follows:

FILING OF COMPLAINTS

1. **Applicability** – These complaint procedures apply to the beneficiaries of the NCDOT's programs, activities, and services, including, but not limited to, members of the public, contractors, subcontractors, consultants, and other sub-recipients of federal and state funds.
2. **Eligibility** – Any person or class of persons who believes he/she has been subjected to discrimination or retaliation prohibited by any of the Civil Rights authorities, based upon race, color, sex, age, national origin, or disability, may file a written complaint with NCDOT's Civil Rights office. The law prohibits intimidation or retaliation of any sort. The complaint may be filed by the affected individual or a representative, and must be in writing.
3. **Time Limits and Filing Options** – A complaint must be filed no later than 180 calendar days after the following:
   - The date of the alleged act of discrimination; or
   - The date when the person(s) became aware of the alleged discrimination; or
   - Where there has been a continuing course of conduct, the date on which that conduct was discontinued or the latest instance of the conduct.

   Title VI and other discrimination complaints may be submitted to the following entities:
   - **North Carolina Department of Transportation**, Office of Equal Opportunity & Workforce Services (EOWS), External Civil Rights Section, 1511 Mail Service Center, Raleigh, NC 27699-1511; 919-508-1808 or toll free 800-522-0453
   - **US Department of Transportation**, Departmental Office of Civil Rights, External Civil Rights Programs Division, 1200 New Jersey Avenue, SE, Washington, DC 20590; 202-366-4070

     Federal Highway Administration, North Carolina Division Office, 310 New Bern Avenue, Suite 410, Raleigh, NC 27601, 919-747-7010

     Federal Highway Administration, Office of Civil Rights, 1200 New Jersey Avenue, SE, 8th Floor, E81-314, Washington, DC 20590, 202-366-0693 / 366-0752

     Federal Transit Administration, Office of Civil Rights, ATTN: Title VI Program Coordinator, East Bldg. 5th Floor – TCR, 1200 New Jersey Avenue, SE, Washington, DC 20590

     Federal Aviation Administration, Office of Civil Rights, 800 Independence Avenue, SW, Washington, DC 20591, 202-267-3258
   - **US Department of Justice**, Special Litigation Section, Civil Rights Division, 950 Pennsylvania Avenue, NW, Washington, DC 20530, 202-514-6255 or toll free 877-218-5228
4. **Format for Complaints –** Complaints must be in **writing** and **signed** by the complainant(s) or a representative and include the complainant's name, address, and telephone number. Complaints received by fax or e-mail will be acknowledged and processed. Allegations received by telephone will be reduced to writing and provided to the complainant for confirmation or revision before processing. Complaints will be accepted in other languages including Braille.
5. **Discrimination Complaint Form –** Contact NCDOT EOWS at the phone number above to receive a full copy of the Discrimination Complaint Form and procedures.

6. **Complaint Basis –** Allegations must be based on issues involving race, color, national origin, sex, age, or disability. The term "basis" refers to the complainant's membership in a protected group category. Contact this office to receive a Discrimination Complaint Form.

Protected Categories	Definition	Examples	Applicable Statutes and Regulations	
			FHWA	FTA
Race	An individual belonging to one of the accepted racial groups; or the perception, based usually on physical characteristics that a person is a member of a racial group	Black/African American, Hispanic/Latino, Asian, American Indian/Alaska Native, Native Hawaiian/Pacific Islander, White	Title VI of the Civil Rights Act of 1964; 49 CFR Part 21; 23 CFR 200	Title VI of the Civil Rights Act of 1964; 49 CFR Part 21; Circular 4702.1B
Color	Color of skin, including shade of skin within a racial group	Black, White, brown, yellow, etc.		
National Origin	Place of birth. Citizenship is not a factor. Discrimination based on language or a person's accent is also covered.	Mexican, Cuban, Japanese, Vietnamese, Chinese		
Sex	Gender	Women and Men	1973 Federal-Aid Highway Act	Title IX of the Education Amendments of 1972
Age	Persons of any age	21 year old person	Age Discrimination Act of 1975	
Disability	Physical or mental impairment, permanent or temporary, or perceived.	Blind, alcoholic, para-amputee, epileptic, diabetic, arthritic	Section 504 of the Rehabilitation Act of 1973; Americans with Disabilities Act of 1990	

III. Pertinent Nondiscrimination Authorities

During the performance of this contract, the contractor, for itself, its assignees, and successors in interest agrees to comply with the following non-discrimination statutes and authorities, including, but not limited to:

- Title VI of the Civil Rights Act of 1964 (42 U.S.C. § 2000d *et seq*., 78 stat. 252), (prohibits discrimination on the basis of race, color, national origin); and 49 CFR Part 21.
- The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, (42 U.S.C. § 4601), (prohibits unfair treatment of persons displaced or whose property has been acquired because of Federal or Federal-aid programs and projects);
- Federal-Aid Highway Act of 1973, (23 U.S.C. § 324 *et seq*.), (prohibits discrimination on the basis of sex);
- Section 504 of the Rehabilitation Act of 1973, (29 U.S.C. § 794 *et seq*.), as amended, (prohibits discrimination on the basis of disability); and 49 CFR Part 27;

- The Age Discrimination Act of 1975, as amended, (42 U.S.C. § 6101 *et seq*.), (prohibits discrimination on the basis of age);
- Airport and Airway Improvement Act of 1982, (49 USC § 471, Section 47123), as amended, (prohibits discrimination based on race, creed, color, national origin, or sex);
- The Civil Rights Restoration Act of 1987, (PL 100-209), (Broadened the scope, coverage and applicability of Title VI of the Civil Rights Act of 1964, The Age Discrimination Act of 1975 and Section 504 of the Rehabilitation Act of 1973, by expanding the definition of the terms "programs or activities" to include all of the programs or activities of the Federal-aid recipients, sub-recipients and contractors, whether such programs or activities are Federally funded or not);
- Titles II and III of the Americans with Disabilities Act, which prohibit discrimination on the basis of disability in the operation of public entities, public and private transportation systems, places of public accommodation, and certain testing entities (42 U.S.C. §§ 12131 – 12189) as implemented by Department of Transportation regulations at 49 C.F.R. parts 37 and 38;
- The Federal Aviation Administration's Non-discrimination statute (49 U.S.C. § 47123) (prohibits discrimination on the basis of race, color, national origin, and sex);
- Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, which ensures discrimination against minority populations by discouraging programs, policies, and activities with disproportionately high and adverse human health or environmental effects on minority and low-income populations;
- Executive Order 13166, Improving Access to Services for Persons with Limited English Proficiency, and resulting agency guidance, national origin discrimination includes discrimination because of limited English proficiency (LEP). To ensure compliance with Title VI, you must take reasonable steps to ensure that LEP persons have meaningful access to your programs (70 Fed. Reg. at 74087 to 74100);
- Title IX of the Education Amendments of 1972, as amended, which prohibits you from discriminating because of sex in education programs or activities (20 U.S.C. 1681 et seq).
- Title VII of the Civil Rights Act of 1964 (42 U.S.C. § 2000e *et seq.*, Pub. L. 88-352), (prohibits employment discrimination on the basis of race, color, religion, sex, or national origin);
- 49 CFR Part 26, regulation to ensure nondiscrimination in the award and administration of DOT-assisted contracts in the Department's highway, transit, and airport financial assistance programs, as regards the use of Disadvantaged Business Enterprises (DBEs);
- Form FHWA-1273, "Required Contract Provisions," a collection of contract provisions and proposal notices that are generally applicable to *all Federal-aid construction projects* and must be made a part of, and physically incorporated into, *all federally-assisted contracts*, as well as appropriate subcontracts and purchase orders, particularly Sections II (Nondiscrimination) and III (Nonsegregated Facilities).

STANDARD SPECIAL PROVISION

ON-THE-JOB TRAINING

(10-16-07) (Rev. 4-21-15) Z-10

Description

The North Carolina Department of Transportation will administer a custom version of the Federal On-the-Job Training (OJT) Program, commonly referred to as the Alternate OJT Program. All contractors (existing and newcomers) will be automatically placed in the Alternate Program. Standard OJT requirements typically associated with individual projects will no longer be applied at the project level. Instead, these requirements will be applicable on an annual basis for each contractor administered by the OJT Program Manager.

On the Job Training shall meet the requirements of 23 CFR 230.107 (b), 23 USC – Section 140, this provision and the On-the-Job Training Program Manual.

The Alternate OJT Program will allow a contractor to train employees on Federal, State and privately funded projects located in North Carolina. However, priority shall be given to training employees on NCDOT Federal-Aid funded projects.

Minorities and Women

Developing, training and upgrading of minorities and women toward journeyman level status is a primary objective of this special training provision. Accordingly, the Contractor shall make every effort to enroll minority and women as trainees to the extent that such persons are available within a reasonable area of recruitment. This training commitment is not intended, and shall not be used, to discriminate against any applicant for training, whether a member of a minority group or not.

Assigning Training Goals

The Department, through the OJT Program Manager, will assign training goals for a calendar year based on the contractors' past three years' activity and the contractors' anticipated upcoming year's activity with the Department. At the beginning of each year, all contractors eligible will be contacted by the Department to determine the number of trainees that will be assigned for the upcoming calendar year. At that time the Contractor shall enter into an agreement with the Department to provide a self-imposed on-the-job training program for the calendar year. This agreement will include a specific number of annual training goals agreed to by both parties. The number of training assignments may range from 1 to 15 per contractor per calendar year. The Contractor shall sign an agreement to fulfill their annual goal for the year.\

Training Classifications

The Contractor shall provide on-the-job training aimed at developing full journeyman level workers in the construction craft/operator positions. Preference shall be given to providing training in the following skilled work classifications:

Equipment Operators	Office Engineers
Truck Drivers	Estimators
Carpenters	Iron / Reinforcing Steel Workers
Concrete Finishers	Mechanics
Pipe Layers	Welders

The Department has established common training classifications and their respective training requirements that may be used by the contractors. However, the classifications established are not all-inclusive. Where the training is oriented toward construction applications, training will be allowed in lower-level management positions such as office engineers and estimators. Contractors shall submit new classifications for specific job functions that their employees are performing. The Department will review and recommend for acceptance to FHWA the new classifications proposed by contractors, if applicable. New classifications shall meet the following requirements:

Proposed training classifications are reasonable and realistic based on the job skill classification needs, and

The number of training hours specified in the training classification is consistent with common practices and provides enough time for the trainee to obtain journeyman level status.

The Contractor may allow trainees to be trained by a subcontractor provided that the Contractor retains primary responsibility for meeting the training and this provision is made applicable to the subcontract. However, only the Contractor will receive credit towards the annual goal for the trainee.

Where feasible, 25 percent of apprentices or trainees in each occupation shall be in their first year of apprenticeship or training. The number of trainees shall be distributed among the work classifications on the basis of the contractor's needs and the availability of journeymen in the various classifications within a reasonable area of recruitment.

No employee shall be employed as a trainee in any classification in which they have successfully completed a training course leading to journeyman level status or in which they have been employed as a journeyman.

Records and Reports

The Contractor shall maintain enrollment, monthly and completion reports documenting company compliance under these contract documents. These documents and any other information as requested shall be submitted to the OJT Program Manager.

Upon completion and graduation of the program, the Contractor shall provide each trainee with a certification Certificate showing the type and length of training satisfactorily completed.

Trainee Interviews

All trainees enrolled in the program will receive an initial and Trainee/Post graduate interview conducted by the OJT program staff.

Trainee Wages

Contractors shall compensate trainees on a graduating pay scale based upon a percentage of the prevailing minimum journeyman wages (Davis-Bacon Act). Minimum pay shall be as follows:

60 percent	of the journeyman wage for the first half of the training period
75 percent	of the journeyman wage for the third quarter of the training period
90 percent	of the journeyman wage for the last quarter of the training period

In no instance shall a trainee be paid less than the local minimum wage. The Contractor shall adhere to the minimum hourly wage rate that will satisfy both the NC Department of Labor (NCDOL) and the Department.

Achieving or Failing to Meet Training Goals

The Contractor will be credited for each trainee employed by him on the contract work who is currently enrolled or becomes enrolled in an approved program and who receives training for at least 50 percent of the specific program requirement. Trainees will be allowed to be transferred between projects if required by the Contractor's scheduled workload to meet training goals.

If a contractor fails to attain their training assignments for the calendar year, they may be taken off the NCDOT's Bidders List.

Measurement and Payment

No compensation will be made for providing required training in accordance with these contract documents.

STANDARD SPECIAL PROVISION

NAME CHANGE FOR NCDENR

(1-19-16) Z-11

Description

Wherever in the 2012 Standard Specifications, Project Special Provisions, Standard Special Provisions, Permits or Plans that reference is made to “NCDENR” or “North Carolina Department of Environment and Natural Resources”, replace with “NCDEQ” or “North Carolina Department of Environmental Quality” respectively, as the case may be.

TC-1

B-5937 Currituck/Dare County

WORK ZONE TRAFFIC CONTROL
Project Special Provisions

Law Enforcement:
(05/14/2013)

Description

Furnish Law Enforcement Officers and marked Law Enforcement vehicles to direct traffic in accordance with the contract.

Construction Methods

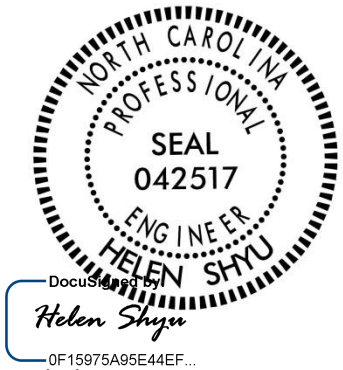
Use uniformed Law Enforcement Officers and marked Law Enforcement vehicles equipped with blue lights mounted on top of the vehicle, and Law Enforcement vehicle emblems to direct or control traffic as required by the plans or by the Engineer.

Measurement and Payment

Law Enforcement will be measured and paid for in the actual number of hours that each Law Enforcement Officer is provided during the life of the project as approved by the Engineer. There will be no direct payment for marked Law Enforcement vehicles as they are considered incidental to the pay item.

Payment will be made under:

Pay Item	Pay Unit
Law Enforcement	Hour



11/8/2016

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NORTH CAROLINA PROFESSIONAL SEAL 18565 ENGINEER TIMOTHY M. SHERRILL

TMS

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Timothy M. Sherrill
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3/10/2017

NORTH CAROLINA PROFESSIONAL SEAL 043571 ENGINEER SAMUEL L. CULLUM

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Samuel Cullum
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Initials Define Responsible Engineer for respective PSP

OVERLAY SURFACE PREPARATION FOR POLYESTER POLYMER CONCRETE (SPECIAL)

DESCRIPTION

This provision addresses the surface preparation activities required prior to the placement of polyester polymer concrete (PPC). Unless specifically mentioned below, all requirements specified for the bridge deck are also required for the approach slabs.

DEFINITIONS

Scarification shall consist of the removal of any asphalt wearing surface and concrete surface to the uniform depth and limits shown on the plans.

Shotblasting shall consist of steel beads (or other materials as approved by the Engineer) "shot" out of a machine onto the bridge concrete deck concrete floor to remove soft or deteriorated concrete, and to clean the concrete deck surface for the application of the PPC overlay. Contractor shall vary the speed of the shotblaster or make multiple passes, as necessary, to achieve the required surface preparation for the PPC overlay. Areas inaccessible with shotblasting equipment may require surface preparation with sandblasting equipment and hand equipment.

EQUIPMENT

All equipment for cleaning the existing concrete surface and mixing and applying the overlay system shall be in accordance with the System Provider's recommendations, as approved by the Engineer prior to commencement of any work:

- Scarifying equipment that is a power-operated, mechanical grinder capable of removing a minimum depth of ¼" for each pass.
- Shotblasting and sandblasting equipment to adequately prepare the bridge deck substrate, as required in this provision. Provide equipment to supply oil-free and moisture-free compressed air for final surface preparation.
- Equipment capable of sawing concrete to the specified plan depth.
- Power driven hand tools for removal of unsound concrete are required that meet the following requirements:
    - Pneumatic hammers weighing a nominal 15 lbs. or less.
    - Pneumatic hammer chisel-type bits that do not exceed the diameter of the shaft in width.
- Hand tools such as hammers and chisels for removal of final particles of unsound concrete.
- Self-propelled vacuum capable of picking up dust and other loose material from prepared deck surface.
- Equipment to supply oil-free and moisture-free compressed air for final surface preparation.

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

MANAGEMENT AND DISPOSAL OF CONCRETE DEBRIS

All concrete debris shall become the property of the Contractor. The contractor shall be responsible for disposing of all debris generated by scarification, shotblasting, sandblasting, and

any other surface preparation operations, in compliance with applicable regulations concerning such disposal.

All costs associated with management and disposal of all debris shall be included in the payment of other items.

OSP PLAN SUBMITTAL

Prior to beginning surface preparation activities, the Contractor shall submit for review and approval the Overlay Surface Preparation (OSP) Plan. The OSP Plan shall detail the type of equipment that is intended to be used and the means by which the Contractor will achieve the following requirements:

- Estimate depth of reinforcing steel.
- Scarification of deck to depth required.
- Measure depth of scarification to show completed within limits.
- Measure depth of shotblasting to show completed within limits.

SURFACE PREPARATION

Remove all existing asphalt overlays and all loose, disintegrated, unsound or contaminated concrete to the limits shown on the plans with the following requirements. During surface preparation, precaution shall be taken to assure that traffic is protected from rebound, dust, and construction activities. Appropriate shielding shall be provided as required and directed by the Engineer.

A. Sealing of Bridge Deck: Seal all expansion joints subject to run-off water from the scarification, shotblasting, and PPC placement process with material approved by the Engineer, prior to beginning any demolition. The expansion joints shall remain sealed until it has been determined that water and materials from the scarification, shotblasting, and PPC placement operations cannot be discharged through them any longer. Take all steps necessary to eliminate the flow of water or materials through the expansion joints, and any other locations water or materials could leak from the deck.

   All deck drains in the immediate work area and other sections of the bridge affected by the work being performed shall be sealed prior to beginning scarification. Drains shall remain sealed until it has been determined that water and materials from the scarification, shotblasting, and PPC placement operations cannot be discharged through them any longer.

B. Scarifying Bridge Deck: Remove any asphalt wearing surface from the bridge deck and scarify the concrete deck to remove the entire concrete surface of the deck to the uniform depth and limits shown on the plans.

   It will be the Contractor's responsibility to determine amount of cover for the reinforcing steel. Use a pachometer or other approved device, as approved by Engineer, prior to scarification. Readings shall be read and recorded in the presence of the Engineer. Readings shall be recorded for each span at 1/5 points longitudinally and 1/3 points transversely. The cost for this work will be considered incidental to the cost of surface preparation of the bridge deck.

   Estimated average cover to top mat:
   Currituck 16: 1½" +/-½"

The above top mat cover dimensions are an estimate based on the best available information. Calibrate scarifying equipment in order to avoid damaging the reinforcing steel in the bridge floor or the approach slab. Care shall be taken not to cut, stretch, or damage any exposed reinforcing steel. If reinforcing bars or bridge drainage devices are pulled up or snagged during scarification operations, cease work and consult with the Engineer to determine any necessary adjustments to the roto-milling operation.

Remove and dispose of all concrete and asphalt, and thoroughly clean the scarified surface. In areas where reinforcing steel is located in the depth to be scarified, use another method with the Engineer's approval.

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

Regardless of the method of removal, the removal operation shall be stopped if it is determined that sound concrete is being removed to a depth greater than required by the plans.

C. Class II Surface Preparation (Partial Depth): At locations specified on the plans for Class II Surface Preparation, verify the depth of removal achieved by the scarification. Remove by additional scarification or chipping with hand tools all existing patches and contaminated concrete to the required depth. No additional payment will be made for Class II Surface Preparation depths achieved by the initial scarification.

All patches shall be removed under Class II surface preparation. If any patch cannot be removed by means of scarification, the Contractor shall use hand tools to remove the patch. Areas indicated on the plans that require Class II surface preparation, including the locations of existing patches, are from the best information available. The Contractor shall verify prior to surface preparation the location of all existing patches.

Dispose of the removed concrete, clean, repair or replace rusted or loose reinforcing steel, and thoroughly clean the newly exposed surface. Care shall be taken not to cut, stretch, or damage any exposed reinforcing steel.

In overhangs, removing concrete areas of less than 0.60 ft^2/ft length of bridge without overhang support is permitted unless the Engineer directs otherwise. Overhang support is required for areas removed greater than 0.60 ft^2/ft length of bridge. Submit details of overhang support to the Engineer for approval prior to beginning the work.

D. Class III Surface Preparation (Full Depth): Remove by scarification and chipping with hand tools the full depth of slab. Dispose of the removed concrete, clean, repair or replace damaged reinforcing steel and thoroughly clean the newly exposed surface. Care shall be taken not to cut, stretch, or damage any exposed reinforcing steel.

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

Overhang support is required for full depth removal adjacent to bridge rails. Submit details of overhang support to the Engineer for approval prior to beginning the work.

Under Deck Containment: Under deck containment shall be installed where Class III surface preparation occurs. The containment shall be installed prior to excavation in the areas where

full depth removal is required or blow thru may occur during the scarification and excavation process.

Submit for approval detailed plans for the under deck containment system. Detail how waste, debris, and wastewater are contained.

E. Concrete Deck Repair: Repair and fill the Class II surface preparation areas of the existing bridge concrete deck prior to the final surface preparation and application of the PPC overlay, at locations shown in the plans, or as determined by the Engineer, if necessary. Materials other than PPC may be used for concrete deck repairs, but shall be approved by the PPC System Provider's Technical Representative and shall be applied and prepared as required by the PPC System Provider. For concrete deck repairs with PPC, materials, equipment, surface preparation, placement, and finishing of PPC used for deck repairs shall meet the requirements of the PPC provision. PPC repair material may be placed up to one (1) hour prior to overlay placement.

Prior to any construction, take the necessary precautions to ensure debris from bridge deck preparation and repairs is not allowed to fall below the bridge deck.

Use the following surface preparation equipment:

- Sawing equipment capable of sawing concrete to a specified depth.
- Power driven hand tools for removal of concrete are required that meet the following requirements:
  - Pneumatic hammers weighing a nominal 15 lbs (7 kg) or less.
  - Pneumatic hammer chisel-type bits that do not exceed the diameter of the shaft in width.
  - Hand tools such as hammers and chisels for removal of final particles of concrete.

Spalled or unsound areas of the deck shall be removed to sound concrete at the locations noted in the contract plans or as directed by the Engineer. Remove existing spalled or unsound areas of the bridge concrete deck by methods approved by the Engineer. Provide a 1" deep saw cut around the perimeter of areas noted for bridge deck removal. Remove, using the type of tools listed above, all concrete within the sawcut to a minimum depth of 1" and as necessary to remove unsound concrete. All loose and unsound concrete shall be removed.

If the condition of the concrete is such that deep spalls or sheer faces result, notify the Engineer for the proper course of action.

Clean, repair, or replace rusted or loose reinforcing steel. Thoroughly clean the newly exposed surface to be free of all grease, oil, curing compounds, acids, dirt, or loose debris.

All repairs shall be placed/ finished to match substrate deck grade in order to provide a uniform overlay thickness.

Concrete deck repairs with PPC may be utilized as a stand-alone item where required on structures not to receive a PPC overlay.

G. Concrete for Full Depth Repair: Repair and fill the Class III surface preparation areas with Class AA or high early strength structural concrete, in accordance with the methods described below:

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

Provide a raked finish to the surface of the Class AA concrete which provides a minimum relief of 1/16" and a maximum relief of ¼". Place the overlay course after the Class AA concrete has attained a minimum compressive strength of 2500 psi. The strength shall be verified by an approved, non-destructive test method.

Refill the areas where concrete was removed with high early strength concrete as described in the Concrete for Deck Repair and Volumetric Mixer special provisions.

Other parameters for the deck repair material and preparation shall be as required by the PPC System Provider.

