

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

FINAL REQUEST FOR PROPOSALS
DESIGN-BUILD PROJECT



TIP U-2827B / C-5620A

July 20, 2016



VOID FOR BIDDING

DATE AND TIME OF TECHNICAL AND PRICE PROPOSAL SUBMISSION: **August 9, 2016 BY 4:00 PM**

DATE AND TIME OF PRICE PROPOSAL OPENING: **August 30, 2016 AT 2:00 PM**

CONTRACT ID: C203862

WBS ELEMENT NO. 34872.3.4

FEDERAL-AID NO. NHP-0421(087)

COUNTY: Forsyth

ROUTE NO. US 421 / I-40 Business

MILES: 1.2

LOCATION: US 421 / I-40 Business Pavement Reconstruction, Bridge Replacements, and Interchange Modifications from west of Fourth Street to east of Church Street; and Multi-Use Path from Fourth Street to Liberty Street

TYPE OF WORK: DESIGN-BUILD AS SPECIFIED IN THE SCOPE OF WORK
CONTAINED IN THE REQUEST FOR PROPOSALS

NOTICE:

ALL PROPOSERS 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 PROPOSER 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. PROPOSERS 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. NOT WITHSTANDING THESE LIMITATIONS ON BIDDING, THE PROPOSER WHO IS AWARDED ANY PROJECT SHALL COMPLY WITH CHAPTER 87 OF THE GENERAL STATUTES OF NORTH CAROLINA FOR LICENSING REQUIREMENTS WITHIN 60 CALENDAR DAYS OF BID OPENING, REGARDLESS OF FUNDING SOURCES.

5% BID BOND OR BID DEPOSIT REQUIRED

**PROPOSAL FORM FOR THE CONSTRUCTION OF CONTRACT NO. C203862
IN FORSYTH COUNTY, NORTH CAROLINA**

Date _____ **20** _____

**DEPARTMENT OF TRANSPORTATION,
RALEIGH, NORTH CAROLINA**

The Design-Build Team herein acknowledges that it has carefully examined the location of the proposed work to be known as Contract No. C203862; has carefully examined the Final Request for Proposals (RFP) and all addendums thereto, specifications, special provisions, the form of contract, and the forms of contract payment bond and contract performance bonds, which are acknowledged to be part of the Contract; and thoroughly understands the stipulations, requirements and provisions. The undersigned Design-Build Team agrees to be bound upon their execution of the Contract and including any subsequent award to them by the Secretary of Transportation in accordance with this Contract to provide the necessary contract payment bond and contract performance bond within fourteen calendar days after the written notice of award is received by them.

The undersigned Design-Build Team further agrees to provide all necessary materials, machinery, implements, appliances, tools, labor, and other means of construction, except as otherwise noted, to perform all the work and required labor to design, construct and complete all the work necessary for State Highway Contract No. C203862 in Forsyth County by no later than the date(s) specified in the Final RFP or Technical Proposal, whichever is earlier, and in accordance with the requirements of the Engineer, the Final RFP and Addenda thereto, the 2012 *Standard Specifications for Roads and Structures*, specifications prepared by the Department, the Technical Proposal prepared by the Design-Build Team, at the lump sum price(s) bid by the Design-Build Team in their Price Proposal.

The Design-Build Team shall provide signed and sealed documents prepared by the Design-Build Team, which specifications and plans show the details covering this project and adhere to the items noted above.

The Design-Build Team acknowledges that project documents furnished by the Department are preliminary and provided solely to assist the Design-Build Team in the development of the project design. Unless otherwise noted herein, the Department does not warrant or guarantee the sufficiency or accuracy of any information furnished by the Department.

The Department does not warrant or guarantee the sufficiency or accuracy of any investigations made, nor the interpretations made or opinions of the Department as to the type of materials and conditions to be encountered at the project site. The Design-Build Team is advised to make such independent investigations, as they deem necessary to satisfy their self as to conditions to be encountered on this project. The Design-Build Team shall have no claim for additional compensation or for an extension of contract time for any reason resulting from the actual conditions encountered at the site differing from those indicated in any of the information or documents furnished by the Department except as may be allowed under the provisions of the Standard Specifications.

Although the Department has furnished preliminary designs for this project, unless otherwise noted herein, the Design-Build Team shall assume full responsibility, including liability, for the

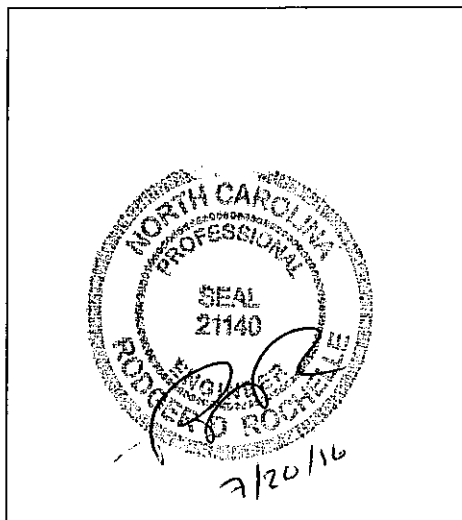
project design, including the use of portions of the Department design, modification of such design, or other designs as may be submitted by the Design-Build Team.

The Design-Build Team shall be fully and totally responsible for the accuracy and completeness of all work performed under this contract, and shall indemnify and hold the Department harmless for any additional costs and all claims against the Department or the State which may arise due to errors or omissions of the Department in furnishing the preliminary project designs and information, and of the Design-Build Team in performing the work.

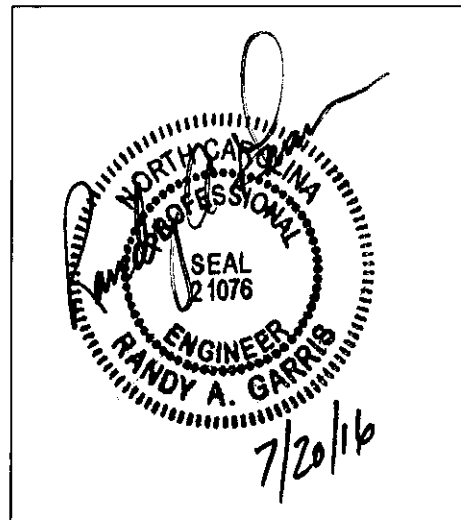
The published volume entitled *North Carolina Department of Transportation, Raleigh, Standard Specifications for Roads and Structures*, January 2012, as well as, all design manuals, policy and procedures manuals, and AASHTO publications and guidelines referenced in the Request For Proposals, with all amendments and supplements thereto, are by reference, incorporated and made part of this contract; that, except as herein modified, all the design, construction and Construction Engineering Inspection included in this contract is to be done in accordance with the documents noted above and under the direction of the Engineer.

If the Design-Build Proposal is accepted and the award is made, the Technical Proposal submitted by the Design-Build Team is by reference, incorporated and made part of this contract. 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 by written approval as allowed by the Request for Proposals.

Accompanying the Design-Build Proposal shall be 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 Design-Build Team 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 them, as provided in the Standard Specifications; otherwise said deposit will be returned to the Design-Build Team.



*Administrator of the Technical
Services Division*



State Contract Officer

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PROPOSAL FORMS - ITEMIZED SHEET, ETC.

Itemized Proposal Sheet (TAN SHEET)

Fuel Usage Factor Chart and Estimate of Quantities

Listing of DBE Subcontractors

Execution of Bid, Non-Collusion Affidavit, Debarment Certification and Gift Ban
Certification

Signature Sheet

***** PROJECT SPECIAL PROVISIONS *******CONTRACT TIME AND LIQUIDATED DAMAGES**

07/12/07

DB1 G04A

The date of availability for this contract is September 26, 2016, except that the Design-Build Team shall only begin ground disturbing activities as allowed by this Request for Proposals (RFP). The Design-Build Team shall consider this factor in determining the proposed completion date for this project.

The completion date for this contract is defined as the date proposed in the Technical Proposal by the proposer who is awarded the project. The completion date thus proposed shall not be later than November 15, 2021.

When observation periods are required by the special provisions, they are not a part of the work to be completed by the completion date and / or intermediate contract times. Should an observation period extend beyond the Final Completion Date proposed by the Design-Build Team in the Technical Proposal, the performance and payment bonds shall remain in full force and effect until the observation period has been completed and the work accepted by the Department.

The liquidated damages for this contract are **Ten Thousand Dollars (\$10,000.00)** per calendar day. As an exception to this amount, where the contract has been determined to be substantially complete as defined by the Special Provision entitled *Substantial Completion* found elsewhere in this RFP, the liquidated damages will be reduced to **Two Thousand Dollars (\$2,000.00)** per calendar day.

Where the Design-Build Team who is awarded the contract has proposed a completion date for the contract as required above, but also has proposed an earlier date for substantial completion, then both of these proposed dates will become contract requirements.

Liquidated damages of **Two Thousand Dollars (\$2,000.00)** per calendar day will be applicable to the early date for substantial completion proposed by the bidder. Liquidated damages of **Ten Thousand Dollars (\$10,000.00)** per calendar day will be applicable to the Final Completion Date proposed by the bidder where the Design-Build Team has proposed an earlier date for substantial completion.

INTERMEDIATE CONTRACT TIME NUMBER 1 & LIQUIDATED DAMAGES / INCENTIVE

(3-22-07)

DB 1 G07

Intermediate Contract Time #1 is for the full closure of US 421 / I-40 Business, from east of the NC 150 (Peters Creek Parkway) Loop A gore located at approximately Station 24+00 -L- to the US 52 most western loop gore to perform all work necessary to complete the mainline pavement reconstruction operations.

Time is of the essence in completing the work associated with this ICT and opening US 421 / I-40 Business to traffic. A delay in completing this work will result in damage due to increased engineering and inspection costs to the Department, great hardship to the general public, public inconvenience, obstruction of traffic, interference with businesses, and increased cost of maintaining traffic. The Department desires that the work be completed and that the Design-Build Team pursue the work with such labor, equipment and materials, as necessary to ensure that the Intermediate Contract Time shall be met with only regards for time extensions and / or time reliefs as defined below.

By reason of the aforementioned necessity to expeditiously complete the work included in this Request for Proposals, it is mutually agreed, that the Design-Build Team will receive an incentive payment of **Fifty Thousand Dollars (\$50,000)** per calendar day for each day prior to the ICT #1 duration specified in the Design-Build Team's Technical Proposal. The specified duration shall be utilized in determining the incentive payment and it shall not be revised for any reason whatsoever. The aforementioned incentive payment shall be limited to a maximum amount of **Three Million Dollars, (\$3,000,000.00)**. The Department will pay the incentive payment, determined to be due to the Design-Build Team, within Forty-five (45) calendar days after the work has been completed and US 421 / I-40 has been opened to traffic. Under the provisions of Article 108-13 of the 2012 *Standard Specifications for Roads and Structures*, no incentive payment shall be paid if the Contract is terminated.

If the work is not completed and / or US 421 / I-40 Business is not open to traffic within the ICT #1 duration specified in the Design-Build Team's Technical Proposal, 1) the Department will consider time extensions in accordance with Article 108-10 of the 2012 *Standard Specifications for Roads and Structures*, excluding Subarticle 108-10(B)(5); 2) the incentive will be forfeited, regardless of any time extensions granted; and 3) the Design-Build Team shall be assessed liquidated damages in the amount of **Fifty Thousand Dollar (\$50,000.00)** per calendar day, or any portion thereof.

If the work is not completed and / or US 421 / I-40 Business is not open to traffic within the maximum 730 consecutive days (two consecutive years) ICT #1 allowed duration, the aforementioned liquidated damages shall be increased to **Seventy-five Thousand Dollar (\$75,000.00)** per calendar day, or any portion thereof.

All liquidated damages shall be deducted from the lump sum amount for the project due to the Design-Build Team.

The completion of the work required for ICT # 1 shall be defined as having all the US 421 / I-40 Business lanes open to traffic in the proposed final traffic pattern, including but not limited to placement of the final surface course and installation of the final pavement markings.

The date of availability for Intermediate Contract Time #1 shall be 1) the date the Design-Build Team closes US 421 / I-40 Business to traffic, as determined by the Design-Build Team and 2) in accordance with the requirements noted below. The Design-Build Team shall provide the Engineer a minimum of 45 days written notice prior to the date of availability. The date of completion shall be the number of calendar days proposed by the Design-Build Team in the

Technical Proposal, and such number of calendar days shall not be greater than 730 consecutive days (two consecutive years). The aforementioned date of availability shall not occur until the Design-Build Team has completed the following traffic improvements and the improvements are open to traffic.

1. All proposed NC 150 (Peters Creek Parkway) roadway widening and bridge construction for the ultimate typical section width (installation of the final surface course layer and concrete islands will not be required); and traffic shall be operational in the interim traffic pattern, as defined in the August 2015 *Business 40 Reconstruction Study - Detour Conditions Traffic Operations Report* 2021 Detour conditions Scenario 1 and Scenario 2.
2. The temporary NC 150 (Peters Creek Parkway) Loop A and Loop D improvements noted in the Roadway Scope of Work found elsewhere in this RFP.
3. All high mast lighting inside the Peter's Creek Parkway interchange.
4. All temporary offsite intersection improvements noted in the Roadway Scope of Work found elsewhere in this RFP.
5. All proposed improvements on Marshall Street, Eight Street, and North Martin Luther King Jr. Drive.
6. All proposed improvements along Academy Street at the NC 150 (Peters Creek Parkway) intersection.

OTHER LIQUIDATED DAMAGES AND INCENTIVES

(3/22/07) (Rev. 02/14/08)

DB1 G11

Reference the Transportation Management Scope of Work found elsewhere in this RFP for more information on the following time restrictions and liquidated damages:

Liquidated Damages for Intermediate Contract Time #2 for lane narrowing, lane closure, holiday and special event time restrictions for I-40, US 52, and US 421 / I-40 Business and ramps and loops are \$2,500.00 per 15-minute period or any portion thereof.

Liquidated Damages for Intermediate Contract Time #3 for lane narrowing, lane closure, holiday and special event time restrictions for NC 150 (Peters Creek Parkway), Academy Street, Broad Street, 6th Street, First Street, Northwest Boulevard, and Silas Creek Parkway are \$1,000.00 per hour or any portion thereof.

Liquidated Damages for Intermediate Contract Time #4 for lane narrowing, lane closure, holiday and special event time restrictions for all other roads are \$500.00 per hour or any portion thereof.

Liquidated Damages for Intermediate Contract Time #5 for road closure time restrictions for US 421 / I-40 Business including all ramps and loops and NC 150 (Peters Creek Parkway) are \$5,000.00 per 15-minute period or any portion thereof.

Liquidated Damages for Intermediate Contract Time #6 for lane narrowing, lane closure restrictions of US 421 / I-40 Business, from the western sound barrier wall construction limits to the NC 150 (Peters Creek Parkway) Loop A gore, located at approximately

Station 24+00 -L-, during the two-year full closure of US 421 / I-40 Business (ICT #1) are \$1,500.00 per calendar day or any portion thereof.

Liquidated Damages for Intermediate Contract Times #7 and #8 for lane narrowing, lane closure restrictions of US 421 / I-40 Business, from the western sound barrier wall construction limits to the NC 150 (Peters Creek Parkway) Loop A gore, located at approximately Station 24+00 -L-, prior to the two-year full closure of US 421 / I-40 Business (ICT #1) are \$15,000.00 per calendar day or any portion thereof.

Liquidated Damages for Intermediate Contract Times #9 through #13 for road closure time restrictions for NC 150 (Peters Creek Parkway) Ramp A, Loop A, Ramp C, Ramp D, and Loop D are \$1,000.00 per hour or any portion thereof.

Liquidated Damages for Intermediate Contract Times #14 through #21 for road closure time restrictions for Fourth Street; Broad Street, including all ramps; Brookstown Avenue; Marshall Street, including Marshall Street ramps; Cherry Street, including Cherry Street ramps; Liberty Street, including Liberty Street ramps; Main Street, including Main Street ramps; and Church Street are \$1,000.00 per calendar day or any portion thereof.

Reference the Traffic Signals and Signals Communication Scope of Work found elsewhere in this RFP for more information on the following liquidated damages:

Liquidated Damages for Intermediate Contract Time #22 for failure to repair a damaged traffic signal fiber optic communications cable and restore communication within 24 hours are \$500.00 per hour or any portion thereof.

Liquidated Damages for Intermediate Contract Time #23 for failure to reestablish traffic signal fiber communications within 72 hours are \$2,500.00 per 12-hour period or any portion thereof.

Liquidated Damages for Intermediate Contract Time #24 for failure to provide a plan that defines 1) an anticipated traffic signal fiber optic communications disruption timeframe and 2) a plan of action for reestablishing traffic signal communications a minimum of 21 days prior to a proposed disruption are \$10,000.00 per failure.

Reference the ITS Scope of Work found elsewhere in this RFP for more information on the following liquidated damages:

Liquidated Damages for Intermediate Contract Time #25 for failure to repair a damaged ITS fiber optic communications cable and restore communication within 24 hours are \$500.00 per hour or any portion thereof.

Liquidated Damages for Intermediate Contract Time #26 for failure to reestablish ITS fiber communications within 72 hours are \$2,500.00 per 12-hour period or any portion thereof.

Liquidated Damages for Intermediate Contract Time #27 for failure to provide a plan that defines 1) an anticipated ITS fiber optic communications disruption timeframe and 2) a plan of action for reestablishing ITS communications a minimum of 21 days prior to a proposed disruption in service are \$10,000.00 per failure.

Liquidated damages for Erosion and Sedimentation Control efforts apply to this project:

Reference the Erosion and Sedimentation Control Scope of Work found elsewhere in this RFP for additional information under the Liquidated Damages Section.

PAYOUT SCHEDULE

(11-16-09)

DB1 G13

No later than 12:00 o'clock noon on the sixth day after the opening of the Price Proposal, the responsive proposer with the lowest adjusted price shall submit a proposed Anticipated Monthly Payout Schedule to the office of the State Contract Officer. The information shall be submitted in a sealed package with the outer wrapping clearly marked "Anticipated Monthly Payout Schedule" along with the Design-Build Team name and the contract number. The Anticipated Monthly Payout Schedule will be used by the Department to establish the monthly funding levels for this project. The Anticipated Monthly Payout Schedule shall parallel, and agree with, the project schedule the Design-Build Team submits as a part of their Technical Proposal. The schedule shall include a monthly percentage breakdown (in terms of the total contract amount percentages) of the work anticipated to be completed. The schedule shall begin with the Date of Availability and end with the Actual Completion Date proposed by the Design-Build Team. If the Payout Schedule is not submitted as stated herein, the Technical and Price Proposals will be considered irregular by the Department, and the bid may be rejected.

Submit updates of the Anticipated Monthly Payout Schedule on March 15, June 15, September 15, and December 15 of each calendar year until project acceptance. Submit all updates to the Resident Engineer with a copy to the State Construction Engineer at 1 South Wilmington St, 1543 Mail Service Center, Raleigh, NC 27699-1543.

MOBILIZATION

(9-1-11)

DB1 G15B

Revise the 2012 *Standard Specifications for Roads and Structures* as follows:

Page 8-1, Subarticle 800-2, MEASUREMENT AND PAYMENT

Delete this subarticle in its entirety and replace with the following:

800-2 MEASUREMENT AND PAYMENT

Ten percent of the "Total Amount of Bid for Entire Project" shall be considered the lump sum amount for Mobilization. Partial payments for Mobilization will be made beginning with the first partial pay estimate paid on the contract. Payment will be made at the rate of 75 percent of the lump sum amount calculated for Mobilization. The remaining 25 percent will be paid with

the partial pay estimate following approval of all permits required in the Environmental Permits Scope of Work found elsewhere in this RFP.

SUBSTANTIAL COMPLETION

(3-22-07)

DB1 G16

When the special provisions provide for a reduction in the rate of liquidated damages for the contract time or an intermediate contract time after the work is substantially complete, the work will be considered substantially complete when the following requirements are satisfied:

1. Through traffic has been placed along the project or along the work required by an intermediate contract time and the work is complete to the extent specified below, and all lanes and shoulders are open such that traffic can move unimpeded at the posted speed. Intersecting roads and service roads are complete to the extent that they provide the safe and convenient use of the facility by the public.
2. The final layers of pavement for all lanes and shoulders along the project or along the work required by an intermediate contract time are complete.
3. Excluding signs on intersecting roadways, all signs are complete and accepted.
4. All guardrails, drainage devices, ditches, excavation and embankment are complete.
5. Remaining work along the project consists of permanent pavement markings, permanent pavement markers or incidental construction that is away from the paved portion of the roadway.
6. All lane and shoulder closure work related to the construction of the Multi-Use Path (MUP) is complete and are open to traffic.

Upon apparent substantial completion of the entire project or the work required by an intermediate contract time, the Engineer will make an inspection of the work. If the inspection discloses the entire project or the work required by an intermediate contract time is substantially complete; the Engineer will notify the Design-Build Team in writing that the work is substantially complete. If the inspection discloses the entire project or the work required by an intermediate contract time is not substantially complete, the Engineer will notify the Design-Build Team in writing of the work that is not substantially complete. The entire project or the work required by an intermediate contract time will not be considered substantially complete until all of the recommendations made at the time of the inspection have been satisfactorily completed.

SUBMITTAL OF QUANTITIES, FUEL BASE INDEX PRICE AND OPT-OUT OPTION

1/23/14

DB1 G43

(A) Submittal of Quantities

Submit quantities on the *Fuel Usage Factor Chart and Estimate of Quantities* sheet, located in the back of this RFP, following the Itemized Proposal Sheet.

The Design-Build Team shall prepare an Estimate of Quantities that they anticipate incorporating into the completed project and upon which the Price Proposal was based. The quantity breakdown shall include all items of work that appear in the *Fuel Usage Factor Chart and Estimate of Quantities* sheet. Only those items of work which are specifically noted in the *Fuel Usage Factor Chart and Estimate of Quantities* sheet will be subject to fuel price adjustments.

Submittal The submittal shall be signed and dated by an officer of the Design-Build Team. The information shall be copied and submitted in a separate sealed package with the outer wrapping clearly marked "Fuel Price Adjustment" and shall be delivered at the same time and location as the Technical and Price Proposal. The original shall be submitted in the Price Proposal.

Trade Secret Information submitted on the *Fuel Usage Factor Chart and Estimate of Quantities* sheet will be considered "Trade Secret" in accordance with the requirements of G.S. 66-152(3) until such time as the Price Proposal is opened.

(B) Base Index Price

The Design-Build Team's Estimate of Quantities will be used on the various partial payment estimates to determine fuel price adjustments. The Design-Build Team shall submit a payment request for quantities of work completed based on the work completed for that estimate period. The quantities requested for partial payment shall be reflective of the work actually accomplished for the specified period. The Design-Build Team shall certify that the quantities are reasonable for the specified period. The base index price for DIESEL #2 FUEL is **\$1.5593** per gallon.

(C) Opt Out of Fuel Price Adjustment

If the Design-Build Team elects not to pursue reimbursement for Fuel Price Adjustments, a quantity of zero shall be entered for all quantities in the *Fuel Usage Factor Chart and Estimate of Quantities* sheet and the declination box shall be checked. Failure to complete this form will mean that the Design-Build Team is declining the Fuel Price Adjustments for this project.

(D) Change Option

The proposer will not be permitted to change the option after the Price Proposal and the copy of the *Fuel Usage Factor Chart and Estimate of Quantities* sheet are submitted.

(E) Failure to Submit

Failure to submit the completed *Fuel Usage Factor Chart and Estimate of Quantities* sheet separately and in the Price Proposal will result in the Technical and Price Proposal being considered irregular by the Department and the Technical and Price Proposal may be rejected.

INDIVIDUAL MEETINGS WITH PROPOSERS

(9-1-11)

DB1 G048

The Department will provide at least two Question and Answer Sessions to meet with each proposer individually to specifically address questions regarding the draft Requests for Proposals.

The Department will attempt to arrange for a meeting between each individual proposer and the affected utility owners.

The Department will afford each proposer one additional meeting with the Department (maximum two-hour time limit) to discuss project specifics and address the proposer's concerns and questions. This meeting may occur at any time after the first Question and Answer Session with the proposers and before two weeks prior to the Technical and Price Proposals submittal date. The proposer shall request this meeting in writing to the State Contract Officer, providing the Department a minimum of one week advance notice of the requested date. The proposer shall also state in the request those disciplines within the Department that are requested to be in attendance. The Department makes no assurance that the request may be honored on that specific date or that all disciplines requested can be in attendance.

Additional individual meetings may be permitted in accordance with the *Alternative Technical Concepts and Confidential Questions* Project Special Provision found elsewhere in this RFP.

EXECUTION OF BID, NON-COLLUSION AFFIDAVIT, DEBARMENT CERTIFICATION AND GIFT BAN CERTIFICATION

(1/24/13)

DB1 G52

The Proposer's attention is directed to the various sheets in the Request for Proposals which are to be signed by the Proposer. A list of these sheets is shown below. The signature sheets are located behind the Itemized Proposal Sheet in this Request for Proposal. The NCDOT bid bond form is available on-line at:

<https://connect.ncdot.gov/letting/Pages/Design-Build-Resources.aspx>

or by contacting the Records and Documents office at 919-707-6900.

1. Applicable Signature Sheets: 1, 2, 3, 4, 5, or 6 (Bid)
2. Bid Bond dated the day of Technical and Price Proposal submission

The Proposer shall certify to the best of his knowledge all subcontractors, material suppliers and vendors utilized herein current status concerning suspension, debarment, voluntary exclusion, or determination of ineligibility by any federal agency, in accordance with the "Debarment Certification" located behind the *Execution of Bid Non-Collusion Affidavit, Debarment Certification and Gift Ban Certification* signature sheets in this RFP. Execution of the bid signature sheets in conjunction with any applicable statements concerning exceptions, when such statements have been made on the "Debarment Certification", constitutes the Proposer's certification of "status" under penalty of perjury under the laws of the United States.

SUBMISSION OF DESIGN-BUILD PROPOSAL

(9-1-11)

DB1 G55A

The Proposer's attention is directed that each Proposer's Design-Build Proposal shall comply with the following requirements in order for that Design-Build Proposal to be responsive and considered for award.

1. The Proposer shall be prequalified with the Department prior to submitting a Design-Build Proposal.
2. The Proposer shall deliver the Design-Build Proposal to the place indicated, and prior to the time indicated in this Request for Proposals.
3. The Design-Build Proposal documents shall be signed by an authorized employee of the Proposer.
4. The Design-Build Proposal shall be accompanied by Bid surety in the form of a Bid Bond or Bid Deposit, dated the day of Technical and Price Proposal submission.
5. If Disadvantaged Business Enterprises (DBE) goals are established for this contract, the Proposer shall complete the form Listing of DBE Subcontractors contained elsewhere in this RFP in accordance with the Project Special Provision entitled *Disadvantaged Business Enterprises*.
6. The Design-Build Proposal shall address all the requirements as specified in this Request for Proposals.

In addition to the above requirements, failure to comply with any of the requirements of Article 102-8 of the Standard Special Provisions, Division One (found elsewhere in this RFP), Article 102-9 of the 2012 *Standard Specifications for Roads and Structures*, or Article 102-10 of the 2012 *Standard Specifications for Roads and Structures* and as amended in the Standard Special Provisions, Division One (found elsewhere in this RFP) may result in a Design-Build Proposal being rejected.

ALTERNATIVE TECHNICAL CONCEPTS AND CONFIDENTIAL QUESTIONS

(6-8-11)

DB1 G56A

To accommodate innovation that may or may not be specifically allowed by the RFP, or other documents incorporated into the contract by reference, the Design-Build Team has the option of submitting Confidential Questions and Alternative Technical Concepts.

Definitions

A Confidential Question is defined as a private query to the Department containing information whose disclosure could alert others to certain details of doing business in a particular manner.

An Alternative Technical Concept is a private query to the Department that requests a variance to the requirements of the RFP, or other documents incorporated into the contract by reference, that is equal or better in quality or effect as determined by the Department in its sole discretion and that have been used elsewhere under comparable circumstances.

Confidential Questions

The Design-Build Team will be permitted to ask Confidential Questions of the Department, and neither the question nor the answer will be shared with other Design-Build Teams. The Department, in its sole discretion, will determine if a question is considered confidential.

Confidential Questions arising prior to issuance of the Final RFP will be allowed during the industry review of the draft RFP with the individual Design-Build Teams. the Department will answer the Confidential Question verbally at the industry review meeting, if possible, and / or through subtle changes in the Final RFP, which will clarify the scope by either allowing or disallowing the request. To the greatest extent possible, the revision will be made in such a manner as to not disclose the Confidential Question.

After the issuance of the Final RFP, Confidential Questions may be asked by requesting a meeting with the State Contract Officer. The request shall be in writing and provide sufficient detail to evaluate the magnitude of the request. Questions shall be of such magnitude as to warrant a special meeting. Minor questions will not be acknowledged or answered. After evaluation, the State Contract Officer will respond to the question in writing to the Design-Build Team and / or through subtle changes in the Final RFP as reflected in an addendum, which will clarify the scope by either allowing or disallowing the request. To the greatest extent possible, the revision will be made in such a manner as to not disclose the Confidential Question.

If the Design-Build Team includes work based on the Confidential Questions and answers, the work shall be discussed in the Technical Proposal.

Alternative Technical Concepts

The Design-Build Team may include an ATC in the Technical and Price Proposal only if the ATC has been received by the Department by no later than four weeks prior to the deadline for

submitting Technical and Price Proposals and it has been approved by the Department (including conditionally approved ATCs, if all conditions are met).

The submittal deadline above applies only to initial ATC submittals. Resubmittal of an ATC that (1) has been revised in response to the Department's requests for further information concerning a prior submittal or (2) is a Formal ATC for a Preliminary ATC that received a favorable response from the Department shall be received by the Department no later than two weeks prior to the deadline for submitting Technical and Price Proposals.

Should the Department revise the RFP after a Formal ATC has been approved, the Design-Build Team shall be solely responsible for reviewing the RFP and determining if the ATC deviates from the revised requirements. If necessary, the Design-Build Team must submit a request for approval of all additional required variance(s) within five business days of the revised RFP distribution.

An ATC shall in no way take advantage of an error or omission in the RFP, or other documents incorporated into the contract by reference. If, at the sole discretion of the Department, an ATC is deemed to take advantage of an error or omission in the RFP, or other documents incorporated into the contract by reference, the RFP will be revised without regard to confidentiality. If at any time, the Department receives a documented question on the project similar to a concept submitted in the form of a Preliminary ATC or Formal ATC, the Department reserves the right to revise the RFP without further regard for confidentiality.