H. Preparation of Reinforcing Steel: Remove concrete without cutting or damaging existing steel unless otherwise noted in the plans. Damaged reinforcing steel, such as bars with nicks deeper than 20% of the bar diameter, shall be repaired or replaced. Reinforcing steel which has a cross section reduced to 75% or less shall be replaced with new reinforcing steel of similar cross section area. Replacement bars shall be Grade 60 and meet the material requirements of Section 1070 of the Standard Specifications. Replacement bars shall be spliced to existing bars using either minimum 30 bar diameter lap splices to existing steel with 100% cross sectional area or approved mechanical connectors.

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

Reinforcing steel exposed and satisfactorily cleaned and prepared will not require additional cleaning, if encased in concrete within seven (7) days. Rebar exposed for more than seven (7) days shall be satisfactorily cleaned and prepared, prior to placement of the new concrete. The satisfactory cleanliness and preparation of the reinforcing steel shall be determined by the Engineer.

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

I. Surface Cleaning: The surface of concrete substrate shall be prepared for application of the overlay by shotblasting in order to remove all existing grease, slurry, oils, paint, dirt, striping, curing compound, rust, membrane, weak surface mortar, or any other contaminants that could interfere with the proper adhesion of the overlay system. The final prepared surface shall adhere to the following requirements:

1. If expansion joints are not being replaced or have been replaced prior to shotblasting they shall be protected from damage from the shotblasting operation. Deck drains and areas

of curb or railing above the proposed surface shall be protected from the shotblasting operation.

2. The areas to receive overlay shall be cleaned by shotblasting, or abrasive sandblasting in the event that the shotblaster cannot access areas to be prepared. Do not begin shotblasting until all grinding or milling operations are completed. Cleaning shall not commence until all work involving the repair of the concrete deck surface has been completed and the deck is dry. All contaminants shall be picked up and stored in the vacuum unit and no dust shall be created during the blasting operation that will obstruct the view of motorists in adjacent roadways. The travel speed and/or number of passes of the shotblasting unit shall be adjusted, so as to result in all weak or loose surface mortar being removed, aggregates within the concrete being exposed, and open pores in the concrete exposed, as well as a visible change in the concrete color. Cleaned surfaces shall not be exposed to vehicular traffic unless approved by the Engineer. If the deck becomes contaminated before placing the overlay, the Contractor shall shotblast or abrasive sandblast the contaminated areas to the satisfaction of the Engineer at no additional cost.
3. Prior to the overlay placement, any loose particles shall be removed by magnets and oil free compressed air and vacuuming, such that no trapped particles remain. Power washing will not be allowed.
4. The areas to be overlaid shall be blown off with oil and moisture free compressed air just prior to placement of the primer and shall be completely dry.
5. Cleaning methods other than those detailed by specification may be suggested by the PPC System Provider and approved by the Engineer.
6. All steel surfaces that will be in contact with the PPC overlay shall be cleaned in accordance with SSPC-SP No. 10, Near-White Blast Cleaning, except that wet blasting methods shall not be allowed.

J. Safety: Provide a containment system for handling expected and unexpected blow thru of the deck. The containment system shall retain runoff water and debris and protect the area under the bridge deck. The Contractor shall be responsible for any injury or damage caused by these operations. The containment system shall remain in place until the concrete has been cast and attained minimum strength.

Provide adequate lighting when performing deck preparation activities at night. Submit a lighting plan to the Engineer for approval prior to beginning work.

BASIS OF PAYMENT

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

Shotblasting Bridge Deck will be measured and paid for at the contract unit price per square yard and will be full compensation for the shotblasting and necessary sandblasting and handwork to prepare the entire concrete bridge deck, and removal and disposal of all waste material generated.

Class II Surface Preparation will be measured and paid for at the contract unit price per square yard and will be full compensation for Class II deck preparation where required by the plans. The cost will also include removal and disposal of unsound and contaminated concrete, removal of all existing patches, cleaning, repairing or replacing of reinforcing steel, and all materials, labor, tools, equipment and incidentals necessary to complete the work.

Class III Surface Preparation will be measured and paid for at the contract unit price per square yard and will be full compensation for Class III deck preparation where required by the plans. The cost will also include removal and disposal of unsound and contaminated concrete, cleaning, repairing or replacing of reinforcing steel, under deck containment, placing and finishing concrete for full depth repair, and for furnishing all materials, labor, tools, equipment and incidentals necessary to complete the work.

Payment will be made under:

Pay Item	**Pay Unit**
Scarifying Bridge Deck	Square Yard
Shotblasting Bridge Deck	Square Yard
Class II Surface Preparation	Square Yard
Class III Surface Preparation	Square Yard

POLYESTER POLYMER CONCRETE BRIDGE DECK OVERLAY (SPECIAL)

DESCRIPTION

This work consists of furnishing and placing a Polyester Polymer Concrete (PPC) overlay system with a High Molecular Weight Methacrylate (HMWM) resin primer on concrete surfaces. The surface of the concrete shall be prepared and the PPC overlay system shall be applied in accordance with this provision in conformity with the lines, grades, thickness, and typical cross-sections shown on the plans or as approved by the Engineer.

Work includes: bridge deck concrete repairs, bridge deck surface preparation; placement of HMWM primer; placement of PPC surface patching and/or overlay; and any incidentals necessary to complete the project as specified or as shown on the plans.

QUALIFICATIONS AND SUBMITTALS

The Contractor shall submit the following requested items and any other relevant documents at least two weeks prior to the PPC Overlay Pre-placement Conference. These submittals are for approval and shall be directed to the Engineer.

A. Overlay System: The Contractor shall submit two copies of the System Provider's material information, written installation instructions, material safety data sheets, and independent test results for approval.

B. System Provider Qualifications: The Contractor shall install an overlay system with all components provided through a single System Provider with documented experience successfully supplying at least 5 PPC overlay projects of similar size and scope within the past 5 years. The Contractor shall submit documentation of the System Provider's project experience including the following:
   1) Project Location
   2) Owner Agency

3) Project construction date
4) Overlay quantities
5) Reference name and contact information for owner representative

C. Contractor Qualifications: The Contractor shall submit documentation of successful projects placing structural concrete bridge decks, modified concrete bridge deck overlays, or PPC overlay systems to finished grade using similar equipment as specified herein within the past 5 years. A minimum of two (2) employees on site must have the equivalent work experience qualifications of the Contractor The documentation of Contractors qualifications shall include the following:
1) Project Location
2) Owner Agency
3) Project construction date
4) Overlay quantities
5) Reference name and contact information for owner representative

D. System Provider Technical Representative Qualifications: The System Provider Technical Representative shall have a minimum of 5 years of experience with PPC and be completely competent in all aspects of the work, including surface preparation, mixing, placement, curing, and testing of the PPC Overlay System. The Technical Representative shall have experience on a minimum of 5 successful projects of similar size and scope. The Contractor shall submit documentation of the System Provider Technical Representative's experience including the following:
1) Years of Experience with PPC
2) Project location
3) Project construction date
4) Overlay quantities
5) Reference name and contact information for owner representative

The Technical Representative shall be available on site, for a minimum of three (3) days per project, to give the installer advice and guidance on the installation of PPC. This includes, but not limited to deck concrete surface preparation, PPC application, and PPC cure.

E. Overlay Placement Plan: The Contractor shall submit an Overlay Placement Plan that includes the following:
1) Schedule of overlay work and testing for each bridge
2) Anticipated concrete deck repair locations and repair method
3) Staging plan describing overlay placement sequence including:
   a) Construction joint locations. Longitudinal construction joints between passes shall be located along the centerline or edge of travel lanes.
   b) Sequence of placement
   c) Placement widths
   d) Anticipated placement lengths
   e) Placement direction
   f) Joint locations
   g) Location of proposed trial overlay(s)
4) Description of equipment used for:
   a) Surface preparation including grinding and shotblasting
   b) Applying HMWM Primer resin

c) Measuring, mixing, placing, and finishing the PPC
d) Applying surface finish sand

5) Method of protecting and finishing inlets and bridge drains
6) Method for isolating expansion joints
7) Method for measuring and maintaining overlay thickness and profile
8) Cure time for PPC
9) Storage and handling of HMWM resin and PPC components
10) Procedure for disposal of excess HMWM resin, PPC, and containers
11) Procedure for cleanup of mixing and placement equipment

F. Equipment: The Contractor shall submit documentation of current certification that mixing equipment has been calibrated (Caltrans California test CT 109 or similar accepted). The Contractor shall submit a documented history of the use of the placement equipment to successfully place PPC overlays on bridge projects for review and approval by the Engineer.

MATERIALS

The PPC shall consist of polyester resin binder and aggregate as specified below. It shall also include a compatible primer which when mixed with other specified ingredients and applied as specified herein, is capable of producing a PPC meeting the requirements of this specification.

1) Verification. The Contractor shall submit a Certified Test Report from independent labs for all of the materials associated with the PPC overlay in accordance with this special provision.

2) Packaging and Shipment. All components shall be shipped in strong, substantial containers, bearing the manufacturer's label specifying batch/lot number, brand name, and quantity. If bulk resin is to be used, the contractor shall notify the Engineer in writing 10 days prior to the delivery of the bulk resin to the job site. Bulk resin is any resin that is stored in containers in excess of 55 gallons.

3) Sampling. NCDOT reserves the right to retain and test samples of components of the PPC Overlay system. This includes requiring submittal of samples prior to the first installation or on-site sampling during construction.

A. Polyester Resin Binder: Polyester resin binder shall have the following properties:
1) Be an unsaturated isophthalic polyester-styrene co-polymer. The resin content shall be 12% +/-1% of the weight of the dry aggregate.
2) Contain at least 1 percent by weight gamma-methacryloxypropyltrimethoxysilane, an organosilane ester silane coupler.
3) Be used with a promoter that is compatible with suitable methyl ethyl ketone peroxide and cumene hydroperoxide initiators.
4) Meet the required values for the material properties shown in Table 1, below.

Accelerators or inhibitors may be required to achieve proper setting time of PPC. They shall be used as recommended by the overlay System Provider.

Table 1
POLYESTER RESIN BINDER PROPERTIES
(Each lot sent to job shall be tested)

Property	Test Method	Requirement

Viscosity*	ASTM D 2196	75 – 200 cps (RVT No.1 Spindle, 20 RPM at 77 °F)
Specific Gravity*	ASTM D 1475	1.05 to 1.10 at 77 °F
Elongation	ASTM D 638	35 percent, minimum Type I specimen, thickness 0.25 ± 0.03" at Rate = 0.45 inch/minute.
	ASTM D 618	Sample Conditioning: 18/25/50+5/70
Tensile Strength	ASTM D 638	2,500 psi, minimum Type I specimen, thickness 0.25 ± 0.03" at Rate = 0.45 inch/minute.
	ASTM D 618	Sample Conditioning: 18/25/50+5/70
* Test shall be performed before adding initiator.		

B. High Molecular Weight Methacrylate (HMWM) Primer: Primer for the substrate concrete surface shall be a wax-free, low odor, high molecular weight methacrylate primer, and consist of a resin, initiator, and promoter. The primer shall conform to requirements indicated in Table 2, below, and all components shall be supplied by the System Provider.

Initiator for the methacrylate resin shall consist of a metal drier and peroxide. If supplied separately from the resin, the metal drier shall not be mixed with the peroxide directly; a VIOLENT EXOTHERMIC REACTION will occur. The containers and measuring devices shall not be stored in a manner that allows leakage or spilling to contact the containers or materials of the other.

Table 2
HIGH MOLECULAR WEIGHT METHACRYLATE RESIN PROPERTIES
(Tested yearly)

Property	Test Method	Requirement
Viscosity**	ASTM D 2196	25 cps maximum (Brookfield RVT with UL adapter, 50 RPM at 77 °F)
Volatile Content**	ASTM D 2369	30 percent, maximum
Specific Gravity**	ASTM D 1475	0.90 minimum at 77 °F
Flash Point	ASTM D 3278	180 °F minimum
Vapor Pressure**	ASTM D 323	1.0 mm Hg, maximum at 77 °F
PCC Saturated Surface-Dry Bond Strength (Adhesive)	California Test 551, part 5	700 psi, minimum at 24 hours and 70 ± 1°F (with PPC at 12% resin content by weight of the dry aggregate), primed surface
**Test shall be performed before initiator is added		

C. Aggregates: PPC aggregate shall have the following properties:
1) No more than 45 percent crushed particles retained on the No. 8 sieve when tested in accordance with AASHTO Test Method T335.
2) Fine aggregate consists of natural sand only.

3) Weighted-average aggregate absorption of no more than 1.0 percent when tested under AASHTO Test Methods T84 and T85.
4) At the time of mixing with resin, have moisture content of not more than one half of the weighted-average aggregate absorption when tested under AASHTO Test Method T255.
5) Moh's hardness of 7 or greater.
6) Comply with the requirements for the aggregate gradation indicated in Table 3, below:

Table 3
AGGREGATE GRADATION
(Tested yearly)

Sieve Size	Percent Passing
3/8"	100
No. 4	60-85
No. 8	55-65
No. 16	29-50
No. 30	16-36
No. 50	5-20
No. 100	0-7
No. 200	0-3

Sand for abrasive sand finish shall have the following properties:
1) Commercial-quality blast sand.
2) Not less than 95 percent pass the No. 8 sieve and not less than 95 percent retained on the No. 20 sieve when tested under AASHTO Test Method T27.
3) Shall be dry at the time of application.

D. Composite system: The composite PPC system shall have the following properties indicated in Table 4, below:

Table 4
COMPOSITE PROPERTIES
(Tested every 2 years)

Property	Test Method	Requirement
PCC Saturated Surface Dry Bond Strength	CT 551	500 psi minimum at 24 hrs. and 70° F (without primer, at 12% resin content by weight of the dry aggregate, on Saturated Surface Dry Specimen)
Abrasion Resistance	CT 550	<2g weight loss (at 12% resin content by weight of the dry aggregate)
Modulus of Elasticity	ASTM C 469	1,000,000 psi to 2,000,000psi (at 12% resin content by weight of the dry aggregate)

CONSTRUCTION REQUIREMENTS

A. PPC Overlay Pre-placement Conference: A Pre-placement Conference shall be held before any overlay operations begin. Attendees shall include representatives from all parties

involved in the work. If necessary, teleconferencing of attendees may be approved by the Engineer.

B. Trial Application: Prior to constructing the overlay, one or more trial applications shall be placed on a previously constructed concrete base to demonstrate proper initial set time and the effectiveness of the mixing, placing, and finishing equipment proposed. The set time can be determined as the time elapsed from resin catalyzation until the in-place PPC cannot be deformed by pressing with a finger, indicating the resin binder is no longer in a liquid state. Each trial application shall be the planned paving width, at least 10 feet long, and the same thickness as the specified overlay. Conditions during the construction of the trial application(s) and equipment used shall be similar to those to be used for construction of the overlay. The location of the trial application(s) shall be approved by the Engineer. Trial applications shall be properly disposed of off-site by the Contractor, if removal is necessary.

The number of trial applications required shall be as many as necessary for the Contractor to demonstrate the ability to construct an acceptable trial overlay section and competency to perform the work. However, the installer or proposed equipment/techniques may be rejected if not shown to be acceptable after three (3) trials.

Overlay tensile bond testing shall be performed in accordance with the acceptance testing herein. Vertical axis pull bond tests shall be performed after 24 hours by the Contractor in accordance to ACI 503R-30. At a minimum, 2 pull bond tests shall be performed on each Trial Application. Acceptable test results shall be achieved on a Trial Application before the installation may proceed. Tensile bond testing shall be performed by an independent testing firm and shall be arranged by the Contractor, cost to be included in bid price for *Placing and Finishing PPC Overlay* item.

C. Equipment: All equipment for cleaning the existing concrete surface and mixing and applying the overlay system shall be in accordance with the System Provider's recommendations, as approved by the Engineer prior to commencement of any work.

1) Surface Preparation Equipment: Provide appropriate scarifying, shotblasting, sandblasting and other equipment to adequately prepare the bridge deck substrate, as required in the Overlay Surface Preparation for Polyester Polymer Concrete special provision.

2) Mixing Equipment: A continuous automated mixer shall be used for all PPC overlay applications. The continuous mixer shall:
   a. Employ an auger screw/chute device capable of sufficiently mixing catalyzed resin with dry aggregate.
   b. Employ a plural component pumping system capable of handling polyester binder resin and catalyst while maintaining proper ratios to achieve set/cure times within the specified limits. Catalyzed resin shall flow through a static mix tube for sufficient duration to completely mix the liquid system.
   c. Be equipped with an automatic metering device that measures and records aggregate and resin volumes. Record volumes at least every five minutes, including time and date. Submit recorded volumes at the end of the work shift.
   d. Have a visible readout gage that displays volumes of aggregate and resin being recorded.
   e. Produce a satisfactory mix consistently during the entire placement.

A portable mechanical mixer of appropriate size for proposed batches, as recommended by the System Provider and approved by the Engineer, may be used for all PPC patching applications and for smaller area overlay applications if approved by the Engineer.

3) Finishing Equipment: Finishing may be accomplished with a Self-Propelled Slip-Form Paving Machine.

Self-Propelled Slip-Form Paving Machine

A self-propelled slip-form paving machine, which is modified or specifically built to effectively place the PPC overlay in a manner that meets the objectives and requirements of the project, shall be used for major PPC overlay applications. The paving machine shall:

a. Employ a vibrating pan to consolidate and finish the PPC.
b. Be fitted with hydraulically controlled grade automation to establish the finished profile. The automation shall be fitted with substrate grade averaging devices on both sides of the new placement; the device shall average 15 feet in front and behind the automation sensors; or the sensor shall be constructed to work with string-line control. It is acceptable to match grade when placing lanes adjacent to previously placed PPC.
c. Have sufficient engine power and weight to provide adequate vibration of the finishing pan while maintaining consistent forward placement speed.
d. Be capable of both forward and reverse motion under its own power.

D. Concrete Deck Repairs and Surface Preparation: Prepare and repair all concrete deck surfaces in accordance with the requirements of the Overlay Surface Preparation for Polyester Polymer Concrete special provision.

E. Application of Overlay: Methods indicated in this specification are typical of general installations and may be modified per the System Provider's recommendations as approved by the Engineer. The application of the overlay shall not begin until the concrete deck is completely surface dry in accordance with ASTM D4263, with a wait time revised from 16 hours to 2 hours, or as directed by the System Provider's Technical Representative. The concrete surface temperature shall be between 40° and 100° F. Night work may be required when temperatures cannot be met during the day.

During surface preparation and overlay application, precaution shall be taken to assure that traffic is protected from rebound, dust, and construction activities. Appropriate shielding shall be provided as required and directed by the Engineer.

During overlay application, the Contractor shall provide suitable coverings (e.g. heavy duty drop cloths) as needed to protect all exposed areas not to receive overlay, such as curbs, sidewalks, parapets, etc. All damage or defacement resulting from this application shall be cleaned and/or repaired to the Engineer's satisfaction at no additional cost.

1) HMWM Primer Application: Immediately before placing primer, all exposed surfaces shall be completely dry and blown clean with oil-free compressed air. Exposed surfaces shall be protected from precipitation and heavy dew during and after the application of the primer.

After the exposed surfaces have been prepared and are dry, primer shall be applied in accordance with the System Provider's recommendations. Primer shall be placed within 5 minutes of mixing at approximately 90 ft^2/ gal or the rate acceptable to the Engineer.

Primer shall be applied by flooding and uniformly spread to completely cover surfaces to receive overlay. Care shall be taken to avoid heavy application that results in excess puddling. Excess material shall be removed or distributed to meet the required application rate. Primer shall be reapplied to any areas that appear dry prior to overlay placement.

Primer shall not be allowed to leak onto areas that have not received surface preparation.

2) PPC Application: The PPC shall be applied during the interval between 15 minutes and 2 hours after the primer has been applied. The PPC shall be placed prior to gelling and within 15 minutes following addition of initiator, unless otherwise recommended by the System Provider's Technical Representative.

The polyester resin binder shall be initiated and blended completely. Aggregate shall be added and mixed sufficiently when a portable mechanical mixer is used.

PPC shall have an initial set time of at least 30 minutes and at most 90 minutes. The set time can be determined in the field when the in-place PPC cannot be deformed by pressing with a finger, indicating that the resin binder is no longer in a liquid state. If the initial set is not within 30 to 90 minutes, the material shall be removed and replaced.

The overlay shall be consolidated and finished to the required grade and cross-section using PPC placement equipment as defined herein.

If a vibratory screed is used, prior to placing the PPC, place and fasten screed rails in position to ensure finishing the new surface to the required profile. Do not treat screed rails with parting compound to facilitate their removal. Prior to placing the overlay, attach a filler block to the bottom of the screed and pass it over the overlay area to check the thickness. The filler block thickness shall be equal to the design overlay thickness as shown in the plans. Remove all concrete that the block does not clear.

Place the PPC in one operation. Provide a minimum overlay thickness as shown in the plans.

Although the paver or screed may yield a finished or nearly finished surface, additional finishing may be necessary. PPC shall be finished, as necessary, through traditional concrete finishing methods, producing a slight resin bleed indicating complete consolidation of aggregates.

Finishing of PPC used as patching of an existing deck surface or overlay shall be completed and finished using traditional concrete hand finishing methods and hand concrete finishing tools. Such patches shall be placed flush with the top of the existing deck surface.

Resin content shall be as specified in the Materials section of this special provision and to yield a PPC consistency that requires surface applied consolidation and finishing to consolidate aggregates and yield a slight sheen of bleed resin on top surface, yet does not yield excess bleed resin.

A surface friction sand finish of at least 2.2 lbs/ yd^2 shall be broadcast onto the glossy surface immediately after sufficient finishing and before resin gelling occurs. To ensure adequate pavement friction, the completed PPC overlay surface shall be free of any smooth or "glassy" areas such as those resulting from insufficient quantities of surface

aggregate. Any such surface defects shall be repaired by the Contractor in the manner recommended by the System Provider and approved by the Engineer at no additional cost.

After application of surface friction sand, unless otherwise indicated on the plans, groove the bridge floor in accordance with Article 420-14(B) of the Standard Specifications. Vehicular traffic may travel across a deck surface that has not been grooved; however, the entire deck area shall be grooved after the PPC overlay achieves design strength and no later than seven days after completion of the overlay unless otherwise approved by the Engineer.

All working deck joints shall be extended through the overlay and be sealed according to the details in the plans.

If traffic is to be returned to the site, but the overlay is not completed within the allowable lane closure time and is more than ¾ inch higher in elevation than the adjacent pavement, the PPC overlay edges shall be tapered. Tapered edges transverse to the direction of traffic and on the leading edge of the overlay shall be at a 4:1 (horizontal:vertical) slope. Tapered edges transverse to the direction of traffic and on the trailing edge of the overlay and tapered edges longitudinal to the direction of traffic shall be at a 45 degree slope. Tapers of 45 degrees may remain, and PPC overlay may be placed adjacent. Tapers with a slope gentler than 45 degrees shall be sawcut square to the overlay surface, prior to placing adjacent PPC overlay.

The Contractor shall collect a ticket for each pass or portion of a pass that is provided by each mixer, and ensure that the following information is shown on each ticket:

a. Project Number
b. Bridge Number
c. Date and Time
d. Location of Placement (Lane and Station Limits or location and length of placement along the length of the bridge)
e. Aggregate Weight
f. Polyester Resin Binder Weight

The tickets shall be available on site for Inspection personnel to use in tabulating quantities.

Curing: The Contractor shall allow the overlay to cure sufficiently before subjecting it to loads or traffic of any nature that may damage the overlay. Cure time depends upon the ambient and deck temperatures as well as initiator/accelerator levels.

The overlay shall be considered cured to a traffic ready state when a minimum reading of 25 on a properly calibrated Swiss hammer is achieved. Other rebound hammers may be use as approved by the Engineer.

F. Acceptance Testing: Acceptance of the deck repairs, surface preparation, and PPC overlay will be determined by the Engineer based on vertical axis bond tests, and smoothness quality testing performed by the Engineer, assisted by the Contractor.

1) Overlay Direct Tension Bond Testing: Vertical axis pull bond tests shall be performed after 24 hours by the Contractor in accordance to ACI 503R-30. At a minimum, 2 pull bond tests shall be performed on each bridge overlay. For bridges with deck areas greater

than 25,000 square feet, additional tests shall be performed at a frequency of one test per 25,000 square feet of additional deck area, rounded up. Additional testing may be required as directed by the Engineer.