By approving an ATC, the Department acknowledges that the ATC may be included in the design and RFC Plans; however, approval of any ATC in no way relieves the Design-Build Team of its obligation to satisfy (1) other contract requirements not specifically identified in the ATC submittal; (2) any obligation that may arise under applicable laws and regulations; and (3) any obligation mandated by the regulatory agencies as a permit condition.

ATC Submittals

Each ATC submittal shall include three individually bound hard copies and an electronic .pdf file of the entire submittal and shall be submitted to the State Contract Officer at the address provided elsewhere in this RFP.

Formal ATCs

Each Formal ATC submittal shall include the following information:

- 1) **Description** - A detailed description and schematic drawings of the configuration of the ATC or other appropriate descriptive information (including, if appropriate, product details [i.e., specifications, construction tolerances, special provisions] and a traffic operational analysis, if appropriate);
- 2) **Usage** - Where and how the ATC would be used on the project;
- 3) **Deviations** - References to all requirements of the RFP, or other documents incorporated into the contract by reference, that are inconsistent with the proposed ATC, an explanation of the nature of the deviations from said requirements, and a request for approval of such variance(s);

- 4) **Analysis** - An analysis justifying use of the ATC and why the variance to the requirements of the RFP, or other documents incorporated into the contract by reference, should be allowed;
- 5) **Impacts** - Discussion of potential impacts on vehicular traffic, environmental impacts identified, community impact, safety and life-cycle project impacts, and infrastructure costs (including impacts on the cost of repair and maintenance);
- 6) **History** - A detailed description of other projects where the ATC has been used, the success of such usage, and names and telephone numbers of project owners that can confirm such statements;
- 7) **Risks** - A description of added risks to the Department and other entities associated with implementing the ATC; and
- 8) **Costs** - An estimate of the ATC implementation costs to the Department, the Design-Build Team, and other entities (right-of-way, utilities, mitigation, long term maintenance, etc.).

The Formal ATC, if approved, shall be included in the Price Proposal if the Design-Build Team elects to include it in their Technical Proposal.

Review of ATCs

A panel will be selected to review each ATC, which may or may not include members of the Technical Review Committee. The Design-Build Team shall make no direct contact with any member of the review panel, except as may be permitted by the State Contract Officer. Unapproved contact with any member of the review panel will result in a disqualification of that ATC.

The Department may request additional information regarding a proposed ATC at any time. To the greatest extent possible, the Department will return responses to, or request additional information from, the Design-Build Team within 15 business days of the original submittal of a Formal ATC. If additional information is requested, the Department will provide a response within five business days of receipt of all requested information.

The Department may conduct confidential one-on-one meeting(s) to discuss the Design-Build Team's ATC. Under no circumstances will the Department be responsible or liable to the Design-Build Team or any other party as a result of disclosing any ATC materials, whether the disclosure is deemed required by law, by a court order, or occurs through inadvertence, mistake or negligence on the part of the Department or their respective officers, employees, contractors, or consultants.

In the event that the Department receives ATCs from more than one Design-Build Team that are deemed by the Department, in its sole discretion, to be similar in nature, the Department reserves the right to modify the RFP without further regard for confidentiality.

The Department Response to Formal ATCs

The Department will review each Formal ATC and will respond to the Design-Build Team with one of the following determinations:

- 1) The ATC is approved;
- 2) The ATC is not approved;
- 3) The ATC is not approved in its present form, but may be approved upon satisfaction, in the Department's sole discretion, of certain identified conditions that shall be met or certain clarifications or modifications that shall be made (conditionally approved);
- 4) The submittal does not qualify as an ATC but may be included in the Proposal without an ATC (i.e., the concept complies with the baseline requirements of the RFP);
- 5) The submittal does not qualify as an ATC and may not be included in the Proposal;
- 6) The ATC is deemed to take advantage of an error or omission in the RFP, or other documents incorporated into the contract by reference, in which case the ATC will not be considered, and the RFP will be revised to correct the error or omission.
- 7) A documented question has been received outside of the ATC process on the same topic and the RFP will be revised to address that question; or
- 8) More than one ATC has been received on the same topic and the Department has elected to exercise its right to revise the RFP. This response could also follow and supersede one of the other previously supplied responses above.

Formal ATC Inclusion in Technical Proposal

The Design-Build Team may incorporate one or more approved Formal ATCs as part of its Technical and Price Proposals. If the Department responded to a Formal ATC by stating that it would be approved if certain conditions were met, those conditions shall be stipulated and met in the Technical Proposal.

In addition to outlining each implemented Formal ATC, and providing assurances to meet all attached conditions, the Design-Build Team shall also include a copy of the Formal ATC approval letter from the State Contract Officer in each of the twelve Technical Proposals submitted. This letter will be included in the distribution of the Technical Proposals to the Technical Review Committee.

Approval of a Formal ATC in no way implies that the Formal ATC will receive a favorable review from the Technical Review Committee. The Technical Proposals will be evaluated in regards to the evaluation criteria found in this RFP, regardless of whether or not Formal ATCs are included.

The Price Proposal shall reflect all incorporated Formal ATCs. Except for incorporating approved Formal ATCs, the Technical Proposal may not otherwise contain exceptions to, or deviations from, the requirements of the RFP, or other documents incorporated into the contract by reference.

Preliminary ATCs

At the Design-Build Team's option, a Preliminary ATC submittal may be made that presents a concept and a brief narrative of the benefits of said concept. The purpose of allowing such a Preliminary ATC is to limit the Design-Build Team's expense in the pursuit of a Formal ATC that may be quickly denied by the Department.

To the greatest extent possible, the Department will review Preliminary ATCs within ten business days of submittal and provide written comments that include one of the responses noted below. The Department's response to a Preliminary ATC submittal will be either (1) that the Preliminary ATC is denied; (2) that the Preliminary ATC would be considered as a Formal ATC if the Team so elects to pursue a Formal ATC submission; (3) that an ATC is not required; (4) a documented question has been received outside of the ATC process on the same topic and the RFP will be revised to address that question; (5) more than one ATC has been received on the same topic and the Department has elected to exercise its right to revise the RFP; or (6) that the ATC takes advantage of an error or omission in the RFP or other documents incorporated into the contract by reference, in which case the ATC will not be considered and the RFP will be revised to correct the error or omission. The Department in no way warrants that a favorable response to a Preliminary ATC submittal will translate into a favorable response to a Formal ATC submittal. Likewise, a favorable response to a Preliminary ATC submittal is not sufficient to include the ATC in a Technical Proposal.

SCHEDULE OF ESTIMATED COMPLETION PROGRESS

(9-1-11) (Rev. 8/3/15)

DB1 G58

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

<u>Fiscal Year</u>	<u>Progress (% of Dollar Value)</u>
2017 (07/01/16 – 06/30/17)	11% of Total Amount Bid
2018 (07/01/17 – 06/30/18)	22% of Total Amount Bid
2019 (07/01/18 – 06/30/19)	27% of Total Amount Bid
2020 (07/01/19 – 06/30/20)	21% of Total Amount Bid
2021 (07/01/20 – 06/30/21)	15% of Total Amount Bid
2022 (07/01/21 – 06/30/21)	4% of Total Amount Bid

The Design-Build Team shall also furnish its own progress schedule in accordance with Article 108-2 of the 2012 *Standard Specifications for Roads and Structures*. Any acceleration of

the progress as shown by the Design-Build Team's progress schedule over the progress as shown above shall be subject to the approval of the Engineer.

DISADVANTAGED BUSINESS ENTERPRISE

(12-1-13)(Rev. 1-8-16)

DB1 G061

Description

The purpose of this Special Provision is to carry out the U.S. Department of Transportation's policy of ensuring nondiscrimination in the award and administration of contracts financed in whole or in part with Federal funds. This provision is guided by 49 CFR Part 26.

Definitions

Additional DBE Subcontractors - Any DBE submitted at the time of bid that will not be used to meet the DBE goal. No submittal of a Letter of Intent is required.

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

Contract Goal Requirement - The approved DBE participation at time of award, but not greater than the advertised contract goal.

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

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

Goal Confirmation Letter - Written documentation from the Department to the Proposer confirming the Design-Build Team's approved, committed DBE participation along with a listing of the committed DBE firms.

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

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 DBE certification, such that an applicant is required to apply only once for a DBE certification that will be honored by all recipients of USDOT funds in the state and not limited to the Department of Transportation only. The Certification Program is 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.

Forms and Websites Referenced in this Provision

DBE Payment Tracking System - On-line system in which the Design-Build Team enters the payments made to DBE 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 DBE firms working on the project.

<http://www.ncdot.org/doh/forms/files/DBE-IS.xls>

RF-1 DBE Replacement Request Form - Form for replacing a committed DBE.

<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 DBE subcontractor, manufacturer or regular dealer that affirms that a portion of said contract is going to be performed by the signed DBE 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 DBE Subcontractors Form - Form for entering DBE subcontractors on a project that will meet this DBE goal contained elsewhere in this RFP.

[http://connect.ncdot.gov/municipalities/Bid%20Proposals%20for%20LGA%20Content/08%20DBE%20Subcontractors%20\(Federal\).doc](http://connect.ncdot.gov/municipalities/Bid%20Proposals%20for%20LGA%20Content/08%20DBE%20Subcontractors%20(Federal).doc)

Subcontractor Quote Comparison Sheet - Spreadsheet for showing all subcontractor quotes in the work areas where DBEs 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>

DBE Goal

The following DBE goal for participation by Disadvantaged Business Enterprises is established for this contract:

Disadvantaged Business Enterprises **12.0%**

- (A) *If the DBE goal is more than zero*, the Design-Build Team shall exercise all necessary and reasonable steps to ensure that DBEs participate in at least the percent of the contract as set forth above as the DBE goal.
- (B) *If the DBE goal is zero*, the Design-Build Team shall make an effort to recruit and use DBEs during the performance of the contract. Any DBE participation obtained shall be reported to the Department.

This goal is to be met through utilization of highway construction contractors and / or right of way acquisition firms. Utilization of DBE firms performing design, other preconstruction services, or Construction Engineering and Inspection are not included in this goal.

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 DBE certified shall be used to meet the DBE goal. The Directory can be found at the following link.

<https://partner.ncdot.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 DBE Subcontractors

At the time of bid, Proposers shall submit all DBE participation that they anticipate to use during the life of the contract. Only those identified to meet the DBE goal will be considered committed, even though the listing shall include both committed DBE subcontractors and additional DBE subcontractors. Additional DBE subcontractor participation submitted at the time of bid will be used toward the Department's overall race-neutral goal. Only those firms with current DBE certification at the time of Price Proposal opening will be acceptable for listing in the Proposer's submittal of DBE participation. The Design-Build Team shall indicate the following required information:

- (1) *If the DBE goal is more than zero,*
 - (a) Proposers, at the time the Price Proposal is submitted, shall submit a listing of DBE participation, including the names and addresses on *Listing of DBE Subcontractors* contained elsewhere in the contract documents in order for the Price Proposal to be considered responsive. Proposers shall indicate the total dollar value of the DBE participation for the contract.
 - (b) If Proposers have no DBE participation, they shall indicate this on the *Listing of DBE 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.** Price Proposals submitted that do not have DBE participation indicated on the appropriate form will not be read publicly during the opening of the Price Proposals. The Department will not consider these Price Proposals for award and the proposal will be rejected.
 - (c) The Proposer shall be responsible for ensuring that the DBE 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 opening of the Price Proposals, that DBE's participation will not count towards achieving the corresponding goal.
- (2) *If the DBE goal is zero,* entries on the *Listing of DBE Subcontractors* are not required for the zero goal, however any DBE participation that is achieved during the project shall be reported in accordance with requirements contained elsewhere in this special provision.

DBE Prime Contractor

When a certified DBE firm proposes on a contract that contains a DBE goal, the DBE firm is responsible for meeting the goal or making good faith efforts to meet the goal, just like any other proposer. In most cases, a DBE proposer on a contract will meet the DBE goal by virtue of the work it performs on the contract with its own forces. However, all the work that is performed by the DBE proposer and any other DBE subcontractors will count toward the DBE goal. The DBE proposer shall list itself along with any DBE subcontractors, if any, in order to receive credit toward the DBE goal.

For example, if the DBE goal is 45.0% and the DBE proposer will only perform 40.0% of the contract work, the prime will list itself at 40.0%, and the additional 5.0% shall be obtained through additional DBE participation with DBE subcontractors or documented through a good faith effort.

DBE prime contractors shall also follow Sections A and B listed under *Listing of DBE Subcontractor* just as a non-DBE proposer would.

Written Documentation – Letter of Intent

The Proposer shall submit written documentation for each DBE that will be used to meet the DBE goal of the contract, indicating the Proposer's commitment to use the DBE 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 12:00 noon of the sixth calendar day following opening of Price Proposals, 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 12:00 noon on the next official state business day.

If the Proposer fails to submit the Letter of Intent from each committed DBE to be used toward the DBE goal, or if the form is incomplete (i.e. both signatures are not present), the DBE participation will not count toward meeting the DBE goal. If the lack of this participation drops the commitment below the DBE goal, the Design-Build Team shall submit evidence of good faith efforts, completed in its entirety, to the State Contractor Utilization Engineer or DBE@ncdot.gov no later than 12:00 noon on the eighth calendar day following opening of the Price Proposals, 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 12:00 noon on the next official state business day.

Submission of Good Faith Effort

If the Proposer fails to meet or exceed the DBE goal the Proposer with the apparent adjusted low price shall submit to the Department documentation of adequate good faith efforts made to reach the DBE goal.

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 12:00 noon of the sixth calendar day following opening of the Price Proposals 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 the next official state business day. If the Design-Build Team cannot send the information electronically, then one complete set and nine 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 DBE 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 DBE Goals More Than Zero

Adequate good faith efforts mean that the Proposer took all necessary and reasonable steps to achieve the goal which, by their scope, intensity, and appropriateness, could reasonably be expected to obtain sufficient DBE participation. Adequate good faith efforts also mean that the Proposer actively and aggressively sought DBE 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 Proposer has made. Listed below are examples of the types of actions a proposer will take in making a good faith effort to meet the goal 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 DBEs who have the capability to perform the work of the contract. The Proposer must solicit this interest within at least ten days prior to the opening of the Price Proposals to allow the DBEs to respond to the solicitation. Solicitation shall provide the opportunity to DBEs within the Division and surrounding Divisions where the project is located. The Proposer must determine with certainty if the DBEs are interested by taking appropriate steps to follow up initial solicitations.
- (B) Selecting portions of the work to be performed by DBEs in order to increase the likelihood that the DBE goals will be achieved. Where appropriate, break out contract work items into economically feasible units to facilitate DBE participation, even when the prime contractor might otherwise prefer to perform these work items with its own forces. Negotiate with subcontractors to assume part of the responsibility to meet the contract DBE goal when the work to be sublet includes potential for DBE participation (2nd and 3rd tier subcontractors).
- (C) Providing interested DBEs 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 DBEs. It is the Proposer's responsibility to make a portion of the work available to DBE subcontractors and suppliers and to select those portions of the work or material needs consistent with the available DBE subcontractors and suppliers, so as to facilitate DBE participation. Evidence of such negotiation includes the names, addresses, and telephone numbers of DBEs 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 DBEs to perform the work.