The test result shall be the average of the tests for each structure. Test cores shall be drilled a minimum of 0.25" but no greater than 0.50" below the bond line.

The minimum bond strength of the PPC overlay system on normal weight concrete shall be 250 psi. An acceptable test will demonstrate that the overlay bond strength is sufficient by producing a concrete subsurface failure area greater than 50% of the test surface area. The Contractor shall repair all bond test locations with PPC overlay in accordance with this specification.

2) Smoothness Quality Testing: As soon as practical after the PPC has hardened sufficiently, test the finished surface with an approved rolling straightedge that is designed, constructed, and adjusted, so that it will accurately indicate or mark all deck areas which deviate from a plane surface by more than 1/8” in 10’. Remove all high areas in the hardened surface in excess of 1/8” in 10’ with an approved grinding or cutting machine. Additionally, the final PPC deck surface shall not deviate from the line and elevation indicated on the plans by more than 0.3” over any 50’ length. If approved by the Engineer, correct low areas in an acceptable manner.

G. Corrective Work

1) Repair of Surface Defects: The repair materials and finishing methods for surface defects in the overlay shall be in accordance to those used for the application of the overlay. All surface defects shall be repaired to the satisfaction of the Engineer before acceptance of the work is made.

2) Correction for Smoothness: Areas showing high spots of more than 1/8 inch in 10 feet shall be marked and diamond ground until the high spot does not exceed 1/8 inch in 10 feet. Ground surface may be sawcut grooved to restore the texture if ordered by the Engineer. Areas showing low spots of more than 1/8 inch in 10 feet shall be marked and prepared with shot blasting or sandblasting, primed, and filled with either catalyzed resin and broadcast sand or mixed PPC slurry material. The use of resin or mixed slurry material shall be as recommended by the System Provider and approved by the Engineer.

3) Replacement of Defective Overlay: A defective overlay, or portion thereof, resulting in failing overlay pull bond test results shall be removed and replaced at the Contractor’s expense. The Contractor shall submit a written corrective work proposal to the Engineer, which shall include the methods and procedures that will be used. The Contractor shall not commence corrective work until the methods and procedures have been approved in writing by the Engineer. The Engineers approval shall not relieve the Contractor of the responsibility of producing work in conformity with the Contract.

4) Repair of Cracking: After a one-week cure period, if cracks are in the overlay, the Contractor shall fill the cracks with properly catalyzed and mixed HMWM primer material at his own expense. Care shall be taken to fill the cracks only, and ensure minimal HMWM primer is left on the finished surface of the overlay.

MEASUREMENT AND PAYMENT

PPC Materials will be measured as the actual volume of PPC material complete-in-place. The volume shall include material used for overlay, patching of existing unsound concrete deck surface or overlays, and bridge deck concrete repairs as directed by the Engineer. Tickets provided to the project inspector, showing quantities of PPC produced, shall be sufficient to calculate volume of material placed. Materials placed for Trial Overlay shall be included in Pay Quantity if placed and remaining on the bridge deck as part of the permanent overlay. *PPC Materials* will be paid for at the contract unit price per cubic yard and will be full compensation to furnish the PPC material, including HMWM primer, freight to the project site, receiving, storage, and disposal of any unused PPC overlay material. Payment by cubic foot will be based on a 135 lbs/ ft^3 unit weight and quantities recorded by calibrated mixer unit readouts.

Placing and Finishing PPC Overlay will be measured and paid for as the quantity of final surface finishing. Payment will be full compensation for all labor, equipment, and all incidentals necessary to complete the PPC overlay placement. Construction and removal (if required) of Trial Overlay, including concrete base surfaces, will not be measured and paid for separately, but shall be included in the work.

Payment will be made under:

Pay Item	**Pay Unit**
PPC Materials	Cubic Yard
Placing and Finishing PPC Overlay	Square Yard

SILICONE JOINT SEALANT (SPECIAL)

SEALS

Provide and install a low modulus silicone sealant (non-sag or self-leveling) and backer rod which conforms to the Standard Specifications (Subsections 1023-3 and 1023-4, respectively) and this Special Provision. Use silicone approved for use on joint openings as indicated on project plans and provide a seal with a working range of minimum 50% compression and extension. Silicone joint seal product shall be designated as approved for use on the NCDOT Approved Products List. If non-sag and self-leveling sealants are to be in contact with each other, they shall be from the same manufacturer and shall be compatible for such use.

PREPARATION OF FORMED OR SAWED JOINT FOR SEAL INSTALLATION

The polyester polymer concrete shall cure a minimum of 24 hours prior to seal installation.

After forming or sawing the joint, the Engineer will thoroughly inspect the joint opening for spalls, popouts, cracks, etc. All necessary repairs will be made by the Contractor prior to blast cleaning and installing the seal.

Clean the joints by sandblasting the joint opening to provide a firm, clean joint surface free of curing compound, loose material, and any foreign matter. Sandblast the joint opening without causing pitting or uneven surfaces. The aggregate in the polyester polymer 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 is used to clean the joint opening, 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.

Install the backer rod and silicone sealant in the blast cleaned opening on the same day the surface is blast cleaned.

SEAL INSTALLATION

Install the silicone joint sealant(s) as indicated on the plans, in accordance with the manufacturer's procedures and recommendations, and as recommended below. Do not install the joint seal if the ambient air or surface temperature is below 45°F. Have a manufacturer's certified trained factory representative present during the installation of the first seal of the project, to provide guidance for the proper installation of the silicone joint sealant(s).

After a joint has been sealed, remove excess joint sealer on the pavement or bridge deck concrete as soon as possible.

The installed system shall be watertight and will be monitored until final inspection and approval.

Do not place pavement markings on top of pourable joint seals.

BASIS OF PAYMENT

Silicone Joint Sealant will be measured and paid for at the contract unit price bid per linear foot and will be full compensation for furnishing all material, including backer rod, labor, tools, and equipment necessary for installing these seals in place and accepted.

Payment will be made under:

Pay Item	Pay Unit
Silicone Joint Sealant	Linear Feet

REMOVE AND REPLACE CONCRETE WEARING SURFACE (SPECIAL)

GENERAL

This Special Provision governs equipment, materials, forming, and all other related work in the removal and construction of a reinforced concrete wearing surface in accordance with applicable parts of the Standard Specifications, the details shown on the plans, and as outlined in these Special Provisions.

EQUIPMENT

Prior to beginning any work, obtain approval for all equipment to be used for removal of existing concrete wearing surface, removal of the existing cored slab keyway grout, deck preparation, placing, finishing, and curing the concrete wearing surface:

- Milling equipment that is a power-operated, mechanical grinder capable of removing a minimum depth of ¼" for each pass.
- Shotblasting and sandblasting equipment to adequately prepare the cored slab concrete substrate, as required in this provision. Provide equipment to supply oil-free and moisture-free compressed air for final surface preparation.
- Power driven router tools capable of removing concrete and grout.
- Power driven hand tools for removal of unsound concrete and grout are required that meet the following requirements:
    - Pneumatic hammers weighing a nominal 15 lbs. or less.
    - Pneumatic hammer chisel-type bits that do not exceed the diameter of the shaft in width.
- Hand tools such as hammers and chisels for removal of final particles of unsound concrete and grout.
- Vacuum capable of picking up dust and other loose material from prepared deck surface and shear keyways.
- Equipment to supply oil-free and moisture-free compressed air for final surface preparation.
- If using high pressure water blast, a minimum nozzle pressure of 3000 psi is required.

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

MATERIALS

Unless otherwise noted on the plans, use class AA concrete and a coarse aggregate gradation of 78M. The Class AA concrete shall contain fly ash or ground granulated blast furnace slag at the substitution rate specified in Article 1024-1 and in accordance with Articles 1024-5 and 1024-6 of the Standard Specifications. Place the wearing surface according to the grades, thicknesses and cross sections shown on the plans.

REMOVAL OF EXISTING CONCRETE WEARING SURFACE

Remove existing latex-modified concrete wearing surface from the top of the cored slabs to the limits shown on the plans. Removal may be by a combination of milling or scarification and handwork. Existing latex-modified concrete wearing surface may contain reinforcing steel. Prior to removal of existing wearing surface, with pachometer or other similar device, confirm presence of reinforcing steel.

Remove the entire existing concrete wearing surface, but particular care shall be taken to ensure the concrete of the existing cores slabs is not damaged. The removal operation shall be stopped if it is determined that sound concrete is being removed to a depth greater than required to remove the existing concrete wearing surface. Excessive removal of concrete from or damage to the existing concrete slabs shall be repaired by the Contractor at no additional cost to the Department.

REMOVAL AND REPAIR OF CORED SLAB SHEAR KEYWAYS

After removal of the existing concrete wearing surface, use power tool routing equipment and hand tools, as necessary, to remove all grout from the shear keyways between cored slabs. Use extreme care to ensure that the cored slabs are not damaged and that the keyways retain their

existing shape and dimensions. Excessive removal of concrete from or damage to the existing concrete slabs shall be repaired by the Contractor at no additional cost to the Department.

Remove all grout and debris from each keyway and prepare the keyway surfaces by sand blasting to remove grease, oil, and other contaminants. Use vacuum equipment and oil-free and water-free compressed air equipment to remove cleaning debris from the keyways.

After preparation of the keyways, place new backer rod between cored slabs, below the keyways. Fill keyways with an epoxy mortar meeting requirements of Type I epoxy, as indicated in Section 1081 of the Standard Specifications. As required by the epoxy mortar manufacturer, further prepare the keyway concrete surfaces. Completely fill the keyways and consolidate the epoxy mortar grout and finish to the top of the cored slab surfaces.

PREPARATION OF SURFACE

Prepare all surfaces to be overlaid using the equipment specified herein and prior to placing the welded wire reinforcing steel. Additionally, clean the surface within 48 hours prior to placing the overlay unless otherwise approved.

After removal of the existing concrete wearing surface and prior to placement of the new concrete wearing surface, the surface of concrete substrate shall be prepared for application of the concrete wearing surface by shotblasting in order to remove all existing grease, slurry, oils, dirt, weak surface mortar, or any other contaminants that could interfere with the proper adhesion of the concrete wearing surface. The final prepared surface shall adhere to the following requirements:

1. Deck drains and areas of curb or railing above the proposed surface shall be protected from the shotblasting operation.
2. The areas to receive concrete wearing surface shall be cleaned by shotblasting or abrasive sandblasting in the event that the shotblaster cannot access areas to be prepared. Do not begin shotblasting until all grinding or milling operations are completed. All contaminants shall be picked up and stored in the vacuum unit and no dust shall be created during the blasting operation that will obstruct the view of motorists in adjacent roadways. The travel speed and/or quantity of passes of the shotblasting unit shall be adjusted, so as to result in all weak or loose surface mortar being removed. Cleaned surfaces shall not be exposed to vehicular traffic unless approved by the Engineer. If the deck becomes contaminated before placing the concrete wearing surface, the Contractor shall shotblast or abrasive sandblast the contaminated areas to the satisfaction of the Engineer at no additional cost.
3. Prior to the overlay placement, any loose particles shall be removed by magnets and oil free compressed air and vacuuming, such that no trapped particles remain.
4. Thoroughly soak the cleaned surface for at least 12 hours prior to placing the concrete wearing surface. While soaking the surface, cover it with a layer of white opaque polyethylene film that is at least 4 mils thick. Immediately prior to placing the concrete wearing surface, remove standing water from the surface.

PLACING AND FINISHING

Follow the placing, finishing, and curing requirements of Article 420-14 (A) and (B).

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

LIMITATIONS OF OPERATIONS

The requirements of Article 420-20 will apply to placing vehicles and construction equipment on the finished concrete wearing surface.

Use insulation that meets the requirements of Article 420-7(C), and if required, place it on the concrete wearing surface as soon as the initial set permits.

METHOD OF MEASUREMENT

The quantity of concrete wearing surface to be paid for is the actual number of square feet of concrete wearing surface as provided on the plans.

BASIS OF PAYMENT

Removal of Existing Concrete Wearing Surface will be measured and paid for at the contract unit price per square foot and will be full compensation for applicable work covered by this Special Provision and applicable parts of the Standard Specifications, but not limited to the milling of existing concrete wearing surface from the bridge deck and the cleaning and disposal of all waste material generated.

Removal and Replacement of Shear Keyways will be measured and paid for at the contract unit price per linear foot and will be full compensation for applicable work covered by this Special Provision and applicable parts of the Standard Specifications, but not limited to removal of the existing grout in the Span 154 cored slab shear keyways, necessary sandblasting and handwork to clean and prepare the shear keyways, removal and disposal of all waste material generated, and placement of new epoxy mortar in the shear keyways.

Concrete Wearing Surface will be measured and paid for at the contract unit price per square foot will be full compensation for applicable work covered by this Special Provision and applicable parts of the Standard Specifications, but not limited to preparation of the cored slab concrete surface, furnishing and placing concrete, welded wire reinforcing steel, deck drains, bridge scuppers, and any other material; erecting and removing all forms, curing concrete, protecting concrete in wind, rain, low humidity, high temperatures or other unfavorable weather.

Payment will be made under:

Pay Item	**Pay Unit**
Removal of Existing Concrete Wearing Surface	Square Foot
Removal and Replacement of Shear Keyways	Linear Foot
Concrete Wearing Surface	Square Foot

CLEANING AND PAINTING EXISTING BEARINGS WITH HRCSA

DESCRIPTION

These items of work shall consist of cleaning, preparation, and field application of the specified paint system to existing steel bridge bearings and for all labor, materials, tools and equipment necessary, to complete the work to the limits shown on the plans, described in these special provisions, or as directed by the Engineer.

The bridge bearings shall be cleaned using hand tools, power tools, and high pressure water equipment. Using dry compressed air, connections and crevices will be dried completely. Rust penetrant will be applied to all open connections, crevices, pack rust and scale rust areas. A paint system with a co-polymerized high ratio of 'active' calcium sulfonate (HRCSA) will be used as a stripe coat at all connections/crevices and as a topcoat over the bearings.

CERTIFICATION

The existing paint systems include toxic substances such as red lead oxide, which are considered hazardous if improperly removed. The contractor shall be currently SSPC QP 2, Category A certified, and have successfully completed lead paint removal and field painting on similar structures within 18 months prior to this bid.

The apparent low bidder shall submit a list of projects for which QP 2 work was performed within the last 18 months including owner contact information and submit to the Assistant State Structures Engineer (Operations) 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/projects/ncbridges/#stats**.

The Engineer will evaluate the work history to verify all lead abatement work was 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 Article 102-2 of the *2012 Standard Specifications*.

TWELVE-MONTH OBSERVATION PERIOD

The Contractor maintains responsibility for the coating system for a 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 shall guarantee the coating system under the payment and performance bond (refer to Article 109-10 of the *2012 Standard Specifications*). To successfully complete the observation period, the coating system shall meet the following requirements after 12 months service:

(A) No visible rust, contamination or application defect is observed in any coated area.
(B) Painted surfaces have a uniform color and gloss.

(C) Painted surfaces have an adhesion that meets an ASTM D3359, 3A rating.

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

SUBMITTALS

Submit all of the following to the Engineer for review and approval before scheduling the pre-construction meeting. Allow 40 calendar days for review and approval, or acceptance, of working drawings, from the date they are received, until they are returned by the Engineer.

(A) Work schedule which shall be kept up to date, with a copy of the revised schedule being provided to the Engineer in a timely manner,
(B) Containment Drawings in accordance with SSPC Guide 6, Class 2W sealed by a Professional Engineer licensed by the State of North Carolina,
(C) Bridge wash water sampling and disposal plan,
(D) Subcontractor identification,
(E) Lighting plan for night work in accordance with Section 1413 of the *2012 Standard Specifications*. Lighting shall be equipped with explosion-proof fixtures,
(F) Traffic control plan with NCDOT certified supervisors, flaggers and traffic control devices,
(G) Health and safety plan addressing at least the required topics as specified by the SSPC QP 1 and QP 2 program and including hazard communication, respiratory health, emergency procedures, and local hospital and treatment facilities with directions and phone numbers, disciplinary criteria for workers who violate the plan and accident investigation. The plan shall address the following: hazardous materials, personal protective equipment, general health and safety, occupational health and environmental controls, fire protection and prevention, signs signals, and barricades, materials handling, storage, use, and disposal, hand and power tools, welding and cutting, electrical, scaffolds, fall protection, cranes, derricks, hoists, elevators, and conveyors, ladders, toxic and hazardous substances, airless injection and HPWJ.
(H) Provide the Engineer a letter of certification that all employees performing work on the project have blood lead levels that are below the OSHA action level.
(I) Provide the Engineer with Competent Person qualifications and summary of work experience.
(J) Environmental Compliance Plan
(K) Quality Control Plan (Project Specific) with quality control qualifications and summary of work experience.
(L) Bridge and Public Protection Plan (Overspray, Utilities, etc. - Project/Task Specific)
(M) Soluble salt removing chemical for use during high pressure water cleaning
    (1) Product Data Sheet
(N) Coating Material
    (1) NCDOT HICAMS Test Reports (testing performed by NCDOT Materials and Tests Unit),
    (2) Product Data Sheets,
    (3) Material Safety Data Sheets,
    (4) Product Specific Repair Procedures, and

(5) Acceptance letters from paint manufacturers for work practices that conflict with Project Special Provisions and/or paint manufactures product data sheets.

PRE-CONSTRUCTION MEETING

Submittals shall be reviewed and approved by the Engineer prior to scheduling the pre-construction meeting. Allow no less than 2 weeks for a review process. When requesting a pre-construction meeting, contact the Engineer at least 7 working days in advance of the desired pre-construction date. The contractor's project supervisor, Competent person, quality control personnel, coating manufacturer's representative, and certified traffic control supervisor shall be in attendance at the pre-construction meeting in order for the Contractor and NCDOT team to establish responsibilities for various personnel during project duration and to establish realistic timeframes for problem escalation.

CONTAINMENT PLAN

If a containment plan for Painting of Existing Structure is submitted for a bridge that will have its bearings cleaned and painted with HRCSA, the containment plan for that structural steel painting operation will suffice for cleaning and painting existing bearings with HRCSA. If the structural steel of a bridge is not to be cleaned and painted, and no containment plan has been submitted for that bridge, if that bridge will have its bearings cleaned and painted with HRCSA, a containment plan for cleaning and painting existing bearings with HRCSA shall be submitted for review and approval.

No work shall begin until the Contractor furnishes the Engineer with a containment plan for surface preparation and coating operations and the Engineer reviews and approves, in writing, the acceptability of said plan. Allow a minimum of two weeks for review of the plan. Such plan shall meet or exceed the requirements of Class 2W containment in accordance with SSPC Guide 6. Enclosure drawings and loads supported by the containment structure shall be prepared, signed and sealed by a Professional Engineer licensed by the State of North Carolina.

In the containment plan describe how debris is contained and collected. Describe the type of tarpaulin, bracing materials and the maximum designed wind load. Describe the paint and debris collection system. Describe how the airflow inside the containment structure is designed to meet all applicable OSHA Standards. Describe how wash water will be contained and paint chips separated. Describe how water run-off from rain will be routed by or through the enclosure. Describe what physical containment will be provided during painting application to protect the public and areas not to be painted.

WASH WATER SAMPLING AND DISPOSAL PLAN

No work shall begin 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). 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 Federal and State regulations. See link for NCDOT Guidelines for Managing Bridge Wash Water: **http://www.ncdot.gov/projects/ncbridges/#stats**.

WASTE HANDLING OF PAINT AND DEBRIS

Comply with all Federal, State and local regulations. Failure to comply with the regulations could result in fines and loss of qualified status with NCDOT.

Comply with the Resource Conservation and Recovery Act (RCRA - 40 CFR 261 - 265) and the Occupational Safety and Health Act (OSHA - 29 CFR 1910 - 1926) regulations for employee training, and for the handling, storage, labeling, recordkeeping, reporting, inspections and disposal of all hazardous waste generated during paint removal.

A summary of Generator Requirements is available at the above NCDOT web link which cites the specific regulations for each Generator category. Quantities of waste by weight and dates of waste generation shall be recorded. Waste stored at the project site shall be properly labeled. All waste, hazardous or non-hazardous, requires numbered shipping manifests.

The North Carolina Department of Environment and Natural Resources (NCDENR) have adopted RCRA as the North Carolina Hazardous Waste Management Rules and are responsible for enforcement. The "Hazardous Waste Compliance Manual for Generators of Hazardous Waste" is published by the Compliance Branch of the Division of Waste Management of NCDENR, and can be found at: **http://portal.ncdenr.org/web/wm/hw/rules**.

Use a company from the below list of approved waste management companies. Immediately after award of the contract, arrange for waste containers, sampling, testing, transportation and disposal of all waste. No work shall begin until the Contractor furnishes the Engineer with a written waste disposal plan. Any alternative method for handling waste shall be pre-approved by the Engineer.

Southern Logistics, Inc.
312 Orville Wright Dr., Greensboro, NC 27409
(Phone 336-662-0292)
A&D Environmental
PO Box 484, High Point, NC 27261
(Phone 336-434-7750)
Poseidon Environmental Services, Inc.
837 Boardman-Canfield Rd #209, Youngstown, OH
(Phone 330-726-1560)
Clean Harbors Reidsville, LLC
208 Watlington Industrial Drive, Reidsville, NC 27320
(Phone 336-342-6106)

All removed paint and debris shall be tested for lead following the SW-846 TCLP Method 1311 Extraction, as required in 40 CFR 261, Appendix 11, to determine whether it shall be disposed of as hazardous waste. Furnish the Engineer certified test reports showing TCLP results and Iron analysis of the paint chips stored on site, with disposal in accordance with "Flowchart on Lead Waste Identification and Disposal" at:

http://portal.ncdenr.org/c/document_library/get_file?p_l_id=38491&folderId=328599& name=DLFE-9855.pdf.

All sampling shall be done in presence of the Engineer's representative.

The Competent Person shall obtain composite samples from each barrel of the wash water and waste generated by collecting two or more portions taken at regularly spaced intervals during accumulation. Composite the portions into one sample for testing purposes. Acquire samples after 10% or before 90% of the barrel has accumulated. The intent is to provide samples that are representative of widely separated portions, but not the beginning and end of wash water or waste accumulation.

Perform sampling by passing a receptacle completely through the discharge stream or by completely diverting the discharge into a sample container. If discharge of the wash water or waste is too rapid to divert the complete discharge stream, discharge into a container or transportation unit sufficiently large to accommodate the flow and then accomplish the sampling in the same manner as described above.

Comply with the NCDENR Hazardous Waste Compliance Manual for Generators of Hazardous Waste. Record quantities of waste by weight and dates of waste generation. Until test results are received, store all waste, and label as "NCDOT Bridge Paint Removal Waste - Pending Analysis" and include the date generated and contact information for the Division HazMat Manager or Project Engineer. Store waste containers in an enclosed, sealed and secured storage container protected from traffic from all directions. Obtain approval for the protection plan for these containers from the Engineer. If adequate protection cannot be obtained by use of existing guardrail, provide the necessary supplies and equipment to maintain adequate protection. Once test results are received and characterized, label waste as either "Hazardous Waste - Pending Disposal" or "Paint Waste - Pending Disposal".

Once the waste has been collected, and the quantities determined, prepare the appropriate shipping documents and manifests and present them to the Engineer. The Engineer will verify the type and quantity of waste and obtain a Provisional EPA ID number from the:

NC Hazardous Waste Section
North Carolina Department of Environment & Natural Resources
1646 Mail Service Center
Raleigh, NC 27699
Phone (919) 508-8400, Fax (919) 715-4061

At the time of shipping, the Engineer will sign, date and add the ID number in the appropriate section on the manifest. The maximum on-site storage time for collected waste shall be 90 days. All waste whether hazardous or non-hazardous will require numbered shipping manifests. The cost for waste disposal (including lab and Provisional EPA ID number) is included in the bid price for this contract. Note NC Hazardous Waste Management Rules (15A NCAC 13A) for more information. Provisional EPA ID numbers may be obtained at this link:

http://portal.ncdenr.org/web/wm/provisional-hw-notification-page.

Testing labs shall be certified in accordance with North Carolina State Laboratory Public Health Environmental Sciences. List of certified laboratories may be obtained at this link:

http://slphreporting.ncpublichealth.com/EnvironmentalSciences/Certification/CertifiedLaboratory.asp.

All test results shall be documented on the lab analysis as follows:

1. For leachable lead:
   a. Soils/Solid/Liquid- EPA 1311/200.7/6010

Area sampling will be performed for the first 2 days at each bridge location. The area sample will be located within five feet of the containment and where the highest probability of leakage will occur (access door, etc.). Results from the area sampling will be given to the Engineer within 72 hours of sampling (excluding weekends). If the results of the samples exceed 20 µg/m^3 corrective measures shall be taken and monitoring shall be continued until 2 consecutive sample results are less than 20 µg/m^3.

TWA may suspend the work if there are visible emissions outside the containment enclosure or pump monitoring results exceeding the level of 30 µg/m^3.

Where schools, housing and/or buildings are within 500 feet of the containment, the Contractor shall perform initial TSP-Lead monitoring for the first 10 days of the project during water cleaning and containment removal. Additional monitoring will be required during water cleaning 2 days per month thereafter. Results of the TSP monitoring at any location shall not exceed 1.5 µg/m^3.

EQUIPMENT MOBILIZATION

The equipment used in any travel lanes and paved shoulder shall 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 shall be from truck or trailer supported platforms and all equipment shall 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 and field painting on all similar structures within 18 months prior to this bid are qualified for this work. Work is only sublet by approval of the Engineer.

MATERIAL

PENETRANT AND PAINT SYSTEM

The paint system to be used shall be a High Ratio Co-Polymerized Calcium Sulfonate (HRCSA) coating system. Characteristics of submitted products shall meet or exceed those of the requirements listed within this specification.

The structure is to be coated with a High Ratio, Co-Polymerized Calcium Sulfonate (HRCSA) corrosion mitigation system. Any Contractor-proposed coating system shall meet the following requirements:

a. The proposed coating system shall be an HRCSA coating as defined by these specifications and shall be submitted for approval.
    1. Primer/Topcoat (Minimum 9.5% active sulfonate) must maintain a 9-11 to 1 ratio Total Base Number to Active Sulfonate, i.e., total base number of 85 to 104 to 9.5% Active Sulfonate, as determined by Percent Active Sulfonate Content by Cationic Titration (Hyamine) testing, Procedure No. 817/4.9/T1409A.
    2. Formulations with greater than 27% Alkyd or co-polymer are not valid HRCSA.
    3. Zero VOC, 100% Solids Penetrant/Sealer approved by HRCSA manufacturer (Minimum 15% active sulfonate, a total base number of 135 to 165, must maintain a 9-11 to 1 ratio Active Sulfonate to Total Base Number as determined by Total Base Number Determination testing, Procedure No. 817/4.9/T1401.
b. The proposed coating system shall be certified in writing by the coating manufacturer that the HRCSA Primer/Topcoat and the HRCSA Penetrant Sealer meets the HRCSA generic specification and has been verified by the testing titration protocols indicated above. The Engineer may choose to perform verification testing using the same protocols on materials delivered to the job site.
c. The proposed coating formulation shall have independent laboratory tests showing that the HRCSA coating, as supplied, has been tested to ASTM D5894 with a 24 hour freeze thaw cycle and has passed a minimum 5000 hours with no rust creepage at the scribe. The manufacturer shall certify that the currently manufactured formulation used is the same as the formulation that was tested, and can supply supporting documentation.

Lighting shall be equipped with explosion-proof fixtures.

The accumulation of empty paint cans, combustibles, and other debris will not be permitted.

MSDS sheets for all materials shall be maintained on file and provided to the Engineer prior to receipt of the material from the manufacturers.

If required, paint shall be mixed with mechanical mixers in accordance with the paint manufacturer's recommendations.

The primer, stripe, and other coats may be thinned only if recommended by the manufacturer, done in compliance with the manufacturer's instructions, approved by the Engineer, and mixed in the presence of the Engineer. If recommended by the manufacturer and approved by the Engineer, a measuring cup, have graduation in ounces, shall be used in the addition of thinner to any paint. No "eye balling" during addition of thinner to paint will be allowed. Paint mixed with thinner by "eye balling" will be subject to rejection by the Engineer as ruined material.

PENETRANT AND PAINT STORAGE

Do not expose penetrant and paint materials to rain, excessive condensation, long periods of direct sunlight, or temperatures above 100°F or below 40°F. In addition, the Contractor shall place a device which records the high, low, and current temperatures inside the storage location. Follow the manufacturer's storage requirements if more restrictive than the above requirements. Any material found to be damaged or beyond its expiration date shown on the container shall be immediately removed from the project site and will be considered as ruined material.

TESTING OF PAINT SAMPLES:

Engineer reserves the right to conduct tests of the materials at any time, and any number of times during the period of field painting.

The Engineer will sample the paint(s) being used. A representative size sample of each component of paint(s) at the construction site will be transferred to metal containers, identified, sealed, and certified in the presence of the Contractor.

Tests on paint samples may be performed by the Owner in order to confirm the manufacturer's test results submitted with each batch of material.

If the laboratory test results show that the material being used does not comply with the requirements specified in this Special Provision, the Contractor will be directed to stop painting work and remove non-complying paint; pay for testing; re-paint surfaces coated with rejected paint; or remove rejected paint from previously painted surfaces if, upon re-painting with specified paint, the two coatings are not compatible.

CONSTRUCTION METHODS

CLEANING AND REMOVAL OF PACK RUST

Removal of pack rust shall be done by hand tool cleaning to meet requirements of SSPC-SP 2, or by power tool cleaning to meet requirements of SSPC-SP 3, or a combination of these methods. Any black oxide scale shall be removed, unless otherwise directed by the Engineer. Pay particular attention to crevice areas when removing pack rust and rust scale. Exercise care to avoid nicking or gouging the steel during removal. Remove all rust scale and loose pack rust, followed by high pressure water cleaning.

HIGH PRESSURE WATER CLEANING (HPWC)

The structure (or portions of it to be coated) shall be cleaned with water at a minimum pressure of 5,000 psi, at 5 gallons per minute, with a rotating tip, at a maximum 4 inch standoff distance from the steel surface, held as perpendicular to the steel surface as possible.

All water to be used in the surface preparation shall be potable water.

Ambient wash water temperature is allowed; hot water is not necessary.

The wash water shall include a soluble salt removing chemical at a minimum ratio of 100:1 and in compliance with manufacturer recommendations.

Care should be taken to ensure that the potable wash water does not have a level of chloride exceeding 15 ppm when tested. If higher, the level of soluble salt removing chemical should be proportionally increased as per manufactures recommendation.

It should be expected that the surfaces of the steel (and connections) are contaminated with soluble salts (e.g. Chlorides, Sulfates, or Nitrates). Using an acceptable sample method in accordance with SSPC Guide 15, ensure that soluble slat levels on the surfaces do not exceed allowable soluble salt limits listed below:

Chloride - NVC3 3 $\mu g/cm^2$
Sulfate - NVS10 10 $\mu g/cm^2$
Nitrate - NVN10 10 $\mu g/cm^2$

The frequency of testing shall be 2 tests per span after all surface preparation has been completed and immediately prior to painting. Select test areas representing the greatest amount of corrosion in the span as determined by the Engineers' representative. Additional testing may be required if significant amounts of chloride are detected.

The surface cleaning shall meet the requirements of SSPC-WJ4, to remove loose paint and loose rust. SSPC SP2 or SP3 (hand or power tool cleaning) may be used in inaccessible areas or when water cleaning is not possible.

In some cases, after HPWC, there may be areas of tightly adhered black oxide that were not removed. All black oxide scale shall be removed, unless otherwise directed by the Engineer.

If there is a question of whether all loose paint has been removed, adhesion testing of the remaining "tightly adhered" paint shall be done in accordance with ASTM D 4541-02 Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers,

with a minimum value of 300 psi.

Care should be taken to ensure all crevice corroded and pack rusted joints connections and corrosion frozen bearings are flushed with water containing a soluble salt removing chemical, at a minimum pressure of 5,000 psi, at 5 gallons per minute, to ensure removal of all loose materials and to flush out any contaminant.

COMPRESSED AIR DRYING

All joints, connections, and bearings shall be blown dry with clean, dry, oil free, high pressure (100 psi) compressed air, regardless if the areas appear to be dry. Use the white blotter test in accordance with ASTM D4285 to verify the cleanliness of the compressed air used for blowout of "Limited Access" areas and drying. Conduct the test at least once per shift for each compressor system. Sufficient freedom from oil and moisture is confirmed if soiling and/or discoloration are not visible on the paper. If air contamination is evidenced, change filters, clean traps, add moisture separators or filters, or make adjustments as necessary to achieve clean, dry air.

All surfaces shall be inspected at this point. Surface preparation found to be deficient will be repeated at the Contractor's expense as directed by the Engineer. Once areas are agreed to be satisfactory, the Contractor may proceed with penetrating sealer application.

PENETRATING SEALER

Penetrating sealer may be applied by brush, roller, or airless spray method as recommended by the manufacturer. The mixing amount and method of mixing for the sealer components must be in accordance with the manufacturer's instruction. Wet coat sufficiently to completely cover and penetrate the steel surface, but do not apply heavy coat. Use coat thickness as recommended by the manufacturer. Apply liberally to crevices and joints and/or spaces where a gap has been created between plates and around bolts, nuts and washers. Allow material to soak into spaces. Brush out any excess material, so as to not retard curing of the topcoat or result in an unaesthetically pleasing surface.

The penetrating sealer shall be applied within 24-hours after completion of the cleaning operations and before flash-rusting occurs. No bare steel surface prepared for penetrating sealer application shall be left uncoated long enough to allow the formation of rust. Cleaned areas upon which rust has formed shall be re-cleaned in accordance with the cleaning requirement at no additional cost. The presence of rust shall be determined by the Engineer.

The receiving steel surface shall be clean and absolutely dry. The permissible steel surface temperature and the ambient temperature shall be as recommended by the sealer manufacturer. However, in no case, shall the penetrating sealer be applied when the steel surface or the ambient temperatures is below 36°F or above 104°F, or the relative humidity exceeds 99% or a 3.6°F (2°C) temperature-Dew Point temperature spread.

Drying time is temperature, humidity, and film thickness dependent. Use manufacturer's

recommended drying schedule to estimate the drying time of the penetrating sealer for application of the other coatings. If the manufacturer's recommendations allow, the use of forced air pressure to dry the surface will be permitted.

HRCSA – STRIPING AND TOPCOAT

No application of any stripe/primer shall be allowed until cleaning and preparation of the substrate has been approved by the Engineer. See drawings to determine exact location of structure components to be painted.

The permissible steel surface temperature and the ambient temperature shall be as recommended by the coating manufacturer. However, in no case, shall the coating be applied when the steel surface or the ambient temperatures is below 36°F or above 104°F, or the relative humidity exceeds 99% or a 3.6°F (2°C) temperature-Dew Point temperature spread

The Contractor shall provide paintbrushes, rollers, and spray equipment to conduct the work as specified in this Section.

The Contractor shall also provide specialized equipment as required for the painting of limited access areas and for other difficult-to-clean areas. Specialized equipment may include, but is not limited to:

- Pole guns for spray painting
- Mitts, daubers, or other methods to supplement brush application

Stripe painting will be required on the following surfaces that have been cleaned: edges of plates, angles, lattice, connections (rivets and bolt heads) or other shapes, corners, crevices, back-to-back angles, and built-up edges. The surfaces of existing steel members to which new steel may be connected (faying surfaces) shall also be cleaned and painted as herein described. The stripe coat shall have a band width of at least 4 in. (101.6 mm) to each side of the adjoining edges and is to completely coat the interior of all crevices. All stripe painting should be applied by spray, but immediately afterwards it may be 'brushed in' using a brush. No other method of paint application will be allowed for stripe painting.

Paint for intermediate coat or topcoat may be applied using spray, brush, or roll methods.

Spray painting will be permitted only within a containment that will contain all of the sprayed material, as approved by the Engineer. Complete protection from paint spatter, spillage, overspray, wind-blown paint, or similar releases of paint shall be provided. Covers, tarps, mesh, and similar materials shall be placed around the work area to protect public and private property, pedestrian, vehicular, marine, or other traffic, all portions of the bridge, highway appurtenances, waterways, and similar surrounding areas and property, upon, beneath, or adjacent to the structure.

Apply HRCSA as directed by the manufacturer. Wait time between the stripe coats, intermediate coats, and the topcoat shall be as per the manufacturer's recommendations. The following paint schedule shall be used unless special exceptions are submitted and approved according to manufacturer recommendations prior to the start of this work.

Application Location	Description	Film Thickness
SPOT	Liberally apply a stripe coat to crevice corroded and pack rusted bearings and connections, provide extra material to bolts, nuts and any gaps around rivets.	15-18 mils (wet) 10-12 mils (dry)
SPOT	Over exposed metal areas and areas of tightly adhered contaminant free rust or flash rust apply a spot prime with 5 to 7 mils DFT of Topcoat, including areas mentioned in previous SPOT application	7-10 mils (wet) 5-7 mils (dry)

Prior to placing the subsequent coats, the Contractor will ensure that the prior coat is clean of all foreign matter, such as grease, dirt, bird waste, etc., before application of the subsequent coat.

Sealer, stripe, spots, and finish coats shall be applied in sufficient quantity so as to produce the minimum specified Dry Film Thicknesses (DFT). Care should be taken to not over apply the primer/topcoat, especially on flat surfaces. Maximum 25 mils DFT.

Active calcium sulfonate coatings cure slowly, so wet film measurements may be used as criteria for **preliminary** acceptance of the coating. Wet film thickness (WFT) measurements shall be determined as the job progresses and corrections shall be made during paint application.

Dry film thicknesses shall be determined using SSPC-PA2 – using a digital film thickness gage and a shim – after the coating has cured sufficiently to allow accurate measurements. (Note: Depending upon ambient air conditions, it may take more than one week before DFT measurements can be taken.)

Areas failing to meet the specified WFT range shall be over-coated with the same paint to produce at least the total WFT required.

Paint applied containing unauthorized thinners, paint applied to contaminated surfaces, and paint applied contrary to this Specification shall result in the re-cleaning and re-painting of the surface. The work of re-cleaning, re-painting, or over-coating, if required, shall be performed within 10 days following notification by the Engineer and shall be done by the Contractor to the satisfaction of the Engineer, at no additional cost to the Owner.

INSPECTION

Each layer of application shall be verified by both Quality Control (QC) and Quality Assurance (QA).

QUALITY CONTROL INSPECTOR

The Contractor shall provide a quality control inspector in accordance with the SSPC QP guidelines to ensure that all processes, pack rust removal, and each coating application are

in accordance with the requirements of the contract. The inspector shall have written authority to perform QC duties to include continuous improvement of all QC internal procedures. The presence of the Engineer or inspector at the work site shall in no way lessen the contractor's responsibility for conformity with the contract.

QUALITY ASSURANCE INSPECTOR

The quality assurance inspector, which may be a Department employee or a designated representative of the Department, shall observe, document, assess, and report that the Contractor is complying with all of the requirements of the contract. Inspectors employed by the Department are authorized to inspect and/ or test all work performed and materials furnished. Such inspection may extend to all or any part of the work and to the preparation, fabrication, or manufacture of the materials to be used. The inspector is not authorized to alter or waive the requirements of the contract. Each stage in preparing the structure to be coated, which includes, but not limited to washing, pack rust removal, sealing, and application paint system, shall be inspected and approved by the Engineer or his authorized representative.

INSPECTION ACCESS

The Contractor shall furnish all necessary OSHA-approved apparatus such as ladders, scaffolds, and platforms as required for the Engineer or his inspector to have reasonable and safe access to all parts of the work. The contractor shall illuminate the surfaces to be inspected to a minimum of 50-foot candles of light. All access points shall be illuminated to a minimum of 20-foot candles of light.

INSPECTION INSTRUMENTS

At a minimum, furnish the following calibrated instruments and conduct the following quality control tests:

- Sling Psychrometer - ASTM E337 - bulb type and tables
- Inspection Mirror
- Surface Temperature Thermometer 30°F to 150°F
- Air Thermometer, pocket type, 30°F to 100°F
- Illuminated Magnifier
- Hypodermic Needle Pressure Gauge
- Surface Condition Standards - SSPC VIS 1-3 and 4
- Wet Film Thickness Gage - ASTM D4414
- Dry Film Thickness Gage - SSPC-PA2 Modified
- Calibration Standards (NIST Traceable)
- Surface Contamination Analysis Kit or (Chloride, Nitrate, and Sulfate Level Test Kit) SSPC Technology Guide 15

QUALITY CONTROL

Maintain a daily quality control record in accordance with Article 442-13 of the *2012 Standard Specifications* and make such records available at the job site for review by the inspector and submit to the Engineer as directed. In addition to the information required on M&T-610, submit all Dry Film Thickness (DFT) or Wet Film Thickness (WFT) readings on a form equivalent to M&T-611.

Film thickness shall be measured at no less than six random spots per bearing (each of four bearing plate edges and two readings on top of the sole plate). Also, film thickness shall be measured at no less than six random spots per span on diaphragms/"K" frames.

Each spot is an average of three to five individual gage readings as defined in SSPC PA-2. No spot average shall be less than 80% of minimum film thickness for each layer applied; this does not apply to stripe coat application. These non-conforming areas shall be corrected by the Contractor prior to applying successive coats.

Areas failing to meet the specified film thickness range shall be over-coated with the same paint to produce at least the total film thickness required.

REPAIR OF DAMAGED COATINGS

All damaged coatings, new or existing, shall be repaired prior to project completion and acceptance in accordance with the above specifications for Re-Coating and Over-coating and as directed by the Engineer, at no additional cost to the Owner.

COATING MANUFACTURER'S REPRESENTATIVE

Unless waived by the Engineer, the Contractor shall make arrangements for a representative of the coating manufacturer to be present on-site as work begins, at a minimum, and as necessary as work progresses, to work together with the Contractor and representatives of the owner and to provide comments and guidance, so that the cleaning, application, and inspection procedures are done properly.

MEASUREMENT AND PAYMENT

Painting Containment for Bridge No. ___ will be paid for at the contract lump sum price which price will be full compensation for all collection, handling, storage, air monitoring, 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 paint and water; daily collection of debris into specified containers; and any measures necessary to ensure conformance to all safety and environments regulations as directed by the Engineer.

Pollution Control will be paid at the contract lump sum price which will be full compensation for all collection, handling, storage, air monitoring, and disposal of debris and wash water, all personal protective equipment, and all personal hygiene requirements, and all equipment, material and labor necessary for the daily collection of the blast debris into specified

containers; and any measures necessary to ensure conformance to all safety and environmental regulations as directed by the Engineer.

Cleaning and Painting Existing Bearings with HRCSA Bridge No. ___ will be paid for at the contract lump sum price which will be full compensation for all labor, materials and equipment necessary to complete the work. All work shall be done in a manner satisfactory to the Engineer.

Payment will be made under:

Pay Item	**Pay Unit**
Painting Containment for Bridge No. ___	Lump Sum
Pollution Control	Lump Sum
Cleaning and Painting Existing Bearings with HRCSA Bridge No. ___	Each

CATHODIC PROTECTION INTERMEDIATE BENT METALIZING (SPECIAL)

1. DESCRIPTION

The work under this Project Special Provision includes the installation of the following cathodic protection (CP) system at the intermediate bent caps.

1.1 Metalizing:

The first system requires the application of arc-sprayed zinc (anode) to selected damaged areas (as described in the Contract Documents) that exhibit corrosion problems. This application shall be performed by thermal spraying (metalizing) the concrete with the required surface preparation necessary to produce a good bond between the zinc and concrete. A good bond is essential to provide an efficient system.

2. METALIZING CONTRACTOR/SUBCONTRACTOR QUALIFICATIONS

The metalizing Contractor conducting the installation of the metalized coating must be engaged in thermal spray operations and shall have a minimum of three years of previous experience in metalizing operations with concrete. Provide locations and contact names of successful previous projects for verification at the preconstruction conference.

3. SHOP DRAWINGS

Submit shop drawings and obtain approval prior to field installation. Provide shop drawings for forms and construction methods indicating method of performing the surface preparation, method of supporting any formwork during installation, method of placing encapsulation material, and curing of material.

4. QUALITY CONTROL

4.1 Quality Control Plan:

Include the work under this Project Special Provision in the Contractor General Requirements set forth in NCDOT Specification Division 1. The portion of the Quality Control Plan covering cathodic protection shall be certified by the CP Specialist. For the metalizing system the plan shall include but not be limited to, method and frequency of Contractor's QC testing, continuity testing procedures, zinc anode application, time dedicated for training, thickness measurements, metalizing equipment, and method(s) for initial activation of the cathodic protection systems. The zinc rebound containment system(s) and waste disposal methods shall also be submitted.

4.2 Cathodic Protection Report:

Provide a final report produced by the CP Specialist for the metalizing system. The report shall describe the general characteristics of the systems and installation sequence. The report shall describe the general characteristics of the metalizing work, the thickness and bond strength results for each metalized component. The report and all collected data shall be in typed form and a digital version of the report must be provided along with 4

bound hard copies.

4.3 QC Certification:

Manufacturer Certification for specific materials is required in addition to the Contractor's certification. Unless otherwise required the Contractor shall perform all quality control testing with verification by the Cathodic Protection Specialist. The Contractor shall use certified materials from a Department approved source where applicable.

4.4 Personnel Qualifications:

4.4.1 Metalizing Spray Technician Qualifications:

The Thermal Spray Technician must have a minimum of one year of experience in the operation of Thermal Spray Equipment which includes experience on at least one project of similar scope using a wire metalizing arc unit. The Thermal Spray Technician shall be certified by the metalizing equipment manufacturer.

4.4.2 Cathodic Protection Specialist Qualifications and Responsibilities:

4.4.2.1 Qualifications:

Provide the services of an independent CP Specialist with the following qualifications:

1. A National Association of Corrosion Engineers (NACE) certification in cathodic protection of level CP-4 or a qualified P.E.
2. A minimum of 10 years of experience in the installation and testing of impressed current and galvanic CP systems to protect reinforced concrete structures,
3. Performed quality control and performance testing of CP systems for concrete structures in a minimum of three projects the past five years.
4. Provide the experience record of the CP Specialist(s).

The CP Specialist shall be a subcontractor and may be one individual for multiple cathodic protection systems or multiple individuals responsible for each of the single systems. The CP Specialist shall be independent and shall not be affiliated with the Contractor, the Contractor's Organization, the anode distributor or a subcontractor on the project.

No cathodic protection work will be allowed if at any time an approved CP Specialist is not active or otherwise involved in the Project.

4.4.2.2 Responsibilities:

4.4.2.2.1 Metalizing Cathodic Protection Specialist Services:

For this work the CP Specialist shall be responsible for the following tasks:

1. Supervise every phase of the application of the thermally

sprayed zinc, the continuity testing and corrections of rebar, and any other function further specified for the system.
2. Inspection and testing of the test patch areas for the determination of the target bond strength and submitting the proposed target bonds for approval of the Engineer.
3. Review and verify electrical continuity test results.
4. Review all contractor documents related to the cathodic protection work prior to submittal to the Department for approval.
5. Training Contractor's and Department personnel in performing the required quality control testing for cathodic protection.
6. Visit the project site at a minimum frequency of once per month to inspect the work performed in his/her absence and conduct random QC tests and meet and directly update the Engineer (verbally and in writing) regarding quality of the work in progress. These random tests shall be in addition to the Contractor's QC tests specified in this Project Special Provision.
7. Conduct all other specified testing to meet the requirements of the Contract Documents.
8. Provide Cathodic Protection report in accordance with Section 4.2.
9. Certify Quality Control Plan in accordance with Section 4.1.

5. MATERIALS

5.1 Material Certification and Test Results:

Contractor shall provide as a minimum, but not limited to the following, required test results and certifications for the anode encapsulation material and zinc wire anode.

5.2 Blasting Media:

Contractor shall provide as a minimum, but not limited to the following, technical data sheets of blasting media and equipment, and schematics of containment system.