2. A proposer using good business judgment would consider a number of factors in negotiating with subcontractors, including DBE 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 DBEs is not in itself sufficient reason for a proposer's failure to meet the contract DBE goal, 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 Proposer of the responsibility to make good faith efforts. Proposing Design-Build Teams are not, however, required to accept higher quotes from DBEs if the price difference is excessive or unreasonable.
- (E) Not rejecting DBEs as being unqualified without sound reasons based on a thorough investigation of their capabilities. The Proposer'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 Proposer's efforts to meet the project goal.
- (F) Making efforts to assist interested DBEs in obtaining bonding, lines of credit, or insurance as required by the recipient or proposer.
- (G) Making efforts to assist interested DBEs 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 DBEs. Contact within seven days from the opening of the Price Proposals the Business Development Manager in the Business Opportunity and Work Force Development Unit to give notification of the Proposer's inability to get DBE quotes.
- (I) Any other evidence that the Proposer submits which shows that the Proposer has made reasonable good faith efforts to meet the DBE goal.

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

1. Whether the Proposer's documentation reflects a clear and realistic plan for achieving the DBE goal.
2. The Proposer's past performance in meeting the DBE goals.
3. The performance of other proposers in meeting the DBE goal. For example, when the Proposer with the apparent adjusted low price fails to meet the DBE goal, but others

meet it, you may reasonably raise the question of whether, with additional reasonable efforts the Proposer with the apparent adjusted low price could have met the goal. If the Proposer with the apparent adjusted low price fails to meet the DBE goal, but meets or exceeds the average DBE participation obtained by other proposers, the Department may view this, in conjunction with other factors, as evidence of the Proposer with the apparent adjusted low price having made a good faith effort.

If the Department does not award the contract to the Proposer with the apparent adjusted low price, the Department reserves the right to award the contract to the Proposer with the next adjusted lowest adjusted price that can satisfy to the Department that the DBE goal can be met or that an adequate good faith effort has been made to meet the DBE goal.

Non-Good Faith Appeal

The State Contractual Services Engineer will notify the Design-Build Team verbally and in writing of non-good faith. A Design-Build Team may appeal a determination of non-good faith made by the Goal Compliance Committee. If a Design-Build Team 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 two business days of notification of the determination of non-good faith.

Counting DBE Participation Toward Meeting DBE Goal

(A) Participation

The total dollar value of the participation by a committed DBE will be counted toward the contract goal requirement. The total dollar value of participation by a committed DBE will be based upon the value of work actually performed by the DBE and the actual payments to DBE firms by the Design-Build Team.

(B) Joint Checks

Prior notification of joint check use shall be required when counting DBE 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 DBE may enter into subcontracts. Work that a DBE subcontracts to another DBE firm may be counted toward the contract goal requirement. Work that a DBE subcontracts to a non-DBE firm does not count toward the contract goal requirement. If a DBE 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 DBE is not performing a commercially useful function. The DBE may present evidence to rebut this presumption to the Department. The Department's decision on the rebuttal of this

presumption is subject to review by the Federal Highway Administration but is not administratively appealable to USDOT.

(D) Joint Venture

When a DBE performs as a participant in a joint venture, the Design-Build Team may count toward its contract goal requirement a portion of the total value of participation with the DBE in the joint venture, that portion of the total dollar value being a distinct clearly defined portion of work that the DBE performs with its forces.

(E) Suppliers

A Design-Build Team may count toward its DBE requirement 60 percent of its expenditures for materials and supplies required to complete the contract and obtained from a DBE regular dealer and 100 percent of such expenditures from a DBE manufacturer.

(F) Manufacturers and Regular Dealers

A Design-Build Team may count toward its DBE requirement the following expenditures to DBE firms that are not manufacturers or regular dealers:

1. The fees or commissions charged by a DBE 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 DBE, 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) DBE Utilization

The Design-Build Team may count toward its contract goal requirement only expenditures to DBEs that perform a commercially useful function in the work of a contract. A DBE 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 DBE 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 DBE 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 DBE credit claimed for its performance of the work, and any other relevant factors.

(B) DBE Utilization in Trucking

The following factors will be used to determine if a DBE trucking firm is performing a commercially useful function.

1. The DBE 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 DBE goals.
2. The DBE shall itself own and operate at least one fully licensed, insured, and operational truck used on the contract.
3. The DBE 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 DBE may subcontract the work to another DBE firm, including an owner-operator who is certified as a DBE. The DBE who subcontracts work to another DBE receives credit for the total value of the transportation services the subcontracted DBE provides on the contract.
5. The DBE may also subcontract the work to a non-DBE firm, including from an owner-operator. The DBE who subcontracts the work to a non-DBE is entitled to credit for the total value of transportation services provided by the non-DBE subcontractor not to exceed the value of transportation services provided by DBE-owned trucks on the contract. Additional participation by non-DBE 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 DBE and the Design-Build Team will not count towards the DBE contract requirement.
6. A DBE may lease truck(s) from an established equipment leasing business open to the general public. The lease must indicate that the DBE 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 DBE, so long as the lease gives the DBE absolute priority for use of the leased truck. This type of lease may count toward the DBE's credit as long as the driver is under the DBE's payroll.
7. Subcontracted / leased trucks shall display clearly on the dashboard the name of the DBE 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.

DBE Replacement

When a Design-Build Team has relied on a commitment to a DBE firm (or an approved substitute DBE firm) to meet all or part of a contract goal requirement, the Design-Build Team shall not terminate the DBE for convenience. This includes, but is not limited to, instances in which the Design-Build Team seeks to perform the work of the terminated subcontractor with another DBE subcontractor, a non-DBE subcontractor, or with the Contractor's own forces or those of an affiliate. A DBE 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 DBE 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 DBE firm shall be submitted to the Engineer for approval on Form RF-1 (*DBE Replacement Request*). If the Design-Build Team fails to follow this procedure, the Prime Contractor or other affiliated companies within the Design-Build Team may be disqualified from further bidding for a period of up to six months.

The Design-Build Team shall comply with the following for replacement of a committed DBE:

(A) Performance Related Replacement

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

If a replacement DBE is not found that can perform at least the same amount of work as the terminated DBE, the Design-Build Team 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 DBEs that their interest is solicited in contracting the work defaulted by the previous DBE or in subcontracting other items of work in the contract.
2. Efforts to negotiate with DBEs for specific subbids including, at a minimum:
 - (a) The names, addresses, and telephone numbers of DBEs who were contacted.
 - (b) A description of the information provided to DBEs regarding the plans and specifications for portions of the work to be performed.
3. A list of reasons why DBE quotes were not accepted.

4. Efforts made to assist the DBEs contacted, if needed, in obtaining bonding or insurance required by the Design-Build Team.

(B) Decertification Replacement

1. When a committed DBE is decertified by the Department after the SAF (*Subcontract Approval Form*) has been received by the Department, the Department will not require the Design-Build Team to solicit replacement DBE 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 DBE is decertified prior to the Department receiving the SAF (*Subcontract Approval Form*) for the named DBE firm, the Design-Build Team shall take all necessary and reasonable steps to replace the DBE subcontractor with another DBE subcontractor to perform at least the same amount of work to meet the DBE goal requirement. If a DBE firm is not found to do the same amount of work, a good faith effort must be submitted to NCDOT (Reference 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 DBE, the Design-Build Team will not be required to seek additional participation. When the Engineer makes changes that result in additional work to be performed by a DBE based upon the Design-Build Team's commitment, the DBE shall participate in additional work to the same extent as the DBE 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 Design-Build Team shall seek additional participation by DBEs 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 DBE, the Design-Build Team shall seek participation by DBEs unless otherwise approved by the Engineer.

When the Design-Build Team requests changes in the work that result in the reduction or elimination of work that the Design-Build Team committed to be performed by a DBE, the Design-Build Team shall seek additional participation by DBEs equal to the reduced DBE 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 DBE subcontractor. The Department reserves the right to require copies of actual subcontract agreements involving DBE subcontractors.

When using transportation services to meet the contract commitment, the Design-Build Team 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 DBE for materials, supplies or services, not otherwise documented by the SAF as specified above, the Design-Build Team shall furnish the Engineer a copy of the agreement. The documentation shall also indicate the percentage (60% or 100%) of expenditures claimed for DBE credit.

Reporting Disadvantaged Business Enterprise Participation

The Design-Build Team shall provide the Engineer with an accounting of payments made to all DBE 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 Prime Contractor or other affiliated companies within the Design-Build Team 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 DBEs, 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 Design-Build Team to submit the required information in the time frame specified may result in the disqualification of that Prime Contractor and any affiliate companies within the Design-Build Team 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 Prime Contractor or any affiliate companies within the Design-Build Team from being approved for work on future DOT projects until the required information is submitted.

Design-Build Teams reporting transportation services provided by non-DBE 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 Design-Build Team shall report the accounting of payments through the Department's DBE 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 for Roads and Structures* may be cause to disqualify the Prime Contractor or any affiliated companies within the Design-Build Team from further bidding for a specified length of time.

CERTIFICATION FOR FEDERAL-AID CONTRACTS

(3-21-90)

DB1 G85

The Proposer certifies, by signing and submitting a Design-Build Proposal, to the best of his or her knowledge and belief, that:

- (1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.
- (2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, *Disclosure Form to Report Lobbying*, in accordance with its instructions.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by *Section 1352, Title 31, U.S. Code*. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

The Proposer also agrees by submitting a Design-Build Proposal that he or she shall require that the language of this certification be included in all lower tier subcontracts, which exceed \$100,000 and that all such sub-recipients shall certify and disclose accordingly.

CONTRACTOR'S LICENSE REQUIREMENTS

(7-1-95)

DB1 G88

If the Design-Build Team does not hold the proper license to perform any plumbing, heating, air conditioning, or electrical work in this contract, he will be required to sublet such work to a contractor properly licensed in accordance with *Article 2 of Chapter 87 of the General Statutes* (licensing of heating, plumbing, and air conditioning contractors) and *Article 4 of Chapter 87 of the General Statutes* (licensing of electrical contractors).

U.S. DEPARTMENT OF TRANSPORTATION HOTLINE

(11-22-94)

DB1 G100

To report bid rigging activities call: **1-800-424-9071**

The U.S. Department of Transportation (DOT) operates the above toll-free *hotline* Monday through Friday, 8:00 a.m. to 5:00 p.m. eastern time. Anyone with knowledge of possible bid rigging, bidder collusion, or other fraudulent activities should use the *hotline* to report such activities.

The *hotline* is part of the DOT's continuing effort to identify and investigate highway construction contract fraud and abuse. It is operated under the direction of the DOT Inspector General. All information will be treated confidentially and caller anonymity will be respected.

RESOURCE CONSERVATION AND ENVIRONMENTALLY SUSTAINABLE PRACTICES

(5-21-13)(Rev. 4-10-15)

104-13

DB1 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 2012 *Standard Specifications for Roads and Structures*.

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 1st annually to **valuemanagementunit@ncdot.gov**. For questions regarding the form or reporting, contact the State Value Management Engineer at 919-707-4810.

SUBSURFACE INFORMATION

(3-22-07)

DB1 G119

Available subsurface information will be provided on this project. The Design-Build Team shall be responsible for additional investigations and for verifying the accuracy of the subsurface information supplied by the Department.

DOMESTIC STEEL

(3-6-13)

106

DB G 120

Revise the 2012 *Standard Specifications for Roads and Structures* as follows:

Page 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, and that the contractor can provide invoices documenting the cost of the items. 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.

COOPERATION BETWEEN CONTRACTORS

(9-1-11)

DB1 G133

The Design-Build Team's attention is directed to Article 105-7 of the 2012 *Standard Specifications for Roads and Structures*.

Project U-2925 is located approximately one mile east of Exit 35. Project U-2925 has an anticipated January 2017 completion date

The Design-Build Team on this project shall cooperate with the Contractor or Design-Build Team working within or adjacent to the limits of this project, to the extent that the work can be carried out to the best advantage of all concerned.

BID DOCUMENTATION

(Rev. 07-31-12) (8-3-15)

DB1 G142

General

The successful Design-Build Team shall submit the original, unaltered bid documentation or a certified copy of the original, unaltered bid documentation used to prepare the Price Proposal for this contract to the Department within 10 days after receipt of notice of award of contract. Such documentation shall be placed in escrow with a banking institution or other bonded document storage facility selected by the Department.

The Department will not execute the contract until the original, unaltered bid documentation or a certified copy of the original, unaltered bid documentation has been received by the Department.

Terms

Bid Documentation – Bid Documentation shall mean all written information, working papers, computer printouts, electronic media, charts, and all other data compilations which contain or reflect information, data, and calculations used by the Proposer in the preparation of the Price Proposal. The term *bid documentation* includes, but is not limited to, Design-Build Team equipment rates, Design-Build Team overhead rates, labor rates, efficiency or productivity factors, arithmetical calculations, and quotations from subcontractors and material suppliers to the extent that such rates and quotations were used by the Proposer in formulating and determining the Price Proposal. The term *bid documentation* also includes any manuals, which are standard to the industry used by the Proposer in determining the Price Proposal. Such manuals may be included in the bid documentation by reference. Such reference shall include the name and date of the publication and the publisher. *Bid Documentation* does not include bid documents provided by the Department for use by the Proposer in bidding on this project. The Bid Documentation can be in the form of electronic submittal (i.e. thumb drive) or paper. If the Bidder elects to submit the Bid Documentation in electronic format, the Department requires a backup submittal (i.e. a second thumb drive) in case one is corrupted.

Design-Build Team's Representative – Officer of the Prime Contractor's company; if not an officer, the Contractor shall supply a letter signed and notarized by an officer of the Prime Contractor's company, granting permission for the representative to sign the escrow agreement on behalf of the Prime Contractor.

Escrow Agent – Officer of the select banking institution or other bonded document storage facility authorized to receive and release bid documentation.

Escrow Agreement Information

A draft copy of the Escrow Agreement will be mailed to the Proposer after the notice of award for informational purposes. The Proposer and Department will sign the actual Escrow Agreement at the time the bid documentation is delivered to the Escrow Agent.

Failure to Provide Bid Documentation

The Proposer's failure to provide the original, unaltered bid documentation or a certified copy of the original, unaltered bid documentation within 10 days after the notice of award is received by him may be just cause for rescinding the award of the contract and may result in the removal of the Proposer from the Department's list of qualified bidders for a period of up to 180 days. Award may then be made to the Proposer with the next lowest adjusted price or the work may be readvertised and constructed under the contract or otherwise, as the Department may decide.

Submittal of Bid Documentation

- (A) Appointment – Email **specs@ncdot.gov** or call 919.707.6900 to schedule an appointment.
- (B) Delivery - A representative of the Bidder shall deliver the original, unaltered bid documentation or a certified copy of the original, unaltered bid documentation to the Department, in a container suitable for sealing, within 10 days after the notice of award is received.
- (C) Packaging – The container shall be no larger than 15.5 inches in length by 12 inches wide by 11 inches high and shall be water resistant. The container shall be clearly marked on the face and the back of the container with the following information: Bid Documentation, Bidder's Name, Bidder's Address, Date of Escrow Submittal, Contract Number, TIP Number if applicable, and County.