6. EQUIPMENT AND INSTRUMENTATION

Contractor shall provide as a minimum, but not limited to detailed technical specifications of all equipment and instrumentation intended for use in the Project.

7. METALIZING

7.1 Scope of Work

7.1.1 Sounding Survey:

No metalizing shall be performed until concrete removal/restoration and surface

preparation have been approved by the Engineer.

7.1.2 Staging of Work:
The work shall be performed in accordance with the Transportation Management Plans and the Contract Plans regarding time, location, and methods. All work is subject to the approval of the Engineer.

7.2 Materials and Testing

7.2.1 Metalizing Wire:
The metalizing material shall be essentially pure zinc (99.9% pure) produced in wire form of 1/8 inch standard size which can be molten and sprayed with the equipment described in this Project Special Provision.

7.2.2 Quality Control:
Provide manufacturers certifications for the following:

1. Metalizing zinc anode wire; shall indicate chemical composition, wire diameter, lot number, manufacturing date and relative manufacturing data where applicable.
2. Abrasive blasting material data sheet and MSDS;
3. Water based inorganic zinc silicate metalizing overcoat; Provide manufacturer's specifications and technical data sheets for the following:
   i. Metalizing equipment;
   ii. QC testing equipment;

7.3 Construction Methods

7.3.1 Arc-Sprayed Zinc Construction Methods:

7.3.1.1 General:
This system requires the application of sprayed zinc (anode) to selected damaged areas that exhibit severe corrosion problems after concrete restoration has been completed. The application shall be performed by thermal spraying (metalizing) the concrete with the required surface preparation necessary to produce an acceptable target bond between the zinc and the concrete as further described. A good bond is essential to provide an efficient system.

The Contractor shall apply zinc anodes on all surfaces within the cathodic protection zones defined in the Contract Documents or as directed by the Engineer.

7.3.1.2 Surface Preparation Execution:
Blasting for preparation of the surfaces to receive metalizing shall be performed by the group in charge of the metalizing application and

achieving the established target bond. Different levels of abrasive blasting may be necessary to achieve the target bond for different types of concrete.

7.3.2 Metalizing Equipment:

Zinc application equipment must meet the following minimum requirements:

7.3.2.1 Metalizing Unit:

The metalizing unit shall be a portable, electric arc spray unit capable of spraying zinc wire of 1/8"diameter and should meet the following minimum requirements.

1. The application gun shall be provided with a self-contained electric arc.
2. Spray pattern shall be elliptical in shape and have provisions for adjustments to circular pattern.
3. The application gun shall be capable of operating remotely from the wire feed unit at a distance of no less than 10 feet.
4. The wire feed unit must have moisture/oil separators provided within the unit itself (in addition to the separators already in the line) and shall be enclosed as to protect the anode wire from the environment.
5. The wire feed method shall be dual drive wheel, push type system only. Other wire feed systems may only be given temporary approval based on performance.
6. The system shall be capable of operation at 500 amps continuous duty cycle.
7. The system shall be able to operate remotely from the power supply unit for a minimum distance of 50 feet.
8. The wire feed unit and thermal spray gun assembly shall be reasonably portable and capable of operating from a reach-all, scaffolding, boat, or a small barge.

7.3.2.2 DC Power Supply Unit:

The power supply unit shall be a gasoline or diesel engine driven, direct current power source with a minimum NEMA output rating of 600 amps at 40 volts operating at 80 percent duty cycle.

Alternate power supplies may be approved based on satisfactory recommendation of the metalizing unit manufacturer.

The power supply shall be capable of operation at constant current or constant voltage modes with fully adjustable output over the entire voltage and current range and shall be capable of connection to the metalizing unit at a minimum distance of 50 feet. An ammeter, voltmeter, and oil pressure and engine temperature gauges shall be mounted in the Control Panel of the unit. The gauges shall be maintained clean and readable at all times during the metalizing operation.

7.3.2.3 Air Supply Equipment:

The air supply unit shall be capable of delivering a minimum of 250 CFM of air at 100 pounds of pressure and having an adjustable pressure range of 50 to 125 pounds per square inch (psi). The air compressor shall produce moisture free air at the blast nozzle. When used in conjunction with the metalizing unit and an operator temperature control unit, the system shall be capable of maintaining a minimum air volume of 175 CFM at 90 pounds of pressure at the gun head.

The air compressor shall be provided with a moisture/oil separators mounted within the unit and additional separators or filters as necessary to produce moisture free air. Separators and filters shall be serviced at a minimum of once per day to provide moisture free air. Air moisture and pressure shall be tested daily prior to commencing production.

7.3.2.4 Abrasive Blast Equipment:

The blasting equipment shall be a conventional force fed pressure type stationary sandblaster. The nozzle size shall be such that a minimum of 80 psi is maintained at the blast nozzle. The sandblasting unit shall be securely mounted on the barge (or boat) for the duration of the project. The unit shall be equipped with a minimum 1 1/4 inch piping and valves to provide a sufficient air-sand volume. The blast hose shall be capable of withstanding a working pressure of 175 psi.

7.3.3 Surface Preparation for Sprayed Zinc Cathodic Protection:

7.3.3.1 Concrete Removal:

All concrete removal shall be made under the requirements of the Project Special Provision for Concrete Restoration.

7.3.3.2 Blasting:

All concrete surfaces to be metalized shall be thoroughly blasted with silica sand or other suitable material to remove all existing coatings, cement splatter or foreign materials prior to zinc application. Sandblasting of the concrete should leave a clean, rough surface, which leaves the appearance of medium grit sandpaper without exposing the coarse aggregate.

The abrasive stream should be directed against the work surface at an angle of approximately 15 degrees from the plane and not in excess of 30 degrees unless necessary to reach specific areas. Level of sandblasting of the concrete surface to achieve the highest possible bond of the zinc shall be determined in the field for every type of concrete present to receive metalizing. Blast material must be plant packaged and maintained in a clean and dry condition at all times. Material stored in the sand-blaster pot overnight shall not be used.

Although not anticipated, any steel component requiring metalizing shall receive an abrasive blast to the extent that a near white appearance is obtained as per NACE 2 as referenced in NACE12/AWS C2.23/SSPC-CS23 Standard.

7.3.3.3 Electrical Continuity:

Electrical continuity of the reinforcing steel and any other metallic component in the concrete shall be tested by the CP Specialist and corrected by the Contractor as shown in the Contract Documents. Although part of the cathodic protection work, continuity shall be provided during the concrete restoration operation. Care shall be observed as not to damage any rebar connecting rods or wires for connection plates which may have been installed during the concrete restoration work.

7.3.3.4 Connection for Connection Plates:

The Contractor shall have the option to install the threaded connection rods for the connecting plates during the concrete removal/restoration operation or the surface preparation for metalizing work. However, the surface of the concrete to be in contact with the connection plates shall be sufficiently smooth and uniform as to provide 100% contact between the plates and the concrete.

The Contractor will locate connection plates on solid (original) concrete. Location of the plates will vary by components based on location of spalls. Place the connection plate after applying initial metalizing to the area under the plate and then metalize over the plate extending a minimum of 2 inches in every direction from the plate as shown in the Contract Documents.

7.3.4 Arc-Sprayed Zinc Anode Application:

7.3.4.1 Test Sections-Target Bond:

Prior to commencing the arc-spraying operation, the Contractor shall metalize a minimum of 4 on-site test sections with minimum dimensions of four square feet each. These test sections shall be used to determine the field application rate for the specified thickness and the grain size, texture acceptability and target adhesion strength. The test sections shall be representative of all of the concrete conditions present on the bridge to receive metalizing. Bond strength on the test sections shall be measured at no less than 3 hours and no more than 24 hours after metalizing and shall be conducted as described by ASTM D4541. All bond tests shall be made in triplicate and the results averaged.

Preliminary test areas and adhesion tests shall be performed on the bridge prior to commencing production metalizing. Adhesion strength shall be

measured on all test sections to determine the target bond for production and acceptance for each type of concrete to receive metalizing. Mock-ups of concrete patch materials to be metalized shall be prepared for this test. Target bond shall be established based on the higher strengths obtained from the test areas. It is expected that a minimum of 100 psi of bond strength will be achieved and strengths lower than the expected will not be accepted. Various levels of sandblasting of the test sections of concrete may be necessary to determine the proper surface condition to achieve the target bond.

7.3.4.2 Cleaning:

Prior to zinc application, the concrete surface shall be air blasted to remove any residue from the abrasive blasting operation. Air stream shall be 100% moisture free and discharge a minimum pressure of 50 psi.

7.3.4.3 Zinc Application:

Thermal spraying operation shall not be performed during periods where rainfall, high seas, rough waters or any other wet conditions are present. Zinc spraying shall not be performed when excessive wind is blowing which could interfere with the operation as determined by the Engineer.

Metalizing shall only be applied to surface areas that have been properly prepared as per this Project Special Provision. Metalizing shall be continuous and un-interrupted within the bridge component (piles, caps, etc.) being metalized. Cold overlaps of the zinc will only be allowed for deficiencies correction. On previously metalized components, the existing zinc shall be 100% removed prior to metalizing.

Typically, zinc application shall be performed around the bottom and the entire vertical perimeter of the caps. If the entire component is not being metallized, metallizing shall extend 2 feet on every direction from the edge of the concrete repaired area.

Zinc application shall be performed employing multiple spray passes crossing at a 90 degree angle to achieve a coating thickness of 15 to 20 mils as determined by thickness measurements on test coupons or by other means acceptable to the Engineer.

7.3.4.4 Metalizing Time Window:

Coordinate the metalizing and concrete restoration operations such that metalizing is completed and connected to the reinforcement on each component at no less than 10 days and no more than 90 days after placing the concrete for the concrete restoration operation. Any metalizing to be accepted after 90 days (not to exceed 120 days) following the placement of the concrete shall be tested and certified as having a low probability of corrosion activity around the repaired area.

No metalizing will be approved if placed after 120 days following the placement of the concrete. Metalizing shall be completed within two hours following sandblasting and before any contamination on the concrete develops. If concrete is not metalized within two hours or contamination develops, concrete shall be sandblasted prior to metalizing.

7.3.4.5 Thickness Measurements:

A minimum of one thickness measurement shall be obtained at 25 square feet intervals and recorded. Thickness measurements shall be obtained using a spherical anvil and spindle micrometer with digital display capable of performing measurements ranging from Zero to One inch. Electronic thickness measuring devices may be allowed as approved by the Engineer.

Where deficient coat thickness values are found, the deficient section and the immediate surface around (minimum of one square foot or within three inches), shall receive additional coating so that the coat thickness of the repaired area will reach a minimum of 15 mils. This shall be performed immediately (not to exceed 2 hours) following the first application or the entire element shall be re-metalized.

7.3.4.6 Bond Strength Test:

The Contractor shall conduct a minimum of one coating adhesion strength test (pull-off test) on each metalized element (caps, piles, etc.) or at every 100 square feet as applicable (if the metalized area is larger than 100 square feet in one component). Each test shall be made in triplicate and the values averaged. Results shall be recorded.

Pull-off tests shall be conducted using a mechanical 0 to 500 psi, fixed alignment adhesion tester as per ASTM -D 4541. Pull-off strength shall be a minimum of 90% of the target values determined from the preliminary on-site test areas on the bridge. Measurements shall be obtained at no less than 24 hours after metalizing but at no more than 72 hours. Limits of areas not meeting the required bond strength shall be identified and marked, and then blasted clean of all sprayed metal prior to re-spraying as directed by the Engineer.

7.3.4.7 Zinc Uniformity:

Surfaces not intended to be metalized that are adjacent or in close proximity to the surface to be metalized, shall be protected with suitable masking during the zinc application. The masked surfaces shall form neat horizontal and vertical lines. Surfaces of the zinc coated sections shall be uniform in appearance, free of visible coating defects such as; cracking, burning, blistering and un-coated areas and/or other defects that will affect the function and/or durability of the coating. The Contractor shall visually

inspect the surface of the metalizing to ensure the above using a lens with a minimum magnification of 10x.

7.3.4.8 Zinc Defects:

If a defective coating area is found, the correction shall be performed in the same manner as for deficient thickness correction. Sandblasting of the defective areas may be required as directed by the Engineer. Cold overlaps during reapplication may be necessary. However, re-application on the sprayed zinc anode over previously metalized areas shall not blister burn or otherwise damage the bottom anode layer. Should this occur, the entire element shall be sandblasted to remove the zinc and re-metalized.

7.3.4.9 Overcoat:

After zinc coating is approved satisfactory by the Engineer, the Contractor shall apply a coat of water based inorganic zinc silicate over the metalized areas of the structure. This work shall be performed within 72 hours after the metalizing.

Coating shall be spray applied only and in accordance with the manufacturer recommended thickness and specifications. No roller application is allowed and brush application can only be used as touch-up for correction of small deficient areas. The silicate coating application shall extend six inches beyond the metalized areas in each direction whenever possible and shall have a minimum dry-film thickness of 5-8 mils. Thickness measurements of the silicate overcoat shall be made at a minimum of 2 locations per metalized element or as directed by the Engineer. Areas not to be coated shall be properly masked to protect them from over-spraying or over-run, and to form neat horizontal or vertical lines.

8. METHOD OF MEASUREMENT

8.1 General:

All survey work shall be incidental to the cathodic protection systems installation.

8.2 Cathodic Protection System (Zinc Aluminum Spray):

The quantity to be paid will be the area, in square feet, of the completed and accepted metalized work.

9. BASIS OF PAYMENT

9.1 Cathodic Protection System (Zinc Aluminum Spray):

Price and payment will be full compensation for all work specified in this Project Special Provision and all incidental items necessary to provide a functional metalizing system.

Pay Item	Unit
Cathodic Protection System, Zinc Aluminum Spray	Square Feet

EPOXY PROTECTIVE COATING

GENERAL

The work covered by this Special Provision consists of removing deteriorated concrete from the structure in accordance with the limits, depth and details shown on the plans, described herein and as established by the Engineer. This work also includes removing and disposing all loose debris, cleaning and repairing reinforcing steel and applying epoxy.

The location and extent of repairs shown on the plans are specific to the ends of prestressed beams tops of pile bent caps.

Any portion of the structure that is damaged from construction operations shall be repaired to the Engineer's satisfaction, at no extra cost to the Department.

Epoxy Protective Coating shall be governed by Section 420-18.

MATERIAL REQUIREMENTS

Concrete surface preparation materials shall be submitted by the Contractor and approved by the engineer prior to use. Potential implements, include but are not limited to hammers, brushes, needles, saws, grinders and other mechanical tools, sand blast media, shot blast media, pressurized air and water.

Epoxy shall be Type 4A per section 1081 of the Standard Specifications.

Other materials are as specified in Section 420 of the Standard Specificaitons.

SURFACE PREPARATION

Prior to performing any surface preparation, repair deteriorated concrete in accordance with concrete documents. Remove all deteriorated concrete with tools as described above or as directed by the Engineer. Do not cut or remove the existing reinforcing steel except as described in the plans. Unless specifically directed by the Engineer, do not remove concrete deeper than ¼-inch.

Prior to the application of epoxy mortar, thoroughly clean surfaces to be repaired and remove all loose materials. Remove grease, wax, 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.

Acid etch only if approved by the Engineer. Follow acid etching 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.

Use proposed methods of surface preparation to achieve a concrete surface profile of CSP 3 per ICRI guidelines 310-2

Thoroughly clean the repair area of all dirt, grease, oil or foreign matter, and remove all loose or weakened material before applying epoxy.

Contain areas where concrete surface preparation is being performed and ensure no foreign substances leave the containment or enter the water. All removed material, debris, dirt, etc will be removed from the beam end and cap and removed of off-site in accordance with Standard Specifications.

APPLICATION AND SURFACE FINISH

When surface preparation is completed, apply epoxy to the areas specified in the contract plans and established by the Engineer. Apply epoxy mortar to damp surfaces only when approved. In such instances, remove all free water by air-blasting.

After applying the epoxy, remove excessive material and provide a smooth, flush surface. Remove the epoxy material in accordance with the supplier's instructions.

Immediately after bringing epoxy surfaces to final thickness, thoroughly check for sags, bridging, and other deficiencies. Repair any imperfections at the direction of the Engineer.

MATERIAL TESTING & ACCEPTANCE

Concrete Surface Profiles shall be verified per ICRI Guidelines 310.

MEASUREMENT AND PAYMENT

Beam End Epoxy Coatings and Top of Cap Epoxy Coatings will be measured and paid for at the contract unit price bid per each end coated 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 complete the repair work. The Contractor and Engineer will measure quantities based on plan amount for beam ends. Payment will also include the cost of sandblasting, surface cleaning and preparation, cleaning of reinforcing steel, cost of temporary work platform, testing for soundness, curing of epoxy and any necessary testing.

Payment will be made under:

Pay Item	**Pay Unit**
Beam End Epoxy Coatings	Each
Top of Cap Epoxy Coatings	Square Foot

MISCELLANEOUS FENDER REPAIRS (SPECIAL)

1.0 DESCRIPTION

The work for fender repairs consists of furnishing and installing the materials and all miscellaneous hardware to complete the work in accordance with the plans and this special provision. The work covered under this specification consists of replacing pile cluster wire rope wraps, pile cluster hardware replacement, weather sealing of tops of timber piles, and replacement of existing tin hats on tops of timber piles.

2.0 MATERIALS

Timber treatment material shall be a copper naphthenate solution (minimum 2.0% copper metal) per AWPA M4 and U1.

Tin pile head covers shall be replaced with tin sheet of a weight 8 ounces per square foot or greater, meeting the requirements of ASTM B339-12. Fasteners shall be tin.

Wire rope for pile cluster wraps shall be ½" diameter 6x19, 6x25, or 6x37 class IWRC Type 316 Stainless Steel wire rope with a minimum breaking strength of 18,000 pounds. The rope shall be coated with black poly-vinyl chloride with with 90 durometer (shore A hardness).

Use Type 304 or 316 Bolts, anchors, washers, clips and other hardware unless otherwise noted.

3.0 ACCEPTANCE

The Contractor shall submit all proposed materials to the Engineer for review, prior to purchase and installation.

Final acceptance of all products shall be determined by the Engineer.

4.0 CONSTRUCTION DETAILS

For timber pile treatment, remove existing tin caps and clean tops of piles of all loose material, dirt, laitance, and debris. Follow cleaning activities by liberally coating the pile tops with copper naphthenate solution per AWPA M4, until visible evidence of penetration has ceased.

Place a sheet of tin over the top of the pile. Provide a cover measuring at least 4 inches more in each dimension greater than the diameter of the pile. Bend the cover down over the pile and fasten the edges with large head tin nails.

Replace pile cluster wraps and hardware in kind to existing configuration, at locations described in the plans.

5.0 BASIS OF PAYMENT

The lump sum bid for "Coating of Pile Tops and Tin Hat Replacement" will be the full compensation for all materials and all equipment, tools, and work necessary for their installation. The lump sum price bid for "Coating of Pile Tops and Tin Hat Replacement" will be full compensation for all other work including but not limited to material, equipment, tools, disposal, fasteners, plates, spare parts package, and other necessary items or effort required for completing the work.

The unit price bid for “Pile Wraps” will be the full compensation for all materials, equipment, tools and work necessary for the removal and replacement of pile wraps at locations designated in the plans.

The unit price bid for “3/4” Diameter Stainless Steel Fasteners” will be the full compensation for all materials, equipment, tools and work necessary for the removal and replacement of connection hardware (bolts, nuts, washers, and others) at locations designated in the plans.

Payment will be made under:

Pay Item	Pay Unit
Coating of Pile Tops and Tin Hat Replacement	Lump Sum
Fender Pile Wraps	Each
¾” Diameter Stainless Steel Fasteners	Each

CATHODIC PROTECTION INTEGRAL PILE JACKETS (SPECIAL)

DESCRIPTION

Furnish, fabricate and install an integral pile jacket including the installation of galvanic cathodic protection pile jackets (as described in the Contract Documents) with zinc mesh and bulk zinc anodes.

QUALIFICATIONS

Provide a cathodic protection specialist to supervise the overall installation of the cathodic protection (CP) systems and conduct the tests indicated in the contract documents. CP specialist qualifications shall be submitted to the engineer for approval. This individual shall be under contract with the contractor and should be involved with the coordination of work. As a minimum the individual shall have a minimum of 10 years experience in the field and be either an independent specialist with a National Association of Corrosion Engineers (NACE) cathodic protection specialist certification or an independent registered professional engineer proficient in cathodic protection of steel in concrete. The specialist shall provide services which include, but are not limited to, the following:

1. Conduct strand continuity tests and certify results.
2. Verify and certify effectiveness of continuity bonds.
3. Verify and certify negative connections.
4. Certify overall installation of each pile CP system.
5. Energize each cathodic protection pile jacket.
6. Certify all test results

QUALITY CONTROL

Provide a quality control plan, certified by the CP specialist that all work must comply with for approval prior to commencing the installation work for the CP systems or CP system components.

Work under this Project Special Provision shall be included in the Contractor's Quality Control Plan. As a minimum include in the quality control plan methods of measuring electrical continuity, voltages, currents, and rebar potentials. Also include frequency of intended quality assurance visits and time to discuss quality control and method of construction with Contractor's and Department personnel.

The CP specialist shall provide verbal and written notice to the Engineer on a monthly basis, regarding the status and quality of the CP work on the job.

MATERIALS

Stay-In-Place Forms:

Use forms composed of a durable, inert, corrosion resistant material with an interlocking joint along one or two sides that permits the form to be assembled and sealed in place around the pile or column. Fabricate the forms from glass or carbon fibers and polyester or vinylester resins. Provide jackets with a minimum thickness of 1/8 inch with a minimum thickness at the corners of 3/16 inch and dimensions as shown in the Contract Documents. Ensure the form is capable of maintaining its original shape without additional support or damage when placed around a pile. Ensure the inside face of the form has no bond inhibiting agents in contact with the filler material. Provide the forms with bonded or bolted-on, non-metallic, adjustable standoffs to maintain the forms in the required positions. Sandblast or score the inside surface of the forms with an abrasive material to provide a rough surface texture and ensure bond with the filler material. Equip the forms with a compressible sealing strip at the bottom which will effectively seal the annular space between the pile or column and the form. Use non-metallic hardware for pumping ports when these are provided. Fabricate the jacket form in a workmanlike manner and have it inspected and approved by the Engineer prior to placement. Remove from the project any jacket form that has been rejected.

The forms shall meet the following physical property requirements of Table 1:

Table 1: Physical Requirements of Stay-In-Place Forms	
Water Absorption (ASTM D 570)	1% maximum
Ultimate Tensile Strength (ASTM D 638)*	9,000 psi minimum
Flexural Strength (ASTM D 790)*	16,000 psi minimum
Modulus of Elasticity (ASTM D 790)	700,000 psi minimum
IZOD Impact (ASTM D 256)	15 lb/inch minimum (unnotched specimen)
Barcol Hardness (ASTM D 2583)	45 minimum
Color: Similar to Federal Color Standard No. 595, Table VII, Shade No. 36622. The color must be integral in the form gel coat.	
* On original specimens whose flat surfaces are not machined to disturb the fiberglass.	

Anode Material:

Use expanded zinc mesh anodes pre-installed inside the form by the manufacturer when cathodic protection integral pile or column jackets are specified. The anode shall be suitable for encapsulation in a sand-cement grout or concrete filler. Use anode type and configuration shown in the Contract Documents. If galvanic anodes are used, place the anodes in direct contact with the inside face of the form.

Cathodic Protection System Acceptance:

Preliminary acceptance of systems shall be based on voltage potential measurement tests obtained between the anode and the reinforcing steel to verify that no electrical shorts exist. Any jackets shorted to the rebar cage, welded wire

fabric, or pile reinforcement shall be removed and replaced at no cost to the Department.

Jackets misaligned or with the anode shorted to the reinforcement shall be removed and replaced prior to final acceptance. Jackets exhibiting misalignment that do not exceed 50% from the specified position may be accepted at a reduced price not to exceed 60% of the bid price if approved by the Engineer.