Affidavit

Bid documentation will be considered a certified copy if the proposer includes an affidavit stating that the enclosed documentation is an EXACT copy of the original documentation used by the Proposer to determine the bid for this project. The affidavit shall also list each bid document with sufficient specificity so a comparison may be made between the list and the bid documentation to ensure that all of the bid documentation listed in the affidavit has been enclosed for escrow. The affidavit shall attest that the affiant has personally examined the bid documentation, that the affidavit lists all of the documents used by the proposer to determine the bid for this project, and that all bid documentation has been included. The affidavit shall be signed by a chief officer of the company, have the person's name and title typed below the signature, and the signature shall be notarized at the bottom of the affidavit.

Verification

Upon delivery of the bid documentation, the Department's Contract Officer and the Design-Build Team's representative will verify the accuracy and completeness of the bid documentation compared to the affidavit. Should a discrepancy exist, the Design-Build Team's representative shall immediately furnish the Department's Contract Officer with any other needed bid documentation. The Department's Contract Officer upon determining that the bid documentation is complete will, in the presence of the Design-Build Team's representative, immediately place the complete bid documentation and affidavit in the container and seal it. Both parties will deliver the sealed container to the Escrow Agent for placement in a safety deposit box, vault, or other secure accommodation.

Confidentiality of Bid Documentation

The bid documentation and affidavit in escrow are, and will remain, the property of the Proposer. The Department has no interest in, or right to, the bid documentation and affidavit other than to verify the contents and legibility of the bid documentation unless the Design-Build Team gives

written notice of intent to file a claim, files a written claim, files a written and verified claim, or initiates litigation against the Department. In the event of such written notice of intent to file a claim, filing of a written claim, filing a written and verified claim, or initiation of litigation against the Department, or receipt of a letter from the Design-Build Team authorizing release, the bid documentation and affidavit may become the property of the Department for use in considering any claim or in litigation as the Department may deem appropriate.

Any portion or portions of the bid documentation designated by the Proposer as a *trade secret* at the time the bid documentation is delivered to the Department's Contract Officer shall be protected from disclosure as provided by *G.S. 132-1.2*.

Duration and Use

The bid documentation and affidavit shall remain in escrow until 60 calendar days from the time the Prime Contractor receives the final estimate; or until such time as the Design-Build Team:

- (A) Gives written notice of intent to file a claim,
- (B) Files a written claim,
- (C) Files a written and verified claim,
- (D) Initiates litigation against the Department related to the contract; or
- (E) Authorizes in writing its release.

Upon the giving of written notice of intent to file a claim, filing a written claim, filing a written and verified claim, or the initiation of litigation by the Design-Build Team against the Department, or receipt of a letter from the Design-Build Team authorizing release, the Department may obtain the release and custody of the bid documentation.

The Proposer certifies and agrees that the sealed container placed in escrow contains all of the bid documentation used to determine the Price Proposal and that no other bid documentation shall be relevant or material in litigation over claims brought by the Design-Build Team arising out of this contract.

Release of Bid Documentation to the Contractor

If the bid documentation remains in escrow 60 calendar days after the time the Design-Build Team receives the final estimate and the Design-Build Team has not filed a written claim, filed a written and verified claim, or has not initiated litigation against the Department related to the contract, the Department will instruct the Escrow Agent to release the sealed container to the Prime Contractor.

The Prime Contractor will be notified by certified letter from the Escrow Agent that the bid documentation will be released to the Prime Contractor. The Prime Contractor or his representative shall retrieve the bid documentation from the Escrow Agent within 30 days of the receipt of the certified letter. If the Prime Contractor does not receive the documents within 30 days of the receipt of the certified letter, the Department will contact the Prime Contractor to determine final dispersion of the bid documentation.

Payment

The cost of the escrow will be borne by the Department. There will be no separate payment for all costs of compilation of the data, container, or verification of the bid documentation. Payment at the various contract unit or lump sum prices in the contract will be full compensation for all such costs.

TWELVE MONTH GUARANTEE

(7-15-03)

DB1 G145

- (A) The Design-Build Team 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 Design-Build Team will not be responsible for damage due to normal wear and tear, for negligence on the part of the Department, and / or for use in excess of the design.
- (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 Design-Build Team shall be responsible for invoking the warranted repair work with the manufacturer. The Design-Build Team'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 Design-Build Team 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 Design-Build Team to return to the project to make repairs or perform additional work that the Department would normally compensate the Design-Build Team 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. In addition, failure on the part of the responsible entity(ies) of the Design-Build Team to perform guarantee work within the terms of this provision shall be just cause to remove the responsible entity(ies) from the Department's corresponding prequalified list. The Design-Build Team will be removed for a minimum of 6 months and will be reinstated only after all work has been corrected and the Design-Build Team requests reinstatement in writing.

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.

PERMANENT VEGETATION ESTABLISHMENT

(6-11-15)

104

DB01 G160

Establish permanent vegetation stands of the Long Term Stabilization mixtures identified in the Erosion Control Scope of Work found elsewhere in this RFP. During the period between initial vegetation planting and final project acceptance, perform all work necessary to establish 80% coverage of permanent vegetation within the project limits, as well as, in borrow and waste pits. This work shall include erosion control device maintenance and installation, repair seeding and mulching, supplemental seeding and mulching, mowing, and fertilizer topdressing, as directed. All work shall be performed in accordance with the Erosion Control Scope of Work found elsewhere in this RFP and the applicable section of the 2012 *Standard Specifications for Roads and Structures*.

Once the Engineer has determined that 80% coverage of permanent vegetation has been established, the Design-Build Team will be notified to remove the remaining erosion control devices that are no longer needed. The Design-Build Team shall be responsible for, and shall correct, any areas disturbed by operations performed in permanent vegetation establishment and the removal of temporary erosion control measures, whether occurring prior to or after placing traffic on the project.

EROSION & SEDIMENT CONTROL / STORMWATER CERTIFICATION

(1-16-07) (Rev 12-4-14)

DB1 G180

General

Schedule and conduct construction activities in a manner that will minimize soil erosion and the resulting sedimentation and turbidity of surface waters. Comply with the requirements herein regardless of whether or not a National Pollutant Discharge Elimination System (NPDES) permit for the work is required.

Establish a chain of responsibility for operations and subcontractors' operations to ensure that the *Erosion and Sediment Control / Stormwater Pollution Prevention Plan* is implemented and maintained over the life of the contract.

- (A) *Certified Supervisor* – Provide a certified Erosion and Sediment Control / Stormwater (E&SC/SW) Supervisor to manage the Design-Build Team and subcontractor(s) operations, ensure compliance with Federal, State and Local ordinances and regulations, and to manage the Quality Control Program.
- (B) *Certified Foreman* – Provide a certified, trained foreman for each construction operation that increases the potential for soil erosion or the possible sedimentation and turbidity of surface waters.
- (C) *Certified Installer* – Provide a certified installer to install or direct the installation for erosion or sediment / stormwater control practices.

- (D) *Certified Designer* – Provide a certified designer for the design of the erosion and sediment control / stormwater component of reclamation plans and, if applicable, for the design of the project erosion and sediment control / stormwater plan.

Roles and Responsibilities

- (A) *Certified Erosion and Sediment Control / Stormwater Supervisor* - The Certified Supervisor shall be Level II and responsible for ensuring the erosion and sediment control / stormwater plan is adequately implemented and maintained on the project and for conducting the quality control program. The Certified Supervisor shall be on the project within 24 hours notice from initial exposure of an erodible surface to the project's final acceptance. Perform the following duties:
- (1) **Manage Operations** - Coordinate and schedule the work of subcontractors so that erosion and sediment control/stormwater measures are fully executed for each operation and in a timely manner over the duration of the contract.
 - (a) Oversee the work of subcontractors so that appropriate erosion and sediment control/stormwater preventive measures are conformed to at each stage of the work.
 - (b) Prepare the required National Pollutant Discharge Elimination System (NPDES) Inspection Record and submit to the Engineer.
 - (c) Attend all weekly or monthly construction meetings to discuss the findings of the NPDES inspection and other related issues.
 - (d) Implement the erosion and sediment control / stormwater site plans requested.
 - (e) Provide any needed erosion and sediment control / stormwater practices for the Design-Build Team's temporary work not shown on the plans developed by the Design-Build Team, such as, but not limited to work platforms, temporary construction, pumping operations, plant and storage yards, and cofferdams.
 - (f) Acquire applicable permits and comply with requirements for borrow pits, dewatering, and any temporary work conducted by the Design-Build Team in jurisdictional areas.
 - (g) Conduct all erosion and sediment control / stormwater work in a timely and workmanlike manner.
 - (h) Fully perform and install erosion and sediment control / stormwater work prior to any suspension of the work.
 - (i) Coordinate with Department, Federal, State and Local Regulatory agencies on resolution of erosion and sediment control / stormwater issues due to the Design-Build Team's operations.
 - (j) Ensure that proper cleanup occurs from vehicle tracking on paved surfaces and / or any location where sediment leaves the Right-of-Way.
 - (k) Have available a set of erosion and sediment control/stormwater plans that are initialed and include the installation date of Best Management Practices. These practices shall include temporary and permanent

groundcover and be properly updated to reflect necessary plan and field changes for use and review by Department personnel as well as regulatory agencies.

- (2) Requirements set forth under the NPDES Permit – The Department's NPDES Stormwater permit (NCS000250) outlines certain objectives and management measures pertaining to construction activities. The permit references *NCG010000, General Permit to Discharge Stormwater* under the NPDES, and states that the Department shall incorporate the applicable requirements into its delegated Erosion and Sediment Control Program for construction activities disturbing one or more acres of land. The Department further incorporates these requirements on all contracted bridge and culvert work at jurisdictional waters, regardless of size. Some of the requirements are, but are not limited to:
 - (a) Control project site waste to prevent contamination of surface or ground waters of the state, i.e. from equipment operations/maintenance construction materials, concrete washout, chemicals, litter, fuels, lubricants, coolants, hydraulic fluids, any other petroleum products, and sanitary waste.
 - (b) Inspect erosion and sediment control / stormwater devices and stormwater discharge outfalls at least once every 7 calendar days, twice weekly for construction related Federal Clean Water Act, Section 303(d) impaired streams with turbidity violations, and within 24 hours after a significant rainfall event of 0.5 inch that occurs within a 24-hour period.
 - (c) Maintain an onsite rain gauge or use the Department's Multi-Sensor Precipitation Estimate website to maintain a daily record of rainfall amounts and dates.
 - (d) Maintain erosion and sediment control / stormwater inspection records for review by Department and Regulatory personnel upon request.
 - (e) Implement approved reclamation plans on all borrow pits, waste sites and staging areas.
 - (f) Maintain a log of turbidity test results as outlined in the Department's Procedure for Monitoring Borrow Pit Discharge.
 - (g) Provide secondary containment for bulk storage of liquid materials.
 - (h) Provide training for employees concerning general erosion and sediment control / stormwater awareness, the Department's NPDES Stormwater Permit NCS000250 requirements, and the applicable requirements of the *General Permit, NCG010000*.
 - (i) Report violations of the NPDES permit to the Engineer immediately who will notify the Division of Water Quality Regional Office within 24 hours of becoming aware of the violation.
- (3) Quality Control Program - Maintain a quality control program to control erosion, prevent sedimentation and follow provisions/conditions of permits. The quality control program shall:

- (a) Follow permit requirements related to the Design-Build Team and subcontractors' construction activities.
 - (b) Ensure that all operators and / or subcontractor(s) on site have the proper erosion and sediment control / stormwater certification.
 - (c) Notify the Engineer when the required certified erosion and sediment control / stormwater personnel are not available on the job site when needed.
 - (d) Conduct the inspections required by the NPDES permit.
 - (e) Take corrective actions in the proper timeframe as required by the NPDES permit for problem areas identified during the NPDES inspections.
 - (f) Incorporate erosion control into the work in a timely manner and stabilize disturbed areas with mulch / seed or vegetative cover on a section-by-section basis.
 - (g) Use flocculants approved by state regulatory authorities where appropriate and where required for turbidity and sedimentation reduction.
 - (h) Ensure proper installation and maintenance of temporary erosion and sediment control devices.
 - (i) Remove temporary erosion or sediment control devices when they are no longer necessary as agreed upon by the Engineer.
 - (j) The Design-Build Team's quality control and inspection procedures shall be subject to review by the Engineer. Maintain NPDES inspection records and make records available at all times for verification by the Engineer.
- (B) *Certified Foreman* - At least one Certified Foreman shall be onsite for each type of work listed herein during the respective construction activities to control erosion, prevent sedimentation and follow permit provisions:
- (1) Foreman in charge of grading activities
 - (2) Foreman in charge of bridge or culvert construction over jurisdictional areas
 - (3) Foreman in charge of utility activities
- The Design-Build Team may request to use the same person as the Level II Supervisor and Level II Foreman. This person shall be onsite whenever construction activities as described above are taking place. This request shall be approved by the Engineer prior to work beginning.
- The Design-Build Team may request to name a single Level II Foreman to oversee multiple construction activities on small bridge or culvert replacement projects. This request shall be approved by the Engineer prior to work beginning.
- (C) *Certified Installers* - Provide at least one onsite, Level I Certified Installer for each of the following erosion and sediment control / stormwater crew:
- (1) Seeding and Mulching
 - (2) Temporary Seeding
 - (3) Temporary Mulching

- (4) Sodding
- (5) Silt fence or other perimeter erosion / sediment control device installations
- (6) Erosion control blanket installation
- (7) Hydraulic tackifier installation
- (8) Turbidity curtain installation
- (9) Rock ditch check / sediment dam installation
- (10) Ditch liner / matting installation
- (11) Inlet protection
- (12) Riprap placement
- (13) Stormwater BMP installations (such as but not limited to level spreaders, retention / detention devices)
- (14) Pipe installations within jurisdictional areas

If a Level I *Certified Installer* is not onsite, the Design-Build Team may substitute a Level II Foreman for a Level I Installer, provided the Level II Foreman is not tasked to another crew requiring Level II Foreman oversight.

- (D) *Certified Designer* – Include the certification number of the Level III Certified Designer on the erosion and sediment control / stormwater component of all reclamation plans and if applicable, the certification number of the Level III Certified Designer on the design of the project erosion and sediment control / stormwater plan.

Preconstruction Meeting

Furnish the names of the *Certified Erosion and Sediment Control / Stormwater Supervisor, Certified Foremen, Certified Installers and Certified Designers* and notify the Engineer in writing of changes in certified personnel over the life of the contract within 2 days of change.

Ethical Responsibility

Any company performing work for the North Carolina Department of Transportation has the ethical responsibility to fully disclose any reprimand or dismissal of an employee resulting from improper testing or falsification of records.

Revocation or Suspension of Certification

Upon recommendation of the Chief Engineer to the certification entity, certification for Supervisor, Certified Foremen, Certified Installers and Certified Designer may be revoked or suspended with the issuance of an Immediate Corrective Action (ICA), Notice of Violation (NOV), or Cease and Desist Order for erosion and sediment control / stormwater related issues.