Zinc Mesh:

The zinc mesh shall conform to ASTM B-69 with the following composition:

Lead (Pb)	0.003% weight max
Iron (Fe)	0.001% weight max
Cadmium (Cd)	0.003% weight max
Copper (Cu)	0.7-0.9% weight max
Aluminum (Al)	0.001% weight max
Titanium (Ti)	0.001% weight max
Magnesium (Mg)	0.0005% weight max
Nickel (Ni)	0.001% weight max
Tin (Sn)	0.001% weight max
Zinc (Zn)	balance

The zinc mesh shall have the following physical properties:

Electrical conductivity	28% min
Solid Zinc density	0.26 PCI
Weight of expanded mesh	1.6 PSF
Open area of expanded mesh	53% (density)
Solid Zinc sheet thickness	3/32”

The zinc mesh shall have the following geometrics:

0.500” hex pattern
0.125” strand width in short direction
0.500” strand width in long direction
0.320” short opening
0.750” long opening

Bulk Zinc Anode:

A 48-50 lb bulk zinc anode is required for the cathodic protection system for the jackets. The bulk zinc anode shall conform to ASTM B-418 for a Type I anode and shall be 99% pure zinc with a steel strap core. The steel strap shall be hot dip galvanized with a minimum zinc thickness of 0.005”. A ¾” diameter hole shall be predrilled at each end of the steel strap prior to galvanizing.

The bulk zinc anode shall be clamped to the pile using a two inch galvanized steel channel with the flanged side placed against the concrete surface and using two hop dip galvanized carriage bolts of 5/8” diameter which extend to the anode.

The anode shall be connected to the reinforcing steel as shown in the plans. Minor excavation (up to 2 ft) may be required to place the bulk zinc anode (or address a deficiency). No jetting is permitted, only hand excavation will be allowed. The mudline must be returned to original condition.

Fillers:

Use portland cement grout fillers for non-structural jackets and concrete fillers for structural jackets unless otherwise specified in the Contract Documents. See Special Filler Addendum at end of this PSP.

Portland Cement Grout:

Use a mix design of portland cement, fine aggregate, water and an admixture containing a minimum of 940 pounds of cementitious material per cubic yard. Up to 30%, by weight of cement, may be replaced by fly ash for standard pile jackets. Do not use fly ash, slag, or silica fume for cathodic protection jackets unless specified in the Contract Documents.

Use silica sand fine aggregate meeting the requirements of Section 1014.

Use portland cement meeting the requirements of Section 1024.

Use admixtures meeting the requirements of Sections 1000 and 1024, ASHTO M194, Types A and D.

Use air-entraining admixtures meeting the requirements of Section 1024 and containing no chlorides or other salts corrosive to metals.

Use fly ash meeting the requirements of Section 1024, ASTM C618, Type F, except that loss on ignition shall not exceed 4%.

Provide a grout filler mix with a minimum compressive strength of 5,000 psi at 28 days and a slump of 7 inches to 9 inches. Submit the design mix to the Engineer for approval by the Department before placing any grout filler.

Class AA Concrete:

Use Class AA Concrete meeting the requirements of Section 1000 with an adjusted slump of 7 inches to 9 inches. Reduced size coarse aggregate may be used as approved by the Engineer. Do not use fly ash, slag, or silica fume for cathodic protection jackets.

Submit the design mix to the Engineer for approval by the Department before placing any concrete filler.

Special:

When specified, furnish special fillers in accordance with the Contract Documents. Submit test results and documentation that demonstrate the material meets the requirements for the project. Use materials meeting the requirements of the attached addendum for special fillers when cementitious pre-bagged fillers are specified.

Chlorides:

Total amount of chlorides for jacket fillers shall not exceed 0.4 pounds per cubic yard of filler after placement. Total amount of chloride will be tested at a random basis as directed by the Engineer.

Water:

Use water that meets the requirements of Section 1024 for all filler mixing. Use potable water for cleaning, rinsing, or any other application that requires direct contact with the piles.

Reinforcing Steel:

Use reinforcing steel meeting the requirements of Section 1070 for all structural jackets.

MATERIALS CERTIFICATION AND TESTING

Certification:

For materials other than those for Portland cement grout and Class AA concrete, submit a certificate to the Engineer certifying that the materials furnished meet all the requirements of this Section and conform in all respects to the materials tested.

Attach current test reports to the certificate.

Submit certified test results of the chemical composition of the anode and submit a manufacturer certification stating that the dimensions and physical characteristics of the anode meet the requirements of the Contract Documents when cathodic protection jackets are specified.

Testing:

No test report for tests made more than two years prior to shipment will be accepted for the form material.

Test materials for Portland cement grout and Class AA concrete as required in Section 1000 for approved design mixes. Perform sampling and testing using

Quality Control technicians meeting the requirements of this Project Special Provision.

Test properties of materials for other cement based fillers allowed under "Special" in this project special provision, the same as required for the Department approved design mixes. Test the materials at a frequency of one set of tests per load of the mixer. For each set of tests, cast three 4 inch by 8 inch cylinders for compressive strength testing at the required test date. The Engineer may adjust the frequency of testing based on consistency of the mixes. Conduct a field verification mix prior to commencing the jacket installation. Cure samples of cement based materials in accordance with ASTM C31.

Hardened concrete or grout will be accepted on the basis of strength test results as defined in this Section. Test the laboratory cured samples for compressive strength at 28 days in a laboratory meeting and maintaining at all times the qualification requirements listed in Section 1000.

CONSTRUCTION

Shop Drawings:

Submit shop drawings and obtain approval prior to field installation. Submit shop drawings showing locations of standoff spacers, method of fastening jacket form to piling, method of sealing the form after assembly, and method for bracing during placement of filler. Include details of access holes, fiberglass caps, method of securing anode from movement, and methods for placing the filler and cutting and sealing the pumping ports.

Surface Preparation:

Remove all cracked or delaminated concrete and excavate to a depth of 3/4 inch to 1 inch behind the exposed reinforcement. Limit the size of chipping hammers to 20 pounds unless otherwise approved by the Engineer. Thoroughly clean all pile/column surfaces that the jackets will cover. Remove all oil, grease, dirt, broken concrete, marine growth and any other deleterious material that could prevent proper bonding. Sandblast all exposed reinforcing steel to SSPC-SP10, near white, per the Society of Protective Coatings, to remove all rust and scale before installing the pile jacket. Water blast or mechanically clean reinforcing steel exposed under water by methods and with equipment approved by the Engineer. Clean existing concrete surfaces by sandblasting, wet blasting, wire brushing, water laser, or other methods approved by the Engineer which will yield an equivalent result. Do not place the form until the surface preparation has been approved by the Engineer.

Cathodic Protection:

Provide connection to the reinforcement for cathodic protection integral pile jackets inside the jacket limits unless otherwise specified in the Contract Documents. Use connection methods and materials in accordance with the Contract Documents.

Form Placement:

Place the fiberglass form in position around the pile; secure and seal the interlocking joints, and seal the bottom of the form against the pile surface with the compressible seal and an Engineer approved epoxy mastic suitable for underwater application. Adjust stand-offs as necessary to prevent misalignment and install temporary hard backing to prevent deformation of the jacket. Place a temporary plastic wrap around the form prior to placement of the hardbacking to protect the gel coat.

Filler Placement:

Wet to saturation the surface of the existing concrete immediately prior to placing the filler. Place the filler in one continuous pour at no more than 72 hours after surface preparation. Fill the annulus between the pile or column and jacket form following the jacket manufacturer's instructions and the Contract Documents. Do not drop filler material into forms higher than five feet or into forms containing water. Prevent contamination of the filler during placement and provide internal or external vibration to ensure proper consolidation.

Cure filler for a minimum of 96 hours before removing any external bracing. Remove any filler or other extraneous material from the exterior surface of the form and clean the form without damaging the fiberglass or gel coat resin. Cut pumping ports flush with the surface of the jacket and seal opening with an Engineer approved listed epoxy.

Anode Configuration:

Resistance weld one end of each of two No. 8 AWG copper strand wires with THHN insulation to the spiral that was exposed during the continuity test and one end each of another two wires to the rebar cage or welded wire fabric. The connections shall be coated with two coats of 100% solids non-conductive epoxy such that no wire or weld will be in contact with concrete or patching material. Route the copper wire in conduit so that the free end of the wire terminates near the proposed junction box for fastening later. Resistance weld one end of a No. 8 AWG copper strand wire with HMWPE insulation to the steel bar at the bulk zinc anode. Welding of the connection wire to the bulk anode should be performed prior to anode installation. Attach the bulk zinc anode to the pile. Route the copper cable in the corner of the jacket between the mesh and the form so that the free end of the cable terminates near the proposed junction box for fastening later.

Perform surface preparation and jacket installation as per this Project Special Provision. The zinc mesh/fiberglass jacket halves shall be placed around the pile no later than 18 hours after the water wash and filled with grout/concrete within 96 hours after this PSP surface preparation. After jacket halves have been placed, route the two copper wires coming out of the jacket in conduit so that the free end of the cable terminates near the proposed junction box for fastening later.
The free ends of the copper wires/cables shall be connected in the junction box as shown. The following cables shall be present:

2 spiral (negative) (cathode)
2 cage or wwf (negative) (cathode)
1 bulk anode (positive) (anode)
2 zinc mesh (positive) (anode)

Continuity Testing (Electrical Resistance Check):

Prior to installing any negative connections perform an electrical continuity test between all strands and spiral ties on all piles receiving cathodic protection. After the test is approved, the Contractor shall perform continuity corrections where necessary. Certified test results shall be submitted to the Engineer for approval prior to pile jacket installation. Excavation for electrical continuity test shall be sealed with approved mortar after test within 20 hours.

If the electrical resistance tests reveal continuity between every strand and spiral, make local 4" x 4" excavation for the negative connection that will be needed for resistance welding to the spiral, then proceed to determine which jacket type is required. The 4" x 4" excavation can be located by the Contractor.

If the electrical resistance tests reveal that discontinuity exists in no more than two strands per face, perform scheme 1 as detailed in the Contract Documents, then proceed to determine which jacket type is required.

If the electrical resistance tests reveal that discontinuity exists in three or more strands per face, perform scheme 2 as detailed in the Contract Documents, then proceed to determine which jacket type is required.

CP jackets shall be energized within 14 days after placement of filler material.

A final report detailing the pile jacket system, which includes the testing of systems, potential survey measurements, results of the continuity testing, location of continuity corrections where applicable, and initial energizing information shall be submitted by the Cathodic Protection Specialist to the Engineer and:

Eric "Rick" Nelson
Assistant State Structures Engineer – Design & Operations
Structures Management Unit
1581 Mail Service Center
1000 Birch Ridge Road

Raleigh, NC 27610-1581

METHOD OF MEASUREMENT

The quantities to be paid for under this Section will be the total feet of integral pile or column jacket furnished, installed, completed and accepted. Measure length from bottom of the form to top of the form. All survey work shall be incidental to the cathodic protection system installation.

BASIS OF PAYMENT

Price and payment will be full compensation for all work specified in this Section. No separate payment will be made for reinforcing steel or filler material. Include payment for anode material, anode connection accessories, testing, and activation in the price per foot for cathodic protection integral pile jackets. Remove and replace jackets with misalignment exceeding 3/4 inch or CP jackets with the anode electrically shorted to the reinforcement at no additional cost to the Department. Price and payment will also be full compensation for removal, containment and disposal off-site of unsound concrete including

Payment will be made under:

Pay Item	Unit
Cathodic Protection Integral Pile Jacket (Non-Structural), 16 to 30 Inch	Linear Foot
Cathodic Protection Integral Pile Jacket (Structural) 16 to 30 Inch	Linear Foot

SPECIAL FILLER ADDENDUM FOR INTEGRAL PILE JACKETS

SPECIAL FILLERS

General:

This material is intended to be used as filler material and for rapid repairs to pile jacket structures and other locations specified in the Plans when no design mix concrete is available or a special filler is specified in the Contract Documents. Meet the requirements of this Project Special Provision for preparing the surfaces, placing, testing and curing the concrete.

Mix the material in accordance with the manufacturer's recommendations.

Classification:

The materials to be considered under this classification shall meet the following requirements:

Cathodic Protection (CP) Filler:

Provide cementitious based materials with a minimum cement content of 900 pounds of cement per cubic yard of mix. Material formulation must not contain fly ash, slag, silica fume or other mineral admixtures which may produce increased electrical resistance. The material shall not contain any substances corrosive to metals.

Non-Cathodic Protection (Non-CP) Filler:

Provide cementitious based materials with a minimum cement content of 650 pounds of cement per cubic yard of mix.

The material shall not contain any substances corrosive to metals.

Where concrete filler materials are specified, approved mortar materials may be extended using size number 89 gradation aggregates from a certified Department approved source.

Physical Properties:

The repair material shall meet or exceed the physical properties stated in Table 4 as determined by the specified standard test methods. If extended, materials shall meet the minimum requirements of Table 4.

Table 4 - Physical Properties of Special Fillers			
Requirement	Test Method	Cathodic Protection	Non-Cathodic Protection
Minimum Compressive Strength, psi			
24 hours	ASTM C39* or ASTM C109*	1,500	2,000
28 days		5,000	5,000
Maximum Length Change, %			
Allowable expansion at 28 days when water cured compared to length at one day	ASTM C157**	0.12	0.12
Allowable shrinkage at 28 days when air cured compared to length at one day		-0.12	-0.12
Allowable difference between increase in water and decrease in air		0.20	0.20
Slump (Concrete), inches	ASTM C143	7-9	7-9
Minimum Flow (Mortar), %	ASTM C1437	100	100
Time of Setting (Initial), minutes	ASTM C191* or ASTM C403*	200 to 400	200 to 400
Minimum Bond Strength by Slant Shear (at 7 days), psi	FM 5-587	450	450
Minimum Flexural Strength (at 7 days), psi	ASTM C580	700	700
Minimum Tensile Strength (at 7 days), psi	ASTM C307	200	200
Surface Resistivity (at 28 days), KOhm-cm	FM 5-578	15 or less	22 or greater
Maximum Allowable Total Chlorides lbs/yd^3	FM 5-516	0.40	

* as applicable

** Make and cure the test specimens in accordance with ASTM C157, except omit the curing period in Section 10.3; however both 11.1.1 and 11.1.2 shall apply for 28 day curing period.

Constructability:

Submit to the Engineer for approval shop drawing as may be required to complete repairs in compliance with the design shown in the Plans and the manufacturer's recommended repair system.

PILE STRENGTHENING -WATERLINE FOOTINGS (SPECIAL)

1.0 GENERAL

1.1 SUMMARY

A. This Section specifies the minimum requirements for restoring deteriorated piles using Fiber-Reinforced Polymer (FRP) Laminate encasement or jacket (these terms are interchangeable). The work shall consist of using a fiber–reinforced laminate to create a jacket around the pile to be restored, and filling the annulus between the jacket and the pile with fill material, see Section 2.3.

B. Contractor shall provide all labor, materials, tools, and equipment required for the completion of the Work, as shown on the Contract Documents and specified herein:

1. Prepare existing areas, as defined by these specifications and related Contract Drawings, designated to receive pile restoration
2. Design, furnish, fabricate, and install all jackets, shores, and bracing
3. Prepare installation and placement shop drawings
4. Prepare design drawings for shores, and bracing if required
5. Furnish all submittals required by this Section of the Specifications
6. Coordinate all work with other trades on site.

1.2 REFERENCES

A. The latest edition and addenda of the following publications in effect on the date of Contract Award are part of this Specification and, where referred to by title or basic designation only, are applicable to the extent indicated by the specific reference**:**

1. SSPC SP-2, Hand Tool Cleaning
2. SSPC-SP 6/NACE No. 3, Commercial Blast Cleaning
3. SSPC SP-12 WJ-2 Surface Preparation and Cleaning of Metals by Water Jetting
4. SSPC-SP 13/NACE No. 6, “Surface Preparation of Concrete”
5. SSPC-SP 15 Commercial Grade Power Tool Cleaning
6. ASTM F-2207 Standard Specification for Cured-in-Place Pipe Lining System for Rehabilitation of Metallic Gas Pipe; used to establish the confinement capacity of the FRP.

1.3 SUBMITTALS

A. Comply with pertinent provisions of the Master Project Specification, Submittals.

Product Data:

1. Fiber-Reinforced Laminate product data sheets showing material properties and

strength.

2. Fill resin product data sheets showing material properties and strength.
3. Adhesive resin product data sheets showing material properties and strength.
4. Fill and Adhesive Resin MSDS sheets.
5. Miscellaneous fasteners, anchors, straps, spacers, etc. product data sheets showing material properties.

B. Design and Shop Drawings:

The following information must be provided and sealed by a professional civil engineer:

1. Calculations showing the confining pressure provided by the jacket being used.
2. Details shall be carried out in accordance with the local building codes, and as shown on plans.
3. Shop drawings showing the FRP jacket installation steps, spacer sizes, overlap details, and the filler material to be placed in the annular space.

C. Certifications

1. ASTM F-2207 test report showing the jacket provides a minimum confining pressure given in Section 2.1.C, below.
2. Summary of full-scale structural test reports for strengthening steel, concrete and timber piles. List of and results of full-scale tests.
3. Product approval by the US Army Corps of Engineers and FEMA
4. Material certification for FRP laminates to show date of fabrication.
5. Material certification for fill and adhesive resin to show date of manufacture.

D. Quality Assurance Documents

1. Daily installation reports showing air and water temperatures
2. Daily installation reports showing lot numbers of FRP laminates and resins used on each pile

2.0 PRODUCTS

2.1 FIBER-REINFORCED POLYMER (FRP) LAMINATES

A. The laminate shall be a high-strength Fiber Reinforced Polymer (FRP) laminate constructed with bidirectional carbon or glass fabrics that provides strength in both longitudinal and transverse directions.

B. The FRP laminates shall have the minimum properties listed in the table below.

FRP Laminate Properties			
Property	**Standard**	**Glass**	**Carbon**
Longitudinal Direction			
Tensile Strength, ksi	ASTM D3039	60	100
Modulus of Elasticity, ksi	ASTM D3039	3,500	7,000
Ultimate Elongation, %	ASTM D3039	1.31	0.85
Transverse Direction			
Tensile Strength, ksi	ASTM D3039	60	64
Modulus of Elasticity, ksi	ASTM D3039	3,650	2,940
Ultimate Elongation, %	ASTM D3039	1.06	1.42
Other Properties			
Barcol Hardness	ASTM D2583	50	45
Max. Water Absorption, %	ASTM D 570	0.8	0.7
Laminate Thickness, in.		0.026	0.026

C. The FRP Laminate must provide the nominal structural values listed in the table below. Best fit interpolation may be used for pile sizes not on this table.

Pile Jacket Dia. (in.)	**Glass FRP**		**Carbon FRP**	
	Confining Pressure* (psi)	Long. Steel Equivalent spacing, in.**	Confining Pressure* (psi)	Long. Steel Equivalent spacing, in.**
10	645	19	1050	12
12	535	22	875	14
15	430	28	700	17
18	355	34	580	21
24	265	45	435	28

36	180	66	290	41
48	130	91	220	54
60	107	111	175	68

*Assuming a 2-ply jacket

**Equivalent number of #4 Gr. 60 steel reinforcement distributed around the circumference of the pile

2.2 ADHESIVE RESIN

A. The adhesive resin shall be a two-component high-strength structural epoxy designed for underwater applications. It shall have an immediate high tack consistency both in air and water and shall trowel easily.

B. The adhesive resin shall be a 100% solids formulation with low toxicity and low odor during cure.

C. The adhesive resin must be NSF-61 Certified for potable water application.

D. The adhesive resin shall meet the properties listed in the table below.

Adhesive Resin Properties		
Property	**Standard**	**Value**
Tensile Strength, psi	ASTM D-638	4,360
Compressive Strength, psi	ASTM D-695	11, 700
Flexural Strength, psi	ASTM D-790	8,900
Tensile Elongation, Max. %	- - -	5%

2.3 FILL MATERIAL

A. LOW VISCOSITY RESIN (See Section 3.2.D for Application Instructions)

1. The fill resin shall be a two-component, high-strength, low-viscosity structural epoxy. The resin shall cure underwater and shall provide excellent durability and chemical resistance. The resin shall be a 100% solids formulation with low toxicity and low odor during cure. Low Viscosity Resin (recommended for round timber, concrete or steel piles where the annular space is minimal (smaller than 1/4 inch) and it is desired to fill the cracks and voids with resin in timber and concrete piles)
2. The fill resin must have a low viscosity of 780 cps at 77 F to ensure that it will fill small cracks and voids in the pile.
3. The resin must be heavier than water, with a density greater than 1.10 to flow to the bottom of the annular space and displace the water.
4. The fill resin must be so that its color would show through the glass laminate.
5. The fill resins shall meet the properties listed in the table below.

Fill Resin Properties		
Property	**Standard**	**Value**
Viscosity @ T=77° F, cps	ASTM D-1290	780
Tensile Strength, psi	ASTM D-638	7,900
Compressive Strength, psi	ASTM D-695	11,200
Density	- - -	1.10
Tensile Elongation, Max. %	ASTM D-638	5%
Hardness, Min. Shore D	ASTM D-2240	86

B. EPOXY GROUT (See Section 3.2.E for Application Instructions)

1. The epoxy grout shall be a two-component 100% solids epoxy grout specifically designed for underwater concrete and masonry applications.
2. The epoxy grout resin must have a mixed viscosity of 750-1250 cps at 77 F to ensure easy flow.
3. The epoxy grout resin shall meet the properties listed in the table below.
4. The epoxy grout must be so that its color would show through the glass laminate.
5. Epoxy grout will require placement by incorporating ports in the jacket at 180 degree alternating positions and filling the resin from bottom until it comes out of the next top one; then sealing the first port and connecting to the next top one and continuing thus.

Epoxy Grout Resin Properties		
Property	**Standard**	**Value**
Viscosity @ T=77° F, cps	ASTM D-1290	750-1250
Tensile Strength, psi	ASTM D-638	5,100
Compressive Strength, psi	ASTM D-695	8,500
Tensile Elongation, Max. %	ASTM D-638	4-8%
Hardness, Min. Shore D	ASTM D-2240	85-90

C. UNDERWATER GROUT (See Section 3.2.E for Application Instructions)

1. The fill material shall be a pumpable underwater cement-based non-shrink grout.
2. The grout shall meet the US Army Corps of Engineers CRD-C-621 specifications for

plastic/flowable conditions.

3. The grout shall have minimum compressive strength of 2500 psi (1 day), 8050 psi (7 days) and 9100 psi (28 days).
4. Underwater grout will require placement by incorporating ports in the jacket at 180 degree alternating positions and filling the resin from bottom until it comes out of the next top one; then sealing the first port and connecting to the next top one and continuing thus.

2.4 SPACERS

Spacers used to create an annulus around the pile shall be of the non-reactive type.

2.5 REINFORCING MATERIALS

A. Carbon FRP Strips
   1. The reinforcing material shall be a non-reactive and fully cured carbon FRP strips with a thickness of 0.47 inch and width of 4 inches.
   2. The laminate shall have a tensile strength of 400 ksi and a tensile modulus of elasticity of 24,000 ksi.

B. Reinforcing Steel
   1. The reinforcing material shall be Grade 60 steel conforming to ASTM A615.
   2. The reinforcing steel shall be epoxy coated and conform to ASTM A775.
   3. Prior to installation in the field, all reinforcing steel shall be inspected to ensure the epoxy coating is free of any damage. Epoxy coat the ends of rebar that has been cut in the field.

2.6 ALTERNATIVE MATERIALS

A. Any alternative materials proposed as a substitute for the materials specified in this specification shall be submitted for review and approval to the Project Engineer at least 15 days prior to the bid date.

3.0 EXECUTION

3.1 PREPARATION

A. Concrete Piles

   1. All loose and deteriorated concrete shall be removed using hydraulic or pneumatic hand tools.

   2. Contractor shall take precautions not to damage non-spalled or cracked concrete at location of scheduled repair.

   3. After loose concrete is chipped away, all concrete surfaces scheduled to receive encasements shall be cleaned using high pressure water-jetting with rating of 5000 psi. The purpose of this preparation is to remove all marine growth and any

soft surface layer that may have accumulated on the piles.

4. The elapsed time between the cleaning of the concrete surface and the installation of the FRP encasement shall not exceed 72 hours. If this time frame is exceeded contractor shall re-clean the pile prior to encasement.