The Chief Engineer may recommend suspension or permanent revocation of such certification due to the following:

- (A) Failure to adequately perform the duties as defined within this certification provision
- (B) Issuance of an ICA, NOV, or Cease and Desist Order
- (C) Failure to fully perform environmental commitments as detailed within the permit conditions and specifications
- (D) Demonstration of erroneous documentation or reporting techniques
- (E) Cheating or copying another candidate's work on an examination
- (F) Intentional falsification of records
- (G) Directing a subordinate under direct or indirect supervision to perform any of the above actions
- (H) Dismissal from a company for any of the above reasons
- (I) Suspension or revocation of one's certification by another entity

Suspension or revocation of a certification will be sent by certified mail to the certificant and the Corporate Head of the company that employs the certificant.

A certificant has the right to appeal any adverse action which results in suspension or permanent revocation of certification by responding, in writing, to the Chief Engineer within 10 calendar days after receiving notice of the proposed adverse action.

Chief Engineer
1536 Mail Service Center
Raleigh, NC 27699-1536

Failure to appeal within 10 calendar days will result in the proposed adverse action becoming effective on the date specified on the certified notice. Failure to appeal within the time specified will result in a waiver of all future appeal rights regarding the adverse action taken. The certificant will not be allowed to perform duties associated with the certification during the appeal process. The Chief Engineer will hear the appeal and make a decision within 7 days of hearing the appeal. The decision of the Chief Engineer will be final and will be made in writing to the certificant.

If a certification is temporarily suspended, the certificant shall pass any applicable written examination and any proficiency examination, at the conclusion of the specified suspension period, prior to having the certification reinstated.

Measurement and Payment

Certified Erosion and Sediment Control / Stormwater Supervisor, Certified Foremen, Certified Installers and Certified Designer will be incidental to the project for which no direct compensation will be made.

PROCEDURE FOR MONITORING BORROW PIT DISCHARGE

(1-22-13)

DB1 G181

Water discharge from borrow pit sites shall not cause surface waters to exceed 50 NTUs (nephelometric turbidity unit) in streams not designated as trout waters and 10 NTUs in streams,

lakes or reservoirs designated as trout waters. For lakes and reservoirs not designated as trout waters, the turbidity shall not exceed 25 NTUs. If the turbidity exceeds these levels due to natural background conditions, the existing turbidity level shall not be increased.

If during any operating day, the downstream water quality exceeds the standard, the Design-Build Team shall do all of the following:

- (A) Either cease discharge or modify the discharge volume or turbidity levels to bring the downstream turbidity levels into compliance, or
- (B) Evaluate the upstream conditions to determine if the exceedance of the standard is due to natural background conditions. If the background turbidity measurements exceed the standard, operation of the pit and discharge can continue as long as the stream turbidity levels are not increased due to the discharge.
- (C) Measure and record the turbidity test results (time, date and sampler) at all defined sampling locations 30 minutes after startup and at a minimum, one additional sampling of all sampling locations during that 24-hour period in which the borrow pit is discharging.
- (D) Notify DWR within 24 hours of any stream turbidity standard exceedances that are not brought into compliance.

During the Environmental Assessment required by Article 230-4 of the 2012 *Standard Specifications for Roads and Structures*, the Design-Build Team shall define the point at which the discharge enters into the State's surface waters and the appropriate sampling locations. Sampling locations shall include points upstream and downstream from the point at which the discharge enters these waters. Upstream sampling location shall be located so that it is not influenced by backwater conditions and represents natural background conditions. Downstream sampling location shall be located at the point where complete mixing of the discharge and receiving water has occurred.

The discharge shall be closely monitored when water from the dewatering activities is introduced into jurisdictional wetlands. Any time visible sedimentation (deposition of sediment) on the wetland surface is observed, the dewatering activity will be suspended until turbidity levels in the stilling basin can be reduced to a level where sediment deposition does not occur. Staining of wetland surfaces from suspended clay particles, occurring after evaporation or infiltration, does not constitute sedimentation. No activities shall occur in wetlands that adversely affect the functioning of a wetland. Visible sedimentation will be considered an indication of possible adverse impacts on wetland use.

The Engineer will perform independent turbidity tests on a random basis. These results will be maintained in a log within the project records. Records will include, at a minimum, turbidity test results, time, date and name of sampler. Should the Department's test results exceed those of the Design-Build Team's test results, an immediate test shall be performed jointly with the results superseding the previous test results of both the Department and the Design-Build Team.

To plan, design, construct, and maintain BMPs to address water quality standards, the Design-Build Team shall use the *NCDOT Turbidity Reduction Options for Borrow Pits Matrix*, available at the website noted below:

http://www.ncdot.gov/doh/operations/dp_chief_eng/roadside/fieldops/downloads/Files/TurbidityReductionOptionSheet.pdf

Tier I Methods include stilling basins which are standard compensatory BMPs. Other Tier I methods are noncompensatory and shall be used when needed to meet the stream turbidity standards. Tier II Methods are also noncompensatory and are options that may be needed for protection of rare or unique resources or where special environmental conditions exist at the site which have led to additional requirements being placed in the DWR's 401 Certifications and approval letters, Isolated Wetland Permits, Riparian Buffer Authorization or a DOT Reclamation Plan's Environmental Assessment for the specific site. Should the Design-Build Team exhaust all Tier I Methods on a site exclusive of rare or unique resources or special environmental conditions, Tier II Methods may be required by regulators on a case by case basis per supplemental agreement.

The Design-Build Team may use cation exchange capacity (CEC) values from proposed site borings to plan and develop the Price Proposal for the project. CEC values exceeding 15 milliequivalents per 100 grams of soil may indicate a high potential for turbidity and should be avoided when dewatering into surface water is proposed.

No additional compensation for monitoring borrow pit discharge will be paid.

CLEARING AND GRUBBING

(9-1-11)

DB2 R01

With the exception of areas with Permanent Utility Easements, perform clearing on this project to the limits established by Method "III" shown on Roadway Standard No. 200.02 or 200.03. In areas with Permanent Utility Easements, clearing shall extend to the right of way limits.

BURNING RESTRICTIONS

(7-1-95)

DB2 R05

Open burning shall not be permitted on any portion of the right of way limits established for this project. The Design-Build Team shall not burn the clearing, grubbing or demolition debris designated for disposal and generated from the project at locations within the project limits, off the project limits or at any waste or borrow sites in Forsyth County. The Design-Build Team shall dispose of the clearing, grubbing and demolition debris by means other than burning and in accordance with state and local rules and regulations.

BUILDING AND APPURTENANCE REMOVAL / DEMOLITION

(9-1-11)

DB2 R12A

Unless otherwise as agreed upon by the Department, seal all wells and remove or demolish all buildings and appurtenances, in their entirety, that are located either partially or completely within the project's right of way limits or are located outside the project's right of way limits but

within property purchased as an uneconomical remnant in accordance with Sections 205, 210 and 215 of the 2012 *Standard Specifications for Roads and Structures*.

The Department will perform all assessment, removal and disposal of asbestos. Once the Design-Build Team has acquired a parcel and all buildings and appurtenances have been vacated, the Design-Build Team shall immediately notify the Division Right of Way Agent in writing. Upon receipt of the written notification, the Department then requires 60 days to assess and remove any asbestos prior to the Design-Build Team demolishing any building or appurtenance.

PIPE INSTALLATION

(9-28-12) (Rev 8-3-15)

300

DB3 R01

Revise the 2012 *Standard Specifications for Roads and Structures* as follows:

Page 3-1, Article 300-2, Materials, line 15, in the materials table, replace “Flowable Fill” and “Geotextiles” with the following:

Item	Section
Flowable Fill, Excavatable	1000-6
Grout, Type 2	1003
Geotextiles, Type 4	1056

Page 3-1, Article 300-2, Materials, line 23-24, replace sentence with the following:

Provide foundation conditioning geotextile, and geotextile to wrap pipe joints, in accordance with Section 1056 for Type 4 geotextile.

Page 3-3, Subarticle 300-6(A), Rigid Pipe, line 2, in the first paragraph, replace “an approved non-shrink grout” with “grout” and **line 4**, in the second paragraph, replace “filtration geotextile” with “geotextile”

Page 3-3, Article 300-7, Backfilling, lines 37-38, in the first and second sentences of the fifth paragraph, replace “Excavatable flowable fill” with “Flowable fill”.

DRAINAGE PIPE

(9-1-11)

DB3 R36

Description

Where shown in the plans developed by the Design-Build Team, the Contractor shall use Reinforced Concrete Pipe, Corrugated Aluminum Alloy Pipe, Aluminized Corrugated Steel Pipe, Corrugated Polyethylene Pipe (HDPE Pipe) or Polyvinyl-Chloride Pipe (PVC Pipe) in accordance with the following requirements:

- All pipe types are subject to the maximum and minimum fill height requirements as found on Roadway Standard Drawing 300.01 - Sheet 3 of 3. The appropriate Reinforced

Concrete Pipe class and the appropriate gage thickness for Corrugated Aluminum Alloy Pipe and Aluminized Corrugated Steel Pipe shall be selected based on fill height.

- Site specific conditions may limit a particular material beyond what is identified in this Special Provision. These conditions include, but are not limited to, abrasion, environmental, soil resistivity and pH, high ground water and special loading conditions. The Design-Build Team shall determine if additional restrictions are necessary.
- Slope drains shall be Corrugated Aluminum Alloy Pipe, Aluminized Corrugated Steel Pipe, Corrugated Polyethylene Pipe (HDPE Pipe) or Polyvinyl-Chloride Pipe (PVC Pipe).
- Transverse median drains, storm drainage system pipes, and open-ended cross drains shall be Reinforced Concrete Pipe unless the pipe slope is greater than 10%, in which case the pipe shall be either Corrugated Aluminum Alloy Pipe or Aluminized Corrugated Steel Pipe.

CEMENT AND LIME STABILIZATION OF SUB-GRADE SOILS

(5-20-13)

DB5 R21

General

The Design-Build Team shall be responsible for the following:

1. Performing all laboratory tests in a laboratory certified by the AMRL / NCDOT Laboratory Proficiency Program
2. Sampling Sub-grade soils
3. Conducting Laboratory tests to determine:
 - a. Soil classifications
 - b. Moisture-density relationships
 - c. Quantity of lime or cement required to achieve specified strengths
4. Designating areas to be stabilized by either lime or cement and the required rates of application
5. Conducting field tests to determine unconfined compressive strength

Sampling

The Design-Build Team shall take soil samples, after the project has been graded to within two inches of final sub-grade elevation. The Design-Build Team shall sample the top eight inches at a minimum frequency of one sample per 1,000 feet, per each lane, for classification tests; and one sample per 3,000 feet, per each lane, for moisture density tests and lime or cement mix design tests. For the aforementioned tests, a lane shall be considered 28 feet wide in one direction for sampling purposes. Additional samples shall be taken to ensure that all the predominant soil types, limits of distribution of these soils and different site conditions have been represented.

Classification Tests

The Design-Build Team shall perform the following tests to determine AASHTO classifications of different soils in accordance with AASHTO specifications as modified by NCDOT. Copies of these modified procedures can be obtained from Materials and Test Unit's Soils Laboratory.

TABLE 1

<u>TEST</u>	<u>AASHTO DESIGNATION</u>
Dry Preparation of Disturbed Soils	T-87
Particle Size Analysis of Soils	T-88
Determining the Liquid Limit of Soils	T-89
Determining the Plastic Limit and Plasticity Index of Soils	T-90

Moisture Density Test

Based on the criteria set in Table 2, below, the Design-Build Team shall perform the Moisture Density Tests, using either lime or cement. The Design-Build Team shall use 10% cement by weight in soil cement and 4% lime by weight, in soil-lime mixtures. The Design-Build Team shall conduct the tests in accordance with AASHTO T-99, and T-134 for soil-lime and soil-cement mixtures, respectively. In each case, The Design-Build Team shall determine the maximum dry density and optimum moisture content.

TABLE 2

<u>CRITERIA FOR SELECTING LIME OR CEMENT</u>		
PROPERTY	A	B
Percent passing #200 Sieve	35 Max	36 Min
Liquid Limit	40 Max	41 Min
Plasticity Index	10 Max	25 Min

The Design-Build Team shall use cement for all soils meeting criteria in Column A and lime for all soils meeting criteria in Column B. The Design-Build Team may choose either lime or cement for all soils not meeting all criteria in either Column A or B.

DETERMINING THE APPLICATION RATES FOR SOIL-CEMENT AND SOIL-LIME MIXTURES**Soil-Cement Mixtures**

For soil-cement mixtures, the Design-Build Team shall be required to do the following:

- Make specimens at optimum moisture content using a quantity of cement in the range of 5 to 12 percent by weight.
- Compact the specimens to a minimum density of 95% of maximum dry density obtained using AASHTO T 134.
- Make a minimum of two specimens for each selected cement rate.
- Cure the specimens for seven days in a moist room maintained at a temperature of 73° F $\pm 2.7^\circ$ and a humidity of 100%. At the end of the curing period, immerse the specimens in water for four hours.
- After immersion, test the specimens in unconfined compression in accordance with ASTM D 1633.
- Report the maximum strength obtained and the corresponding percent strain.
- Select the rate of cement that provides a minimum unconfined compressive strength of 200 psi and a maximum of 400 psi.

Soil-Lime Mixtures

For soil-lime mixtures, the Design-Build Team shall be required to do the following:

- Make specimens at optimum moisture content using a quantity of lime in the range of 3.5 to 6.5 percent by weight.
- Compact specimens to a minimum density of 95% of maximum dry density obtained by AASHTO T99.
- Make a minimum of two specimens for each selected lime rate.
- Cure the specimens in sealed plastic bags for 48 hours in an oven at a temperature of 118° F. Do not immerse the specimens in water at the end of the curing period.
- Test the specimens in unconfined compression in accordance with AASHTO T 208. Report the maximum strength obtained and the corresponding percent strain.
- Select the rate of lime that provides a minimum unconfined compressive strength of 60 psi.

Submittals for Review and Approval Prior to Construction

The Design-Build Team shall adhere to the following submittal guidelines:

- Submit all laboratory test results for review.
- Submit a sketch in plan view showing areas of the project to be stabilized by either lime or cement and application rates for each stabilizer.
- Submit any other documentation that supports the Design-Build Team's recommendations.

Construction of Lime Treated Subgrade

The Design-Build Team shall construct the lime treated sub-grade as specified in Section 501 of the North Carolina Department of Transportation 2012 *Standard Specifications for Roads and Structures* with the following exceptions:

Subsection 501-4 Equipment

Contractor's equipment will not require engineer's approval.

Subsection 501-8 (A) General

Paragraph #1 is not applicable to this project.

Subsection 501-9 (B) Preliminary Curing

Amend as follows: Allow a minimum of two days and a maximum of four days for preliminary curing.

Subsection 501-10 Compacting, Shaping, and Finishing

Last paragraph is not applicable.

Subsection 501-11 Thickness

Last two paragraphs are not applicable.

Construction of Cement Treated Subgrade

The Design-Build Team shall construct the soil cement sub-grade as specified in Section 542 of the 2012 *Standard Specifications for Roads and Structures*, with the following exceptions:

Subsection 542-4 Equipment

Contractor's equipment will not require Engineer's approval.

Subsection 542-7 Application of Cement

First paragraph is not applicable.

Subsection 542-11 Thickness

Paragraphs 2 and 3 are not applicable.