5. Irrespective of paragraph 3.1.B.4, above, Contractor shall remove any marine growth that has accumulated on the concrete surface prior to encasement.

3.2 APPLICATION

A. Epoxy Paste

1. The epoxy paste shall be appropriate for underwater installations or for dry installations, as applicable. Adhere strictly to Manufacturer's Recommendations.

2. The epoxy shall be mixed in small batches at the point of installation.

3. Great care shall be given to application of the epoxy paste to the laminate. Thoroughly clean the laminate surface per manufacturer's recommendation prior to the application of the epoxy paste. Air, water and laminate surface temperature shall be between 45 and 90 degrees F.

4. Do not begin application if air, water or laminate surface temperature is below 45 or expected to fall below 45 F within 12 hours of application.

5. Do not begin application if the dew point is within 5 F of the temperature.

6. All epoxy components shall be conditioned to a temperature between 65 and 85 F prior to the time of mixing.

B. FRP Laminate Jacket (Encasement)

1. Cut the required length of the 4-ft (1200-mm) wide laminate jacket in the field. Note that the jacket must wrap a minimum of twice around the pile (720 degrees) plus an 8-inch (200-mm) overlap.

2. Thoroughly mix the epoxy paste.

3. Apply a 30-mil thick film of the epoxy paste to the overlapping portion of the laminate. A notched trowel can be used to ensure uniform epoxy thickness.

4. Tubes or Spacers and Ports.

   a. Tubes are used with Low Viscosity Resin; see Section 2.3.A. Secure a minimum of three injection tubes at 120 degrees apart along the height of the pile to be repaired. Grooves may be cut into the pile to place the tubes flush with the face of the pile.

   b. Spacers are used with Fill Material; see Section 2.3.B and 2.3.C. Install two injection ports in the laminate jacket, one near the bottom of the jacket and the second near the top of the jacket and 180 degrees opposite to the lower jacket. Install the Spacers around the perimeter of the pile at the same elevation to form

a “ring”. Install one “ring” of Spacers near the bottom of the laminate jacket and install a second “ring” near the top of the laminate jacket.

5. Wrap the laminate around the pile ensuring the second layer is in full contact with the first layer. Adjust the diameter of the jacket as necessary.
6. Use ratchet straps or shrink wrap as temporary means to keep the FRP diameter in the desired size.
7. When necessary, additional 4-ft (1200-mm) sections of laminate can be installed similarly. Apply epoxy paste over the overlapping portion of the first laminate to create a longer jacket.
8. At the contractor’s discretion Steps 3 through 7 can be performed on a portion of the pile above water and the assembly lowered below the waterline.
9. Seal the bottom of the annular space.

C. Fill Resin Placement Equipment

1. Contact the FRP Manufacturer for recommended mixing equipment.
2. For small projects the resin may be proportioned and mixed separately before placing the mixed resin in a dispensing pump.
3. For larger projects, an automatic measuring, mixing and dispensing pump must be used.

D. Mixing and Placing Low Viscosity Resin Described in Section 2.3.A above

1. Mix the resin at the point of installation. Adhere strictly to Manufacturer’s Recommendations.
2. Minimum application temperature shall be 45 F.
3. All epoxy components shall be conditioned to a temperature between 65 and 85 F prior to the time of mixing.
4. Introduce resin at the bottom of the annular space using tubes of the appropriate size. At a minimum, use 3 tubes located at 120 degrees.
5. Fill the lower 6 inch (150 mm) of the annular space with resin. Allow sufficient time for this resin to set and penetrate into the pile, creating a horizontal seal layer at the bottom of the FRP jacket.
6. Fill the remaining height of the annular space with resin. Fill resin placement shall begin from the bottom of the laminate jacket until it reaches the top of the jacket. The density of the fill resin is heavier than water and will push the water to the top of the annular space.
7. Allow fill resin to overtop the jacket until all water has been removed from the inside of the jacket.

E. Placing of the Fill Material Described in Sections 2.3.B and 2.3.C above

1. Fill the lower 6 inch (150 mm) of the annular space with fill material. Allow sufficient time for this material to set, creating a horizontal seal layer at the bottom of the FRP jacket.
2. Fill material placement shall begin from the bottom of the laminate jacket using pre-installed ports that are positioned at alternating 180 degrees. Start filling the annular space from bottom until the fill material comes out of the next top port; then seal the first port and connect hose to the next top port and continue thus.
3. Allow the fill material to overtop the jacket until all water and any debris has been removed from the inside of the jacket.
4. Seal the top ½ inch height of the annular space with low viscosity resin.

3.3 INSPECTION

A. The Work to be provided in accordance with this Section of the Specification shall be subject to inspection by Owner at any time(s) during the progress of the Work. Contractor shall provide access and any labor, materials, tools, and equipment required by Owner to complete inspection of the Work as specified herein.

B. Completed installations shall be visually inspected to confirm the integrity of the laminate encasement and the resin fill. Any deficiencies shall be corrected at the Contractor's expense. The Contractor shall propose a repair method and submit it to the Engineer for approval prior to implementing said repair.

C. Acceptance of structure shall be contingent on the Work meeting all of the requirements of the Contract Documents as indicated by the results of all testing, inspection, and other quality assurance procedures required by Owner.

3.4 METHOD OF MEASUREMENT

Pile strengthening will be computed for payment in place, per linear foot along pile, as shown on the plans.

3.4 BASIS OF PAYMENT

Prices and payments will be full compensation for all work specified in this Section, and will be full compensation for removal, containment and disposal off-site of unsound concrete including cleaning, surface preparation, carbon, glass, and epoxy materials, UV Coating materials, labor, tools, equipment, specified testing, and incidentals necessary to complete the work.

No additional compensation will be made for areas which shall be reapplied due to Contractor's error. Payment will be made under:

Pay Item	Unit
Pile Wraps (Waterline Footings)	Linear Foot

PLASTIC LUMBER FENDER BOARDS (SPECIAL)

1.0 DESCRIPTION

The work for providing plastic and composite lumber consists of furnishing and installing the materials and all miscellaneous hardware to complete the work in accordance with the plans and this special provision.

2.0 MATERIALS

Plastic and composite lumber shall be made of polyethylene, contain appropriate colorants and UV inhibitors, and shall meet the material property requirements specified in Table 1. Plastic and composite lumber shall contain glass filament. The lumber must not corrode, rot, warp, splinter or crack. The outer surface of the lumber shall be black in color unless otherwise specified in the Contract Documents. The skin shall be generally smooth, uniform and consolidated but may contain occasional small blisters or pockmarks. Small voids shall be repaired as directed by the Engineer with a repair procedure approved by the Engineer.

Manufacture plastic and composite lumber as one continuous piece with no joints or splices. Plastic and composite lumber shall be free of twist and curvature. Steel reinforcement in the lumber is not permitted.

Plastic and composite lumber must meet the minimum structural properties listed in Table 3 and the dimensions and tolerances of Table 2.

Table 1
Plastic and Composite Lumber Material Properties

Applicable ASTM Code	Applies To	Requirement
Density ASTM D792	Skin of lumber	55 pcf min.
Density ASTM D792	Core of lumber	48 pcf min.
Water Absorption ASTM D570	Skin of lumber	24 hrs: <3.0% weight increase

Table 1 Plastic and Composite Lumber Material Properties		
Impact Resistance ASTM D256 Method A or ASTM D256 Method D	Skin of lumber	Greater than 0.55 ft-lbs/in
Hardness ASTM D2240	Skin of lumber	44-75 (Shore D)
Ultraviolet Light ASTM D4329 UVA	Skin of lumber	500 hours<10% change in Shore D Durometer Hardness
Abrasion ASTM D4060	Skin of lumber	Weight Loss: < 0.03 oz Cycles = 10,000 Wheel = CSl 7 Load: 2.2 lbs
Chemical Resistance ASTM D756 or ASTM D543	Skin and Core of lumber Sea Water Gasoline No. 2 Diesel	 < 1.5% weight increase < 9.5% weight increase < 6.0% weight increase
Tensile Properties ASTM D638	Core of lumber	Minimum 2200 psi at break
Compressive Modulus ASTM D695	Core of lumber	Minimum 40 ksi
Static Coefficient of Friction ASTM D1894	Skin of lumber	Maximum 0.25, wet
Nail Pull-Out or Screw Withdrawal ASTM D6117	Skin and Core of lumber	Minimum 60 lbs (nail) Minimum 400 lbs (screw)

Table 2 Dimensions and Tolerances		
Plastic and Composite lumber	!Dimension	Tolerance
Length	Per order (80ft max)	+6 -0 in
Width	See Contract Plans	± ¼ in
Height	See Contract Plans	± ¼ in
Corner Radius -Lumber with reinforcing rods - Lumber without reinforcing rods	1 ¼ in ¼ in	± ½ in ± 1/16 in
Outer Skin Thickness – (if reinforced with rods)	3/16 in	± 1/8 in
Distance from outer surface to rod elements (if reinforced with rods)	1 ½ in	± 5/8 in
Straightness (gap, bend or inside while lying on a flat surface)		<1 ½ in per 10 feet

Determine the modulus of elasticity for plastic and composite lumber by conducting a three point or four point bend test as per ASTM D790 or D6109. The modulus for lumber with reinforcing rods is to be taken at a strain of 0.01 inches per inch. The modulus for lumber reinforced without reinforcing rods may be taken by one of the methods suggested in ASTM D6109.

Table 3 Structural Properties for Composite Lumber	
Modulus of Elasticity (ASTM D6109)	300 ksi min.
Flexural Strength (ASTM D6109)	No fracture at 2500 psi
Compressive Strength (ASTM D6108)	2200 psi min. parallel to grain 700 psi min. perpendicular to grain

3.0 ACCEPTANCE

The Contractor shall submit the following information to the Resident Engineer and Steve Walton of Materials & Tests (336-993-2300) at least 20 days prior to shipping any plastic and composite lumber:

Copies of the plastic and composite lumber manufacturer's standards and most recent brochure for the lumber products covered by these specifications.

Independent test lab report confirming the plastic and composite lumber products meet the plastic material properties found in Table 1.

Independent test lab report confirming the submitted lumber products meet the minimum structural property requirements found in Table 3.

Written certification from the manufacturer that the submitted plastic and composite lumber products satisfy the requirements of this.

The independent test lab reports must be no older than five (5) years.

The Department reserves the right to place a duly authorized inspector in the plant prior to shipment of any plastic and composite lumber product for the purpose of determining preapproval. Notify the Engineer at least 7 days in advance of any shipment. Preapproval of lumber products shall be on the basis of tests of materials,

inspection of lumber products, conformance with specified dimensions, appearance, and freedom from defect. Each individual plastic and composite lumber piece shall be available for inspection by the inspector. The inspector shall have the authority to reject any or all lumber products not manufactured in accordance with these specifications. Any plastic and composite lumber products found to be defective in any manner at any time shall be rejected and replaced by an acceptable plastic and composite lumber product or repaired in a manner approved by the Engineer. All lumber products preapproved by the inspector shall be stamped as approved. Preapproval does not guarantee final acceptance.

Final acceptance of all plastic and composite lumber products shall be determined by the Engineer.

4.0 CONSTRUCTION DETAILS

Protect materials at all times against exposure to extreme heat or impact. Transport plastic and composite lumber in a manner that will minimize scratching or damage to the outer surfaces, stack on dunnage above ground so that it may be easily inspected and store in a manner that will avoid damage. Lumber damaged in shipping or handling will be rejected.

Cut, bevel, drill, countersink, and otherwise fabricate plastic and composite lumber in accordance with the manufacturer's recommendations. Set all material accurately to required levels and lines, with members plumb and true and accurately cut and fitted. Securely attach all composite lumber to substrate by anchoring and fastening as shown on plans. Perform all cutting and drilling in a manner that allows for the collection of all debris and dispose of properly.

5.0 BASIS OF PAYMENT

The lump sum price bid for "Plastic Lumber Fender Boards" will be the full compensation for all lumber and all equipment, tools, and work necessary for their installation. The lump sum price bid for "Plastic Lumber Fender Boards" will be full compensation for all other work including but not limited to material, equipment, tools, disposal, fasteners, plates, spare parts package, and other necessary items or effort required for completing the work.

SHOTCRETE REPAIRS (12-5-12)

GENERAL

The work covered by this Special Provision consists of removing deteriorated concrete from the structure in accordance with the limits, depth and details shown on the plans, described herein and as established by the Engineer. This work also includes removing and disposing all loose debris, cleaning and repairing reinforcing steel and applying shotcrete.

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

Any portion of the structure that is damaged from construction operations shall be repaired to the Engineer's satisfaction, at no extra cost to the Department.

MATERIAL REQUIREMENTS

Use prepackaged shotcrete conforming to the requirements of ASTM C1480, the applicable sections of the Standard Specifications and the following:

Test Description	Test Method	Age (Days)	Specified Requirements
Silica Fume (%)	ASTM C1240	-	10 (Max.)
Water/Cementitious Materials Ratio	-	-	0.40 (Max.)
Air Content - As Shot (%)	ASTM C231	-	4 ± 1
Slump - As Shot (Range in inches)	ASTM C143	-	2 - 3
Minimum Compressive Strength (psi)	ASTM C39	7 28	3,000 5,000
Minimum Bond Pull-off Strength (psi)	ASTM C1583	28	145
Rapid Chloride Permeability Tests (range in coulombs)	ASTM C1202	-	100 - 1000

Admixtures are not allowed unless approved by the Engineer. Store shotcrete in an environment where temperatures remain above 40°F and less than 95°F

All equipment must operate in accordance with the manufacturer's specifications and material must be placed within the recommended time.

QUALITY CONTROL

A. Qualification of Shotcrete Contractor

The shotcrete Contractor shall provide proof of experience by submitting a description of jobs similar in size and character that have been completed within the last 5 years. The name, address and telephone number of references for the submitted projects shall also be furnished. Failure to provide appropriate documentation will result in the rejection of the proposed shotcrete contractor.

B. Qualification of Nozzleman

The shotcrete Contractor's nozzleman shall be certified by the American Concrete Institute (ACI). Submit proof of certification to the Engineer prior to beginning repair work. The nozzleman shall maintain certification at all times while work is being performed for the Department. Failure to provide and maintain certification will result in the rejection of the proposed nozzleman.

TEMPORARY WORK PLATFORM

Prior to beginning any repair work, provide details for a sufficiently sized temporary work platform at each repair location. Design steel members to meet 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 design and plans for review and approval. The design and plans shall be sealed and signed by a North Carolina registered Professional Engineer. Do not install the platform until the design and plans are approved. Drilling holes in the superstructure for the purpose of attaching the platform is prohibited. Upon completion of work, remove all anchorages in the substructure and repair the substructure at no additional cost to the Department.

SURFACE PREPARATION

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

Prior to removal, introduce a shallow saw cut approximately ½" in depth around the repair area at right angles to the concrete surface. Remove all deteriorated concrete 1 inch below the reinforcing steel with a 17 lb (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. Unless specifically directed by the Engineer, do not remove concrete deeper than 1 inch below the reinforcing steel.

Abrasive blast 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. After sandblasting examine the reinforcing steel to ensure at

least 90% of the original diameter remains. If there is more than 10% reduction in the rebar diameter, splice in and securely tie supplemental reinforcing bars as directed by the Engineer.

Provide welded stainless wire fabric at each repair area larger than one square foot if the depth of the repair exceeds 2 inches from the "As Built" outside face. Provide a minimum 4" x 4" - 12 gage stainless welded wire fabric unless otherwise shown on the plans. Rigidly secure the welded wire fabric to existing steel or to 3/16" diameter stainless hook fasteners adequately spaced to prevent sagging. Encase the welded wire fabric in shotcrete a minimum depth of 1½ inches.

The contractor has the option to use synthetic fiber reinforcement as an alternate to welded wire fabric if attaching welded wire fabric is impractical or if approved by the Engineer. Welded wire fabric and synthetic fiber reinforcement shall not be used in the same repair area.

Thoroughly clean the repair area of all dirt, grease, oil or foreign matter, and remove all loose or weakened material before applying shotcrete. Saturate the repair area with clean water the day before applying shotcrete. Bring the wetted surface to a saturated surface dry (SSD) condition prior to applying shotcrete and maintain this condition until the application begins. Use a blowpipe to facilitate removal of free surface water. Only oil-free compressed air is to be used in the blowpipe.

The time between removal of deteriorated concrete and applying shotcrete shall not exceed 5 days. If the time allowance exceeds 5 days, prepare the surface at the direction of the Engineer before applying shotcrete.

APPLICATION AND SURFACE FINISH

Apply shotcrete only when the surface temperature of the repair area is greater than 40°F and less than 95°F. Do not apply shotcrete to frosted surfaces. Maintain shotcrete at a minimum temperature of 40°F for 3 days after placement.

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

The nozzleman should hold the nozzle 3 to 4 feet from the surface being covered in a position that ensures the shotcrete strikes at right angles to the surface being covered without excessive impact. The nozzleman shall maintain the water amount at a practicable minimum, so the mix properly adheres to the repair area. Water content should 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 wires or guide strips that do not entrap rebound sand. 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.

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

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, saturate the area with clean water and use a blowpipe as outlined previously, prior to continuing with the remaining shotcrete course. Do not apply shotcrete to a dry surface.

Finish all repaired areas, including chamfered edges, as close as practicable to their original "As Built" dimensions and configuration. Provide a minimum 2" of cover for reinforcing steel exposed during repair. Slightly build up and trim shotcrete to the final surface by cutting with the leading edge of a sharp trowel. Use a rubber float to correct any imperfections. Limit work on the finished surface to correcting imperfections caused by trowel cutting.

Immediately after bringing shotcrete surfaces to final thickness, thoroughly check for sags, bridging, and other deficiencies. Repair any imperfections at the direction of the Engineer.

Prevent finished shotcrete from drying out by maintaining 95% relative humidity at the repair and surrounding areas by fogging, moist curing or other approved means for seven days.

MATERIAL TESTING & ACCEPTANCE

Each day shotcreting takes place, the nozzleman shall shoot one 18" x 18" x 3" test panel in the same position as the repair work that is being done to demonstrate the shotcrete is being applied properly. Store, handle and cure the test panel in the same manner as the repaired substructure.

Approximately 72 hours after completing the final shotcrete placement, thoroughly test the surface with a hammer. At this time, the repair area should have sufficient strength for all sound sections to ring sharply. Remove and replace any unsound portions prior to the final inspection of the work. No additional compensation will be provided for removal and replacement of unsound shotcrete.

After 7 days, core three 3" diameter samples from each test panel and from the repaired structure as directed by the Engineer. Any cores taken from the structure shall penetrate into the existing structure concrete at least 2 inches. Cores shall be inspected for delamination, sand pockets, tested for bond strength and compressive strength. If a core taken from a repaired structure unit indicates unsatisfactory application or performance of the shotcrete, take additional cores from the applicable structure unit(s) for additional evaluation and testing as directed by the Engineer. Any repair work failing to meet the requirements of this provision will be rejected and the Contractor shall implement a remediation plan to correct the deficiency at no additional cost to the Department. No extra payment will be provided for drilling extra cores. Patch all core holes in repaired structure units to the satisfaction of the Engineer. All material testing, core testing and sampling will be done by the Materials and Tests Unit of North Carolina Department of Transportation.

MEASUREMENT AND PAYMENT

Shotcrete Repairs 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 complete the repair work. Depth will be measured from the original outside concrete face. The Contractor and Engineer will measure quantities after removal of unsound concrete and before application of repair material. Payment will also include the cost of sandblasting, surface cleaning and preparation, cleaning of reinforcing steel, placement of new steel, cost of temporary work platform, testing for soundness, curing of shotcrete and taking core samples from the test panels and substructure units.

Payment will be made under:

Pay Item	**Pay Unit**
Shotcrete Repairs (Diaphragm, Deck)	Cubic Feet
Shotcrete Repairs (Pile Bents)	Cubic Feet

Note: Optional Polymer Modified Concrete Repair for deck, diaphragm, or other substructure repairs may be used in place of shotcrete repairs, but material and method must be approved prior to use and will be in accordance with Special Provision for Concrete Repairs. Payment for Polymer Modified Concrete Repairs in lieu of shotcrete repairs will be made at bid unit price for shotcrete repairs.

CONCRETE REPAIRS (12-5-12)

DESCRIPTION

Work includes removal of concrete in spalled, delaminated and/or cracked areas of the existing deck, beams, diaphragms, caps, columns, footings, and piles 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, doweling new reinforcing steel, removing all loose materials, removing and disposing of debris, formwork, 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 extent of removal in the field based on an evaluation of the condition of the exposed surfaces. The Contractor shall coordinate removal operations with the Engineer. No more than 30% of a round or square column or 30% of the bearing area under a beam shall be removed without a temporary support system and approval from the Engineer.

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.

REPAIR MATERIAL OPTIONS

Polymer Modified Concrete Repair Material (Prestressed Concrete Girder Repairs & Contractor Option for Diaphragm/Bent/Pile Substructure Repairs in Lieu of Shotcrete)

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.

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. Acid etch only if approved by the Engineer. Follow acid etching 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.

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.

Class AA Concrete Repair Material (Footing Repairs)

Repair material shall be Class AA Portland Cement Concrete as described in Section 1000 of the Standard Specifications.

Prior to the application of Class AA concrete, 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. Acid etch only if approved by the Engineer. Follow acid etching 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.

Upon completion of surface preparation, mix and apply concrete in accordance with Standard Specifications and/or 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 concrete 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.

TEMPORARY WORK PLATFORM

Prior to beginning any repair work, provide details for a sufficiently sized temporary work platform at each repair location. Design steel members to meet 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 design and plans for review and approval. The design and plans shall be sealed and signed by a North Carolina registered Professional Engineer. Do not install the platform until the design and plans are approved.

Drilling holes in the superstructure for the purpose of attaching the platform is prohibited. Upon completion of work, remove all anchorages in the substructure and repair the substructure at no additional cost to the Department.

MEASUREMENT AND PAYMENT

Concrete Repairs 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, reinforcing steel, labor, tools, equipment and incidentals necessary to complete the repair work. Depth will be measured from the original outside concrete face. The Contractor and Engineer will measure quantities after removal of unsound concrete and before application of repair material. Payment will also include the cost of sandblasting, surface cleaning and preparation, cleaning of reinforcing steel, placement of new 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 (PPC Girders)	Cubic Feet
Class “AA” Concrete (Bridge)-Channel Bent Footing Restoration	Cubic Yard

Note: Optional Polymer Modified Concrete Repair for deck, diaphragm, or other substructure repairs may be used in place of shotcrete repairs, but material and method must be approved prior to use and will be in accordance with Special Provision for Concrete Repairs. Payment for Polymer Modified Concrete Repairs in lieu of shotcrete repairs will be made at bid unit price for shotcrete repairs.

FALSEWORK AND FORMWORK (4-5-12)

1.0 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.

2.0 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.

3.0 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.

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

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.

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.

As an option for the Contractor, overhang falsework hangers may be uniformly spaced, at a maximum of 36 inches, provided the following conditions are met:

Member Type (PCG)	Member Depth, (inches)	Max. Overhang Width, (inches)	Max. Slab Edge Thickness, (inches)	Max. Screed Wheel Weight, (lbs.)	Bracket Min. Vertical Leg Extension, (inches)
II	36	39	14	2000	26
III	45	42	14	2000	35
IV	54	45	14	2000	44
MBT	63	51	12	2000	50
MBT	72	55	12	1700	48

Overhang width is measured from the centerline of the girder to the edge of the deck slab.

For Type II, III & IV prestressed concrete girders (PCG), 45-degree cast-in-place half hangers and rods must have a minimum safe working load of 6,000 lbs.

For MBT prestressed concrete girders, 45-degree angle holes for falsework hanger rods shall be cast through the girder top flange and located, measuring along the top of the member, 1'-2 ½" from the edge of the top flange. Hanger hardware and rods must have a minimum safe working load of 6,000 lbs.

The overhang bracket provided for the diagonal leg shall have a minimum safe working load of 3,750 lbs. The vertical leg of the bracket shall extend to the point that the heel bears on the girder bottom flange, no closer than 4 inches from the bottom of the member. However, for 72-inch members, the heel of the bracket shall bear on the web, near the bottom flange transition.

Provide adequate overhang falsework and determine the appropriate adjustments for deck geometry, equipment, casting procedures and casting conditions.

If the optional overhang falsework spacing is used, indicate this on the falsework submittal and advise the girder producer of the proposed details. Failure to notify the Engineer of hanger type and hanger spacing on prestressed concrete girder casting drawings may delay the approval of those drawings.

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 on concrete girders with thin top flanges. 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.

When staged construction of the bridge deck is required, detail falsework and forms for screed and fluid concrete loads to be independent of any previous deck pour components when the mid-span girder deflection due to deck weight is greater than ¾".

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.

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. 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 above ground	Pressure, lb/ft^2 for Indicated Wind Velocity, mph				
	70	80	90	100	110
0 to 30	15	20	25	30	35
30 to 50	20	25	30	35	40
50 to 100	25	30	35	40	45
over 100	30	35	40	45	50

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

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.

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.

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.

4.0 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. 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.

5.0 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.

6.0 METHOD OF MEASUREMENT

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

7.0 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.

SUBMITTAL OF WORKING DRAWINGS (6-19-15)

1.0 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 Engineer. Either the Structures Management Unit or the Geotechnical Engineering 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 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 Engineer, Structures Management Unit contacts or the Geotechnical Engineering 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.

2.0 ADDRESSES AND CONTACTS

For submittals to the Structures Management Unit, use the following addresses:

Via US mail:

Mr. T. K. Koch, P. E.
State Structures Engineer
North Carolina Department
of Transportation
Structures Management Unit
1581 Mail Service Center
Raleigh, NC 27699-1581

Attention: Mr. P. D. Lambert, P. E.

Via other delivery service:

Mr. T. K. Koch, P. E.
State Structures Engineer
North Carolina Department
of Transportation
Structures Management Unit
1000 Birch Ridge Drive
Raleigh, NC 27610

Attention: Mr. P. D. Lambert, P. E.

Submittals may also be made via email.

Send submittals to:

plambert@ncdot.gov (Paul Lambert)

Send an additional e-copy of the submittal to the following address:

jgaither@ncdot.gov (James Gaither)

mrorie@ncdot.gov (Madonna Rorie)

For submittals to the Geotechnical Engineering Unit, use the following addresses:

For projects in Divisions 1-7, use the following Eastern Regional Office address:

Via US mail:

Mr. K. J. Kim, Ph. D., P. E.
Eastern Regional Geotechnical Manager
North Carolina Department of Transportation
Geotechnical Engineering Unit
Eastern Regional Office
1570 Mail Service Center
Raleigh, NC 27699-1570

Via other delivery service:

Mr. K. J. Kim, Ph. D., P. E.
Eastern Regional Geotechnical Manager
North Carolina Department of Transportation
Geotechnical Engineering Unit
Eastern Regional Office
3301 Jones Sausage Road, Suite 100
Garner, NC 27529

For projects in Divisions 8-14, use the following Western Regional Office address:

Via US mail:

Mr. Eric Williams, P. E.
Western Regional Geotechnical Manager
North Carolina Department of Transportation
Geotechnical Engineering Unit
Western Regional Office
5253 Z Max Boulevard
Harrisburg, NC 28075

Via other delivery service:

Mr. Eric Williams, P. E.
Western Region Geotechnical Manager
North Carolina Department of Transportation
Geotechnical Engineering Unit
Western Regional Office
5253 Z Max Boulevard
Harrisburg, NC 28075

The status of the review of structure-related submittals sent to the Structures Management Unit can be viewed from the Unit's web site, via the "Drawing Submittal Status" link.

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

Primary Structures Contact: Paul Lambert (919) 707 – 6407
(919) 250 – 4082 facsimile
plambert@ncdot.gov

Secondary Structures Contacts: James Gaither (919) 707 – 6409
Madonna Rorie (919) 707 – 6508

Eastern Regional Geotechnical Contact (Divisions 1-7):
K. J. Kim (919) 662 – 4710
(919) 662 – 3095 facsimile
kkim@ncdot.gov

Western Regional Geotechnical Contact (Divisions 8-14):

Eric Williams (704) 455 – 8902
(704) 455 – 8912 facsimile
ewilliams3@ncdot.gov

3.0 SUBMITTAL COPIES

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

The first table below covers "Structure Submittals". The Engineer will receive review comments and drawing markups for these submittals from the Structures Management Unit. The second table in this section covers "Geotechnical Submittals". The 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 Structures Management 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.

STRUCTURE SUBMITTALS

Submittal	Copies Required by Structures Management Unit	Copies Required by Geotechnical Engineering Unit	Contract Reference Requiring Submittal [1]
Arch Culvert Falsework	5	0	Plan Note, SN Sheet & "Falsework and Formwork"
Box Culvert Falsework [7]	5	0	Plan Note, SN Sheet & "Falsework and Formwork"
Cofferdams	6	2	Article 410-4
Foam Joint Seals [6]	9	0	"Foam Joint Seals"
Expansion Joint Seals (hold down plate type with base angle)	9	0	"Expansion Joint Seals"
Expansion Joint Seals (modular)	2, then 9	0	"Modular Expansion Joint Seals"

Expansion Joint Seals (strip seals)	9	0	"Strip Seals"
Falsework & Forms [2] (substructure)	8	0	Article 420-3 & "Falsework and Formwork"
Falsework & Forms (superstructure)	8	0	Article 420-3 & "Falsework and Formwork"
Girder Erection over Railroad	5	0	Railroad Provisions
Maintenance and Protection of Traffic Beneath Proposed Structure	8	0	"Maintenance and Protection of Traffic Beneath Proposed Structure at Station ___"
Metal Bridge Railing	8	0	Plan Note
Metal Stay-in-Place Forms	8	0	Article 420-3
Metalwork for Elastomeric Bearings [4,5]	7	0	Article 1072-8
Miscellaneous Metalwork [4,5]	7	0	Article 1072-8
Disc Bearings [4]	8	0	"Disc Bearings"
Overhead and Digital Message Signs (DMS) (metalwork and foundations)	13	0	Applicable Provisions
Placement of Equipment on Structures (cranes, etc.)	7	0	Article 420-20
Precast Concrete Box Culverts	2, then 1 reproducible	0	"Optional Precast Reinforced Concrete Box Culvert at Station ___"
Prestressed Concrete Cored Slab (detensioning sequences) [3]	6	0	Article 1078-11
Prestressed Concrete Deck Panels	6 and 1 reproducible	0	Article 420-3
Prestressed Concrete Girder (strand elongation and detensioning sequences)	6	0	Articles 1078-8 and 1078-11
Removal of Existing Structure over Railroad	5	0	Railroad Provisions
Revised Bridge Deck Plans (adaptation to prestressed deck	2, then 1 reproducible	0	Article 420-3

panels)			
Revised Bridge Deck Plans (adaptation to modular expansion joint seals)	2, then 1 reproducible	0	"Modular Expansion Joint Seals"
Sound Barrier Wall (precast items)	10	0	Article 1077-2 & "Sound Barrier Wall"
Sound Barrier Wall Steel Fabrication Plans [5]	7	0	Article 1072-8 & "Sound Barrier Wall"
Structural Steel [4]	2, then 7	0	Article 1072-8
Temporary Detour Structures	10	2	Article 400-3 & "Construction, Maintenance and Removal of Temporary Structure at Station ____"
TFE Expansion Bearings [4]	8	0	Article 1072-8

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 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 Structures Management Unit.
5. The two sets of preliminary submittals required by Article 1072-8 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.

GEOTECHNICAL SUBMITTALS

Submittal	Copies Required by Geotechnical Engineering Unit	Copies Required by Structures Management Unit	Contract Reference Requiring Submittal [1]
Drilled Pier Construction Plans [2]	1	0	Subarticle 411-3(A)
Crosshole Sonic Logging (CSL) Reports [2]	1	0	Subarticle 411-5(A)(2)
Pile Driving Equipment Data Forms [2,3]	1	0	Subarticle 450-3(D)(2)
Pile Driving Analyzer (PDA) Reports [2]	1	0	Subarticle 450-3(F)(3)
Retaining Walls [4]	8 drawings, 2 calculations	2 drawings	Applicable Provisions
Temporary Shoring [4]	5 drawings, 2 calculations	2 drawings	"Temporary Shoring" & "Temporary Soil Nail Walls"

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. Subarticles refer to the *Standard Specifications*.

2. Submit one hard copy of submittal to the Engineer. Submit a second copy of submittal electronically (PDF via email) or by facsimile, US mail or other delivery service to the appropriate Geotechnical Engineering Unit regional office. Electronic submission is preferred.

3. The Pile Driving Equipment Data Form is available from:
https://connect.ncdot.gov/resources/Geological/Pages/Geotech_Forms_Details.aspx
See second page of form for submittal instructions.

4. Electronic copy of submittal is required. See referenced provision.

MAINTENANCE OF WATER TRAFFIC **(12-5-12)**

The Contractor will be required to maintain water traffic in a manner satisfactory to both the Engineer and the U.S. Coast Guard and in conformance with the conditions of the Bridge Permit issued by the U.S. Coast Guard. The Contractor shall provide and maintain navigational lights in conformance with the requirements of the U.S. Coast Guard on both temporary and permanent work and shall carry on all operations in connection with the construction of the project in such a manner as to avoid damage or delay to water traffic.

No direct payment will be made for work under this section. All costs shall be considered incidental to items for which direct payment is made.

WORK IN, OVER OR ADJACENT TO NAVIGABLE WATERS (12-5-12)

All work in, over, or adjacent to navigable waters shall be in accordance with the special provisions and conditions contained in the permits obtained by the Department from the U.S. Coast Guard, U.S. Army Corps of Engineers, or other authority having jurisdiction. The work shall have no adverse effect on navigation of the waterway including traffic flow, navigational depths, and horizontal and vertical clearances without approval from the authorities granting the permits.

The Contractor shall prepare drawings necessary to obtain any permits which may be required for his operations which are not included in the Department's permit 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. Navigational lights, signals, or facilities shall be provided and maintained by the Contractor on temporary or permanent construction or vessels until such facilities are no longer needed as determined by the Engineer or permitting agency.

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.

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.

EPOXY INJECTION OF CRACKS

Description.

Inject epoxy into cracks in portland cement concrete.

Materials.

Use Type "E" compound epoxy for injection to repair cracks in old structures. Use Type "F-1" compound epoxy (non-sagging gel) for sealing crack surfaces in preparation for injection. Epoxies shall contain no volatile solvent. Epoxies shall be basically pure reactive material with ash content of 2% maximum. The Contractor shall submit to the Engineer certification from the manufacturer of the epoxy, confirming that the requirements of this Section are met.

Specific Requirements for Type B Compounds.

Mixing and Application: Type B epoxy compounds (for bonding fresh concrete to hardened concrete or bonding precast concrete parts) shall be mixed, applied, and cured in accordance with the manufacturer's directions, or as might be directed otherwise by the Engineer. Epoxy compounds shall be used only under conditions which are compatible with the material being applied in accordance with the specific directions of the manufacturer.

Performance Tests:

1. Epoxy Bonding Compounds: Epoxy Bonding Compounds shall be prepared and tested in accordance with FM 3-C882. The ratio of the compressive strength of the composite cylinder to the compressive strength of the weaker concrete shall not be less than 0.90
2. Epoxy Mortars: Epoxy mortar shall be prepared and tested in accordance with FM 3-C882. The average compressive strength of the three test specimens shall be at least 5,000 psi.

Specific Requirements for Type E Compounds.

Epoxies for crack injection shall meet the Specification for Type B compound with these additional requirements:
Viscosity five minutes after mixing 300 to 600 cps at 77 deg. F by ASTM D 2393
Wet bond strength to concrete, minimum 250 psi at seven days by FM 5-518

Specific Requirements for Type F Compounds.

Repairing Spalled Areas: Epoxies for repairing spalled areas shall meet the requirements in this Section.

Subtype F-1: Subtype F-1 is used for repairing vertical and other surfaces and shall be a trowelable low modulus, non-sagging gel epoxy compound capable of bonding to wet surfaces with these properties:

Color	Shall match gray color No. 36622 of FED-STD-595
Viscosity	Gel
Maximum sand loading	2.25 parts sand to one part mixed epoxy by volume
Elongation in tension minimum	10% by ASTM D 638, seven day cure
Wet bond to Steel and Concrete minimum	250 psi by Florida Test Method FM 5-518

All materials must be submitted by Contractor and approved by Engineer prior to use.

Equipment.

For the equipment used to inject the epoxy, meet the recommendations of the epoxy injection material manufacturer and the following requirements:

1. Use equipment that has the capacity to automatically proportion the material components within the mix ratio tolerances set by the epoxy materials manufacturer.

2. Use equipment that has the capacity to automatically mix the epoxy component materials within the pump and injection apparatus. The Engineer will not allow batch mixing.

3. Use equipment that has the capacity to inject the epoxy resin under controlled variable pressures up to 200 psi, with a pressure gauge mounted at or near the nozzle to indicate the actual working pressure.

Injection Personnel Qualifications.

Employ personnel trained in performing injection work similar to that required for the project to carry out the epoxy injection of cracks in concrete. Provide an on-site supervisor for the epoxy injection work who is qualified by one of the following methods: 1. Certified by the manufacturer of the epoxy injection material as having the necessary competence to accomplish the epoxy injection work in a satisfactory and safe manner in compliance with these Specifications. 2. They can furnish documented evidence that they have a minimum of three years experience of on-site supervision of similar epoxy injection work and a list of five contracts in which similar epoxy injection was acceptably completed. Ensure that the listed experience in on-site supervision and completed contracts contains the project name and location, names of contracting parties, the owner's name, brief description of the work, and dates of completion of the epoxy injection work. Submit written evidence showing personnel training and the on-site supervisor's qualification to the Department prior to beginning any epoxy injection work.

Crack Surface Preparation and Cleaning Requirements.

Clean the area surrounding the cracks of all deteriorated concrete, efflorescence and other contaminants detrimental to the adhesion of the surface sealing epoxy compound. Clean the interiors of the cracks with air under sufficient pressure to remove loose materials entrapped within the crack including efflorescence.

Sealing Cracks for Epoxy Injection.

After cleaning, drill injection port holes using a swivel drill chuck and hollow drill bits, including a vacuum attachment which will remove dust and debris generated during drilling. Determine the spacing of the injection port holes by the size of the crack and the depth of the crack in the concrete substrate. Generally, space the injection ports from 4 to 8 inches apart. Determine the actual spacing of injection ports by field trials. Drill the holes to a minimum depth of 5/8 inch, exercising care in aligning the hole along the plane of the crack so that the hole follows the crack for the full 5/8 inch depth. Insert the injection ports in the drilled holes approximately 1/2 inch, allowing for a small reservoir below the injection port. After cleaning the cracks and drilling the injection port holes, seal the crack surface and the injection ports with suitable epoxy.

Epoxy Injection.

Inject the epoxy in accordance with the epoxy manufacturer's instructions. Determine the actual injection procedures and pressures in field trials, based on crack widths and depth into the substrate and sufficiency of the results.

Cleaning After Epoxy Injection.

Clean concrete surface areas of excess epoxy materials and injection ports after completing the epoxy injection work. Clean in a manner which will not damage the concrete by scraping, light sand blasting, grinding, use of solvents, or any other appropriate method approved by the Engineer. Clean excess materials so that no epoxy material or injection ports extend beyond the plane surface of the concrete.

Acceptance.

Drill three cores located in each day's work as directed by the Engineer. Take drilled core samples containing representative crack sizes. The Engineer will accept the epoxy injection work represented by the core samples when the core samples indicate that 90% of the crack void greater than 0.006 inch wide is filled with epoxy resin and the concrete of the core sample is bonded through the crack into a unit. Reinject epoxy injection work which does not satisfy the acceptance criteria, and correct it as necessary at no expense to the Department. Install additional injection ports as required to achieve satisfactory reinjection of epoxy resin. After the epoxy injection work is completed and accepted, fill the core holes with an epoxy mortar consisting of one part by volume epoxy injection resin and four parts by volume clean, dry sand. Supply the sand in moisture proof bags. Do not use previously opened bags of sand for making epoxy mortar. The Contractor may use one part by volume epoxy material for sealing with one part by volume clean, dry sand in lieu of the above.

Method of Measurement.

Epoxy Material:

The quantity to be paid will be the volume, in gallons, authorized, injected, and accepted.

Inject and Seal Crack:

The quantity to be paid will be the length, in feet, authorized and accepted, measured along the approximate centerline of the sealed crack.

Basis of Payment.

Epoxy Material:

Price and payment will be full compensation for all work specified in this Section, including furnishing the epoxy material, and miscellaneous related costs, storage, handling, etc.

Inject and Seal Crack:

Price and payment will constitute full compensation for furnishing all labor, equipment, incidentals and materials (except epoxy), for cleaning and sealing the crack, and all labor and equipment for injecting the crack.

Payment Items:

Payment will be made under the following pay items:

Epoxy Material – per gallon.

Inject and Seal Crack – per foot.

County : Currituck, Dare

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
			ROADWAY ITEMS			
0001	0000100000-N	800	MOBILIZATION	Lump Sum	L.S.	
0002	1330000000-E	607	INCIDENTAL MILLING	242 SY		
0003	1525000000-E	610	ASPHALT CONC SURFACE COURSE, TYPE SF9.5A	20 TON		
0004	1575000000-E	620	ASPHALT BINDER FOR PLANT MIX	5 TON		
0005	4400000000-E	1110	WORK ZONE SIGNS (STATIONARY)	307 SF		
0006	4410000000-E	1110	WORK ZONE SIGNS (BARRICADE MOUNTED)	64 SF		
0007	4415000000-N	1115	FLASHING ARROW BOARD	2 EA		
0008	4420000000-N	1120	PORTABLE CHANGEABLE MESSAGE SIGN	2 EA		
0009	4430000000-N	1130	DRUMS	219 EA		
0010	4445000000-E	1145	BARRICADES (TYPE III)	120 LF		
0011	4480000000-N	1165	TMA	2 EA		
0012	4510000000-N	SP	LAW ENFORCEMENT	64 HR		
0013	4520000000-N	1266	TUBULAR MARKERS (FIXED)	764 EA		
0014	4650000000-N	1251	TEMPORARY RAISED PAVEMENT MARKERS	98 EA		
0015	4700000000-E	1205	THERMOPLASTIC PAVEMENT MARKING LINES (12", 90 MILS)	370 LF		
0016	4710000000-E	1205	THERMOPLASTIC PAVEMENT MARKING LINES (24", 120 MILS)	170 LF		
0017	4721000000-E	1205	THERMOPLASTIC PAVEMENT MARKING CHARACTER (120 MILS)	12 EA		
0018	4725000000-E	1205	THERMOPLASTIC PAVEMENT MARKING SYMBOL (90 MILS)	31 EA		

County : Currituck, Dare

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0019	4770000000-E	1205	COLD APPLIED PLASTIC PAVEMENT MARKING LINES, TYPE ** (4") (IV)	72,168 LF		
0020	4805000000-N	1205	COLD APPLIED PLASTIC PAVEMENT MARKING SYMBOL, TYPE ** (IV)	18 EA		
0021	4847000000-E	1205	POLYUREA PAVEMENT MARKING LINES (4", **********) (HIGHY REFLECTIVE ELEMENTS)	18,619 LF		
0022	4850000000-E	1205	REMOVAL OF PAVEMENT MARKING LINES (4")	49,493 LF		
0023	4875000000-N	1205	REMOVAL OF PAVEMENT MARKING SYMBOLS & CHARACTERS	15 EA		
0024	4900000000-N	1251	PERMANENT RAISED PAVEMENT MARKERS	88 EA		
			STRUCTURE ITEMS			
0025	8156000000-E	SP	CONCRETE WEARING SURFACE	1,260 SF		
0026	8161000000-E	420	GROOVING BRIDGE FLOORS	369,442 SF		
0027	8224000000-E	425	EPOXY COATED REINFORCING STEEL (BRIDGE)	10,398 LB		
0028	8280000000-E	440	APPROX ..... LBS STRUCTURAL STEEL	4,200 LS		
0029	8559000000-E	SP	CLASS II, SURFACE PREPARATION	49.8 SY		
0030	8860000000-N	SP	GENERIC STRUCTURE ITEM COATING OF PILE TOPS AND TIN HAT REPLACEMENT	Lump Sum	L.S.	
0031	8860000000-N	SP	GENERIC STRUCTURE ITEM PAINTING CONTAINMENT FOR BRIDGE NO 260016	Lump Sum	L.S.	
0032	8860000000-N	SP	GENERIC STRUCTURE ITEM PLASTIC LUMBER FENDER BOARDS	Lump Sum	L.S.	

County : Currituck, Dare

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0033	8860000000-N	SP	GENERIC STRUCTURE ITEM POLLUTION CONTROL	Lump Sum	L.S.	
0034	8867000000-E	SP	GENERIC STRUCTURE ITEM CATHODIC PROTECTION INTEGRAL PILE JACKET (NON STRUCTURAL), 16" TO 30"	1,683 LF		
0035	8867000000-E	SP	GENERIC STRUCTURE ITEM CATHODIC PROTECTION INTEGRAL PILE JACKET (STRUCTURAL), 16" TO 30"	561 LF		
0036	8867000000-E	SP	GENERIC STRUCTURE ITEM PILE WRAPS (WATERLINE FOOT-INGS)	740 LF		
0037	8867000000-E	SP	GENERIC STRUCTURE ITEM REMOVAL & REPLACEMENT OF SHEAR KEYWAYS	405 LF		
0038	8867000000-E	SP	GENERIC STRUCTURE ITEM SILICONE JOINT SEALANT	9,109 LF		
0039	8881000000-E	SP	GENERIC STRUCTURE ITEM CLASS AA CONCRETE (BRIDGE)-CHANNEL BENT FTG RESTORATION	95 CY		
0040	8881000000-E	SP	GENERIC STRUCTURE ITEM PPC MATERIALS	1,435 CY		
0041	8882000000-E	SP	GENERIC STRUCTURE ITEM CONCRETE REPAIRS (PPC GIRDERS)	210 CF		
0042	8882000000-E	SP	GENERIC STRUCTURE ITEM SHOTCRETE REPAIRS (DIAPHRAGM, DECK)	328 CF		
0043	8882000000-E	SP	GENERIC STRUCTURE ITEM SHOTCRETE REPAIRS (PILE BENTS)	2,821 CF		
0044	8892000000-E	SP	GENERIC STRUCTURE ITEM CATHODIC PROTECTION SYSTEM, ZINC ALUMINUM SPRAY	60,924 SF		
0045	8892000000-E	SP	GENERIC STRUCTURE ITEM REMOVAL OF EXISTING CONCRETE WEARING SURFACE	1,260 SF		
0046	8892000000-E	SP	GENERIC STRUCTURE ITEM TOP OF CAP EPOXY COATINGS	19,088 SF		

County : Currituck, Dare

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0047	8893000000-E	SP	GENERIC STRUCTURE ITEM PLACING AND FINISHING PPC OVERLAY	46,263 SY		
0048	8893000000-E	SP	GENERIC STRUCTURE ITEM SCARIFYING BRIDGE DECK	46,263 SY		
0049	8893000000-E	SP	GENERIC STRUCTURE ITEM SHOTBLASTING BRIDGE DECK	46,263 SY		
0050	8897000000-N	SP	GENERIC STRUCTURE ITEM 3/4" DIAMETER STAINLESS STEEL FASTENERS	372 EA		
0051	8897000000-N	SP	GENERIC STRUCTURE ITEM BEAM END EPOXY COATINGS	1,980 EA		
0052	8897000000-N	SP	GENERIC STRUCTURE ITEM CLEANING & PAINTING EXISTING BEARINGS W/ HRCSA (BRIDGE NO 260016)	1,980 EA		
0053	8897000000-N	SP	GENERIC STRUCTURE ITEM FENDER PILE WRAPS	46 EA		
0054	0000990000-E	SP	GENERIC MISCELLANEOUS ITEM EPOXY MATERIAL	25 GAL		
0055	8867000000-E	SP	GENERIC STRUCTURE ITEM INJECT AND SEAL CRACK	250 LF		