Unconfined Compressive Strength

The lime-stabilized subgrades shall be tested using Dynamic Cone Penetrometer (DCP) and/or by making field specimens. DCP testing shall be in accordance with *Quality Assurance Testing of Lime-Treated Soils Utilizing the Dynamic Cone Penetrometer*, Test Method #1-2005. The Design-Build Team shall adhere to the testing equipment requirements and procedures as outlined in *Dynamic Cone Penetrometer Testing for Subgrade Stability* except that the minimum penetration depth shall be eight inches. Upon request, a copy of the aforementioned documents can be obtained from the NCDOT Geotechnical Engineering Unit. The required unconfined compressive strength for lime shall be 60 psi, which corresponds to a penetration per blow of approximately 0.5 inches of the Dynamic Cone Penetrometer. If field specimens are made, cure them for seven days and test them in the laboratory. The minimum required unconfined compressive strength for lime-stabilized subgrade shall be 60 psi.

For cement-stabilized subgrades, the Design-Build Team shall make field specimens, cure them for seven days and test them in the laboratory. The minimum and maximum required unconfined compressive strength for soil cement shall be 200 psi and 400 psi, respectively.

For both lime and cement stabilized subgrades, one test shall be required for every 400 feet per lane width at random locations selected using random number tables.

Submittals for Review During Construction

The Design-Build Team shall submit the unconfined compressive strength and dynamic cone penetrometer test results for review and acceptance.

PRICE ADJUSTMENTS FOR ASPHALT BINDER

(9-1-11)

DB6 R25

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

When it is determined that the monthly selling price of asphalt binder on the first business day of the calendar month during which the last day of the partial payment period occurs varies either upward or downward from the Base Price Index, the partial payment for that period will be adjusted. The partial payment will be adjusted by adding the difference (+ or -) of the base price index subtracted from the monthly selling price multiplied by the total theoretical quantity of asphalt binder authorized for use in the plant mix placed during the partial payment period involved.

The base price index for asphalt binder for plant mix is **\$349.29 per ton**.

This base price index represents an average of F.O.B. selling prices of asphalt binder at supplier's terminals on **July 1, 2016**.

PRICE ADJUSTMENTS - ASPHALT CONCRETE PLANT MIX

(9-1-11) (Rev. 3-13-13)

DB6 R26

Revise the 2012 *Standard Specifications for Roads and Structures* as follows:

Page 6-18, Article 609-11 and Page 6-35, Article 610-14

Add the following paragraph before the first paragraph:

The “Asphalt Price” used to calculate any price adjustments set forth in this section shall be \$40.00 per theoretical ton. This price shall apply for all mix types.

FIELD OFFICE

(6-1-07) (Rev. 8-3-15)

DB 08-01

Description

This work consists of furnishing, erecting, equipping, and maintaining a field office for the exclusive use of Department Engineers and Inspectors at a location on the project approved by the Engineer. Provide a field office that complies with the current A.D.A. Design and Accessibility Standards, the National Electric Code, local, state, and federal regulations, and the following:

Procedures

The field office and equipment shall remain the property of the Design-Build Team upon completion of the contract. The field office must be separated from buildings and trailers used by the Design-Build Team and shall be erected and functional as an initial operation. Failure to have the field office functional when work first begins on the project will result in withholding payment of the Design-Build Team's monthly progress estimate. The field office must be operational throughout the duration of the project and be removed upon completion and final acceptance of the project.

Provide a field office that is weatherproof, tightly floored and roofed, constructed with an air space above the ceiling for ventilation, supported above the ground, has a width of at least ten feet, and the floor-to-ceiling height that is at least 7 feet 6 inches. Provide inside walls and a ceiling that are constructed of plywood, fiber board, gypsum board, or other suitable materials. Have the exterior walls, ceiling, and floor insulated.

Provide a field office with a minimum floor space of 500 square feet and that is equipped with the following:

<u>Number</u>	<u>Item</u>
1	Double-pedestal desk (approximately 60 by 34 inches, at least 2,000 square inches)
1	Plan and drafting table (approximately 30 by 96 inches) with adjustable stool
1	Computer table having a minimum size of 48 by 30 by 29 inches
1	Plan rack for 24 by 36 inch drawings with 6 plan clamps
1	Printing calculator
2	2-drawer fire protection file, 15 inch drawer width, minimum UL rating of Class 350
6	Office chairs with a minimum of two having casters
2	Wastebaskets
1	Pencil sharpener
1	Copy machine (8 inch x 11 inch copies)
1	Telephone
1	Fax Machine
1	Answering machine
1	Internet Connection Service (modem for Wi-Fi)

Windows and Doors

Provide a field office with at least three windows, with blinds, each having an area of at least 540 square inches, capable of being easily opened and secured from the inside and having at least two exterior passage doors. Provide doors at least 30 inches in width and 78 inches in height. Provide screens for windows and doors. Equip exterior passage door(s) with lock(s), and furnish at least two keys to the Engineer or inspector.

Steps

Provide accessibility in compliance with the current A. D. A. Design and Accessibility Standards, and the State Building Code and maintain them free from obstructions.

Storage Facility For Nuclear Gage

Furnish the field office with an outside storage facility for the Department's nuclear gage. The storage facility shall not be located within 10 feet of any other structure including the field office.

Lighting, Heating, and Air Conditioning

The field office must have satisfactory lighting, electrical outlets, heating equipment, an exhaust fan, and an air conditioner connected to an operational power source. Provide at least one of the light fixtures that shall be a fluorescent light situated over the plan and drafting table. Furnish electrical current and fuel for heating equipment.

Fire Extinguishers

Furnish and maintain one fire extinguisher for each required exterior passage door. Fire extinguisher(s) may be chemical or dry powder. UL Classification 10-B:C (minimum), suitable for Type A:B:C: fires. Mount and maintain fire extinguisher(s) in accordance with OSHA Safety and Health Standards.

Toilets

Provide a toilet conforming to the requirements of the state and local boards of health or other bodies or courts having jurisdiction in the area. When separate facilities for men and women are not available, place a sign with the words "Rest Room" (with letters at least 1 inch in height) over the doorway, and provide an adequate positive locking system on the inside of the doorway. Maintain responsibility for the water and sewer connections or the installation and connection of a water well and septic tank and drain field. These facilities must conform to all local and state permits.

Utilities

Except for telephone service, make arrangement for necessary internet and utility connections, maintain internet and utilities, pay internet and utility service fees and bills, and make arrangements for final disconnection of internet and utilities. Furnish a telephone in each field office and permit the work necessary to install it. Installation and service fees for the telephone will be paid for by the Department.

Storage Facility for Test Equipment

Provide the field office with a storage facility, separate from the office for storage of test equipment, other than the nuclear gage. Provide a facility that has a minimum floor space of 64 square feet, is weatherproof, tightly floored and roofed, and has a tamper resistant key operated lock.

Miscellaneous Items

The field office must also include the following:

1. A certification that the office is free of asbestos and other hazardous materials.
2. A broom, dust pan, mop and bucket, and general cleaning supplies.
3. Provide and maintain an all-weather parking area for six vehicles, including graveled access to the paved surface.

DYNAMIC MESSAGE SIGN (DMS)

(8-12-15)

DB 08-04

I. GENERAL REQUIREMENTS

DMSs used on the State Highway System shall be preapproved on the current NCDOT ITS & Signals 2012 Qualified Products List (QPL) by the date of installation. DMSs not preapproved will not be allowed for use on the project. To ensure compatibility with the existing DMS Control Software deployed in the State, furnish NTCIP compliant DMSs that are fully compatible with Daktronics, Inc. Vanguard Version 4 software (also referred to hereinafter as the "Control Software"). The QPL is available on the Department's website. The QPL website is:

<https://connect.ncdot.gov/resources/safety/Pages/ITS-and-Signals-Qualified-Products.aspx>

II. DMS REQUIREMENTS

Furnish and install DMSs compliant with UL standards 48, 50, and 879.

Add and configure the new DMSs in the system using the Control Software and computer system. Furnish, install, test, integrate and make fully operational the new DMSs at locations shown in the plans developed by the Design-Build Team.

Furnish operating DMS systems consisting of, but not limited to, the following:

- Full Matrix, 66 mm, 27 pixel high and 60 pixels wide LED DMS, 12" border
- Front Access, 8' x 15'
- DMS mounting hardware
- DMS controllers, Uninterruptible Power Supplies (UPS), cabinets and accessories with interconnect and power cabling and conduit
- Branch circuit conductors and related equipment
- All other equipment and incidentals required for furnishing, installing and testing the DMS system and system components

Use only UL listed and approved electronic and electrical components in the DMS system.

III. MATERIALS**A. Environmental Requirements**

Construct the DMS and DMS controller-cabinet so the equipment within shall be protected against moisture, dust, corrosion and vandalism.

Design the DMS system to comply with the requirements of Section 2.1 (Environmental and Operating Standards) of NEMA TS 4-2005.

B. Full Matrix LED Dynamic Message Sign (DMS)

Construct the DMS to display at least three lines of text that, when installed, are clearly visible and legible to a person with 20 / 20 corrected vision from a distance of 900 feet in advance of the DMS at an eye height of 3.5 feet along the axis.

When displaying three lines, each line must display at least 10 equally spaced and equally sized alphanumeric individual characters. Each character must be at least 18 inches in height and composed from a luminous dot matrix. Provide an entire LED matrix that is a minimum of 27 pixels high and 60 pixels wide.

1. DMS Enclosure

The DMS enclosure construction shall comply with the requirements of Section 3 (Sign Mechanical Construction) of NEMA TS 4-2005. The following requirements complement TS 4-2005:

- Perform all welding of aluminum and aluminum alloys in accordance with the latest edition of AWS D1.2, Structural Welding Code - Aluminum. Continuously weld the seams using Gas Metal Arc Welding (GMAW).
- Provide all exterior and interior DMS housing surfaces with natural, mill-finish aluminum. Remove all grind marks and discoloration from the surfaces.
- Provide corrosion resistant nuts, bolts, washers, and other mounting and bonding parts and components used on the exterior of the DMS housing and ensure they are sealed against water intrusion.
- Provide one front access door for each 10 - 15 pixel wide section of the sign housing. Vertically hinge the doors and design to swing out from the face to provide access to the enclosure interior. Extend each door the full height of the display matrix. Provide a retaining latch mechanism for each door to hold the door open at a 90-degree angle. Each door shall form the face panel for a section of the sign. Mount the LED modules to the door such that they can be removed from the door when in the open position. Other sign components can be located inside the sign enclosure and be accessible through the door opening. Provide for each door a minimum of two (2) screw-type captive latches to lock them in the closed position and pull the door tight and compress a gasket located around the perimeter of each door. Install the gasket around the doors to prevent water from entering the cabinet.
- Furnish the sign face, excluding the front panel, with a flat black, UV treated, colorfast material. Prepare all surfaces for application according to the sheeting manufacturer's recommendations prior to

applying the sheeting. Furnish DMS with UV treated, colorfast border with a minimum width of 12 inches.

- Do not place a manufacturer name, logo, or other information on the front face of the DMS or shield visible to the motorist.
- Provide power supply monitoring circuitry to detect power failure in the DMS and to automatically report this fault to the Control Software. This requirement shall be in addition to reporting power failure at the controller cabinet.
- Do not paint the stainless steel bolts on the Z-bar assemblies used for mounting the enclosure.

2. DMS Interior Environment Control

Install a minimum of one (1) temperature sensor that shall be mounted near the top of the DMS interior. The sensor(s) shall measure the temperature of the air in the enclosure over a minimum range of -40° F to +176° F. Ensure the DMS controller continuously monitors the internal temperature sensor output and report to the DMS control software upon request.

Design the DMS with systems for enclosure ventilation, face panel fog and frost prevention, and safe over-temperature shutdown.

Design the DMS ventilation system to be thermostatically controlled and to keep the internal DMS air temperature lower than +140° F, when the outdoor ambient temperature is +115° F or less.

The ventilation system shall consist of two or more air intake ports located near the bottom of the DMS rear wall. Cover each intake port with a filter that removes airborne particles measuring 500 microns in diameter and larger. Mount one or more ball bearing-type fans at each intake port. These fans shall positively pressure the DMS enclosure.

Design the fans and air filters to be removable and replaceable from inside the DMS housing. To ease serviceability, mount the fans no more than four (4) feet from the floor of the DMS enclosure.

Provide each ventilation fan with a sensor to monitor its rotational speed, measured in revolutions per minute and report this speed to the sign controller upon request.

The ventilation system shall move air across the rear of the LED modules in a manner such that heat is dissipated from the LEDs. Design the airflow system to move air from the bottom of the enclosure towards the top to work with natural convection to move heat away from the modules.

Install each exhaust port near the top of the rear DMS wall. Provide one exhaust port for each air intake port. Screen all exhaust port openings to prevent the entrance of insects and small animals.

Cover each air intake and exhaust port with an aluminum hood attached to the rear wall of the DMS. Thoroughly seal all intakes and exhaust hoods to prevent water from entering the DMS.

Provide a thermostat near the top of the DMS interior to control the activation of the ventilation system.

The DMS shall automatically shut down the LED modules to prevent damaging the LEDs if the measured internal enclosure air temperature exceeds a maximum threshold temperature. The threshold temperature shall be configurable and shall have a default factory setting of 140° F.

3. Front Panel

Protect the DMS face with contiguous, weather-tight, removable panels. These panels shall be a polycarbonate material that are ultraviolet protected, have an antireflection coating, and are a minimum of 1/8- inch thick.

Furnish polycarbonate panels with the following characteristics:

- Tensile Strength, Ultimate: 10,000 PSI
- Tensile Strength, Yield: 9,300 PSI
- Tensile Strain at Break: 125%
- Tensile Modulus: 330,000 PSI
- Flexural Modulus: 330,000 PSI
- Impact Strength, Izod (1/8", notched): 17 ft-lbs/inch of notch
- Rockwell Hardness: M75, R118
- Heat Deflection Temperature Under Load: 264 PSI at 270° F and 66 PSI at 288° F
- Coefficient of Thermal Expansion: 3.9×10^{-5} in/in/F
- Specific Heat: 0.30 BTU/lb/F
- Initial Light Transmittance: 85% minimum
- Change in Light Transmittance, 3 years exposure in a Southern latitude: 3%
- Change in Yellowness Index, 3 years exposure in a Southern latitude: less than 5%

For substitutes, submit one 12" x 12" sample of the proposed material together with a description of the material attributes to the Engineer for review and approval. Install a .09" aluminum mask on the front of the panel (facing the motorists) that contains a circular opening for each LED pixel. Prime and coat the front side of the aluminum mask, which faces the viewing motorists, with automotive-grade flat black acrylic enamel paint or an approved equivalent.

Guarantee all painted surfaces provide a minimum outdoor service life of 20 years.

Design the panels so they will not warp nor reduce the legibility of the characters. Differential expansion of the DMS housing and the front panel must not cause damage to any DMS component or allow openings for moisture or dust. Glare from sunlight, roadway lighting, commercial lighting, or vehicle headlights must not reduce the legibility or visibility of the DMS. Install the panels so that a maintenance person can easily remove or open them for cleaning.

4. Display Modules

Manufacture each display module with a standard number of pixels, not to exceed an array of 9 x 5, which can be easily removed. Assemble the modules onto the DMS assemblies contiguously to form a continuous matrix to display the required number of lines, characters, and character height.

Design display modules that are interchangeable and replaceable without using special tools. Provide plug-in type power and communication cables to connect to a display module.

Construct each display module as a rectangular array of 5 horizontal pixels by 7 to 9 vertical pixels. Provide the module with an equal vertical and horizontal pitch between pixels, and columns that are perpendicular to the rows (i.e., no slant). Design each module to display:

- All upper and lower case letters
- All punctuation marks
- All numerals 0 to 9
- Special user-created characters

Display upper-case letters and numerals over the complete height of the module. Optimize the LED grouping and mounting angle within a pixel for maximum readability.

Furnish two (2) spare display modules per each DMS installed for emergency restoration.

5. Discrete LEDs

Provide discrete LEDs with a nominal viewing cone of **30 degrees** with a half-power angle of 15 degrees measured from the longitudinal axis of the LED. Viewing cone tolerances shall be as specified in the LED manufacturer's product specifications and shall not exceed +/- 3 degrees half-power viewing angle of 30 degrees.

Provide LEDs that are untinted, non-diffused, high output solid state lamps utilizing indium gallium aluminum phosphide (InGaAlP) technology. Provide T1 $\frac{3}{4}$, 0.2 inch size LEDs that emit a true amber color at a wavelength of 590 ± 5 nm.

Provide LEDs with a MTBF (Mean Time Before Failure) of at least 100,000 hours of permanent use at an operating point of 140° F or below at a specific forward current of 20mA. Discrete LED failure shall be defined as the point at which the LED's luminous intensity has degraded to 50% or less of its original level.

Obtain the LEDs used in the display from a single LED manufacturer that have a single part number. Obtain them from batches sorted for luminous output, where the highest luminosity LED is not more than fifty percent more luminous than the lowest luminosity LED when the LEDs are driven at the same forward current. Do not use more than two successive and overlapping batches in the LED display. Document the procedure to be used to comply with this requirement as part of the material submittal.

Individually mount the LEDs on circuit boards that are at least 1/16" thick FR-4 fiberglass, flat black printed circuit board in a manner that promotes cooling. Protect all exposed metal on both sides of the LED pixel board (except the power connector) from water and humidity exposure by a thorough application of acrylic conformal coating. Design the boards so bench level repairs to individual pixels, including discrete LED replacement and conformal coating repair is possible.

Operate the LED display at a low internal DC voltage not to exceed 24 Volts.

Design the LED display operating range to be -20° F to $+140^{\circ}$ F at 95% relative humidity, non-condensing.

Supply the LED manufacturer's technical specification sheet with the material submittals.

6. LED Power Supplies

Power the LED Display by means of multiple regulated switching DC power supplies that operate from 120 volts AC input power and have an output of 48 volts DC or less. Wire the supplies in a redundant parallel configuration that uses multiple power supplies per display. Provide the supplies with current sharing capability that allows equal amounts of current to their portion of the LED display. Provide power supplies rated such that if one supply fails the remaining supplies will be able to operate their portion of the display under full load conditions (i.e. all pixels on at maximum brightness) and at a temperature of 140° F.

Provide power supplies to operate within a minimum input voltage range of +90 to +135 volts AC and within a temperature range of -22° F to 140° F. Power

supply output at 140° F must not deteriorate to less than 65% of its specified output at 70° F. Provide power supplies that are overload protected by means of circuit breakers, that have an efficiency rating of at least 75%, a power factor rating of at least .95, and are UL listed. Provide all power supplies from the same manufacturer and with the same model number. Design the power driver circuitry to minimize power consumption.

Design the field controller to monitor the operational status (normal or failed) of each individual power supply and be able to display this information on the Client Computer screen.

7. LED Pixels

A pixel shall be defined as the smallest programmable portion of a display module that consists of a cluster of closely spaced discrete LEDs. Design each pixel to be a maximum of 2 inches in diameter.

Construct the pixels with two strings of LEDs. It is the manufacturer's responsibility to determine the number of LEDs in each string to produce the candela requirement as stated herein.

Ensure each pixel produces a luminous intensity of 40 Cd when driven with an LED drive current of 20 mA per string.

Power the LEDs in each pixel in strings. Use a redundant design so that the failure of an LED in one string does not affect the operation of any other string within the pixel. Provide the sign controller with the ability to detect the failure of any LED string and identify which LED string has failed. Submit a complete schematic of the LED power and driver circuits with the material submittals.

8. Character Display

Design display modules to be easily removable without the use of tools. Position cooling fans so they do not prevent removal of an LED pixel board or driver board.

Use continuous current to drive the LEDs at the maximum brightness level. Design the light levels to be adjustable for each DMS / controller so the Engineer may set levels to match the luminance requirements at each installation site.

Design the controller to automatically detect failed LED strings or drivers and initiate a report of the event to the Control Software. Design the controller to be able to read the internal temperature of the DMS enclosure and the ambient temperature outside the DMS enclosure and report these to the Control Software.

9. Display Capabilities

Design the DMS with at least the following message displays:

- Static display
- Flashing display with Dynamic flash rates
- At least two alternating Static and / or Flashing sequences (multi-page messages)

10. DMS Mini Controller

Furnish and install a mini controller inside the DMS that is interconnected with the main controller using a fiber optic cable, CAT-5 cable, or an approved alternate. The mini controller will enable a technician to perform all functions available from the main controller. Provide the mini controller with an LCD / keypad interface. Size the LCD display screen to allow preview of an entire one-page message on one screen. Provide a 4 X 4 keypad.

Alternatively, install an EIA/TIA-232E port inside the DMS enclosure to enable a maintenance technician to communicate with the DMS main controller and obtain access to and perform all functions of the main controller using a laptop computer.

C. DMS Enclosure Structure Mounting

Mount the DMS enclosure and interconnect system securely to the support structures. Design the DMS enclosure supports and structure to allow full access to the DMS inspection panels.

Furnish and install U-bolt connections of hanger beams to overhead assembly truss chords with a double nut at each end of the U-bolt. Bring the double nuts tight against each other by the use of two wrenches.

Submit plans for the DMS enclosure, mounting description and calculations to the Engineer for approval. Have such calculations and drawings approved by a Professional Engineer registered in the state of North Carolina, and bear his signature, seal and date of acceptance.

Provide removable lifting eyes or the equivalent on the DMS enclosure rated for its total weight to facilitate handling and mounting the DMS enclosure.

Design the DMS structure to conform to the applicable requirements of the 2009 AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals*, 5th Edition, and the 2010 and 2011 Interim Revisions, and the section titled *DMS Structure* of this Project Special Provision.

D. DMS / DMS Controller Interconnect

Furnish and install all necessary cabling, conduit, and terminal blocks to connect the DMS and the DMS controller. Use approved manufacturer's specifications and the plans developed by the Design-Build Team for cable and conduit types and sizes. Use fiber optic cable to interconnect sign and controller. Install fiber optic interconnect centers in

the sign enclosure and cabinet to securely install and terminate the fiber optic cable. Submit material submittal cut sheets for the interconnect center.

E. DMS Controller and Cabinet

Furnish and install one DMS controller with accessories per DMS in a new equipment cabinet. Mount the controller cabinet on the DMS support structure. Install cabinet so that the height from the ground to the middle of the cabinet is four feet. Ensure a minimum of three-foot level working surface under each cabinet that provides maintenance technicians with a safe working environment.

Provide the DMS controller as a software oriented microprocessor and with resident software stored in non-volatile memory. The Control Software, controller and communications must comply with the NTCIP Standards identified in these Project Special Provisions. Provide sufficient non-volatile memory to allow storage of at least 500 multi-page messages and a test pattern program.

Furnish the controller cabinet with, but not limited to, the following:

- Power supply and distribution assemblies
- Power line filtering hybrid surge protectors
- Radio Interference Suppressor
- Communications surge protection devices
- Industrial-Grade UPS system and local disconnect
- Microprocessor-based controller
- Display driver and control system (unless integral to the DMS)
- Serial interface port for local laptop computer
- Local user interface
- Interior lighting and duplex receptacle
- Adjustable shelves as required for components
- Temperature control system
- All interconnect harnesses, connectors, and terminal blocks
- All necessary installation and mounting hardware

Furnish the DMS controller and associated equipment completely housed in a NEMA 3R cabinet made from 5052 H32 sheet aluminum at least 1/8" thick. Use natural aluminum cabinets. Perform all welding of aluminum and aluminum alloys in accordance with the latest edition of AWS D1.2, Structural Welding Code - Aluminum. Continuously weld the seams using Gas Metal Arc Welding (GMAW).

Slant the cabinet roof away from the front of the cabinet to prevent water from collecting on it.

Do not place a manufacturer name, logo or other information on the faces of the controller cabinet visible to the motorist.

Provide cabinets capable of housing the components and sized to fit space requirement. Design the cabinet layout for ease of maintenance and operation, with all components easily accessible. Submit a cabinet layout plan for approval by the Engineer.

Locate louvered vents with filters in the cabinet to direct airflow over the controller and auxiliary equipment, and in a manner that prevents rain from entering the cabinet. Fit the inside of the cabinet, directly behind the vents, with a replaceable, standard size, commercially available air filter of sufficient size to cover the entire vented area.

Provide a torsionally rigid door with a continuous stainless steel hinge on the side that permits complete access to the cabinet interior. Provide a gasket as a permanent and weather resistant seal at the cabinet door and at the edges of the fan / exhaust openings. Use a non-absorbent gasket material that will maintain its resiliency after long term exposure to the outdoor environment. Construct the doors so that they fit firmly and evenly against the gasket material when closed. Provide the cabinet door with louvered vents and air filters near the bottom as described in the paragraph above.

The cabinet shall contain a full-height standard EIA 19-inch rack. The rack shall be secured within the cabinet by mounts at the top and bottom.

The rack shall contain a minimum of one (1) pullout drawer. The drawer shall be suitable for storing manuals and small tools, such as screwdrivers. The drawer shall be able to latch in the out position to function as a laptop / utility shelf.

Provide a convenient location on the inside of the door to store the cabinet wiring diagrams and other related cabinet drawings. Provide a Corbin #2 main door lock made of non-ferrous or stainless steel material. Key all locks on the project alike, and provide 10 keys to the Engineer. In addition, design the handle to permit pad-locking.

Provide the interior of the cabinet with ample space for housing the controller and all associated equipment and wiring; use no more than 75% of the useable space in the cabinet. Provide ample space in the bottom of the cabinet for the entrance and exit of all power, communications, and grounding conductors and conduit.

Arrange the equipment so as to permit easy installation of the cabling through the conduit so that they will not interfere with the operation, inspection, or maintenance of the unit. Provide adjustable metal shelves, brackets, or other support for the controller unit and auxiliary equipment. Leave a three-inch minimum clearance from the bottom of the cabinet to all equipment, terminals, and bus bars.

Provide power supply monitoring circuitry to detect power failure and to automatically report the occurrence to the Control Software.

Install two 15 watt fluorescent light strips with shields, one in the top of the cabinet and the other under the bottom shelf. Design both lights to automatically turn on when the cabinet door is opened and turn off when the door closes.

Mount and wire a 120V (+10%) GFCI duplex receptacle of the 3-wire grounding type in the cabinet in a location that presents no electrical hazard when used by service personnel for the operation of power tools and work lights.

No cabinet resident equipment shall utilize the GFCI receptacle. Furnish one spare non-GFCI receptacle for future equipment.

Mount a bug-proof and weatherproof thermostatically controlled fan and safety shield in the top of the cabinet. Size the fan to provide at least for two air exchanges per minute. Fuse the fan at 125% of the capacity of the motor. The magnetic field of the fan motor must not affect the performance of the control equipment. Use a fan thermostat that is manually adjustable to turn on between 80° F and 160° F with a differential of not more than 10°F between automatic turn-on and turn-off. Mount it in an easily accessible location, but not within 6 inches of the fan.

Install additional fans and / or heaters as needed to maintain the temperature inside the cabinet within the operating temperature range of the equipment within the cabinet as recommended by equipment manufacturer(s).

1. Wiring

The requirements stated herein apply wherever electrical wiring is needed for any DMS system assemblies and subassemblies such as controller cabinet, DMS enclosure, electrical panel boards and etc.

Neatly arrange and secure the wiring inside the cabinet. Where cable wires are clamped to the walls of the control cabinet, provide clamps made of nylon, metal, plastic with rubber or neoprene protectors, or similar. Lace and jacket all harnesses, or tie them with nylon tie wraps spaced at 6 inches maximum to prevent separation of the individual conductors.

Individually and uniquely label all conductors. Ensure all conductor labels are clearly visible without moving the conductor. Connect all terminal conductors to the terminal strip in right angles. Remove excess conductor before termination of the conductor. Mold the conductor in such a fashion as to retain its relative position to the terminal strip if removed from the strip. Do not run a conductor across a work surface with the exception of connecting to that work surface. No conductor bundles can be supported by fasteners that support work surfaces. Install all connectors, devices and conductors in accordance to manufactures guidelines. Comply with the latest NEC guideline in effect during installation. No conductor or conductor bundle may hang loose or create a snag hazard. Protect all conductors from damage. Ensure all solder joints are completed using industry accepted practices and will not fail due to vibration or movement. Protect lamps and control boards from damage.

No splicing will be allowed for feeder conductors and communication cables from the equipment cabinet to the DMS enclosure.

Insulate all conductors and live terminals so they are not hazardous to maintenance personnel.

Route and bundle all wiring containing line voltage AC and / or shield it from all low voltage control circuits. Install safety covers to prevent accidental contact with all live AC terminals located inside the cabinet.

Use industry standard, keyed-type connectors with a retaining feature for connections to the controller.

Label all equipment and equipment controls clearly.

Supply each cabinet with one complete set of wiring diagrams that identify the color-coding or wire tagging used in all connections. Furnish a water-resistant packet adequate for storing wiring diagrams, operating instructions, and maintenance manuals with each cabinet.

2. Power Supply and Circuit Protection

Design the DMS and controller for use on a system with a line voltage of $120V \pm 10\%$ at a frequency of $60 \text{ Hz} \pm 3 \text{ Hz}$. Under normal operation, do not allow the voltage drop between no load and full load of the DMS and its controller to exceed 3% of the nominal voltage.

Blackout, brownout, line noise, chronic over-voltage, sag, spike, surge, and transient effects are considered typical AC voltage defects. Protect the DMS system equipment so that these defects do not damage the DMS equipment or interrupt their operation. Equip all cabinets with devices to protect the equipment in the cabinet from damage due to lightning and external circuit power and current surges.

3. Circuit Breakers

Protect the DMS controller, accessories, and cabinet utilities with thermal magnetic circuit breakers. Provide the controller cabinet with a main circuit breaker sized according to the NEC. Use appropriately sized branch circuit breakers to protect the controller and accessories and for servicing DMS equipment and cabinet utilities.

4. Surge Suppressor

Install and clearly label filtering hybrid power line surge protectors on the load side of the branch circuit breakers in a manner that permits easy servicing. Ground and electrically bond the surge protector to the cabinet within 2 inches.

Provide power line surge protector that meets the following requirements:

Peak surge current occurrences	20 minimum
Peak surge current for an 8 x 20 microsecond wave-shape	50,000 amperes
Energy Absorption	> 500 Joules
Clamp voltage	240 volts
Response time	<1 nanosecond
Minimum current for filtered output	15 amperes for 120VAC *
Temperature range	-40° F to +158° F

*Capable of handling the continuous current to the equipment

5. Radio Interference Suppressor

Provide each controller cabinet with sufficient electrical and electronic noise suppression to enable all equipment in it to function properly. Provide one or more radio interference suppressors (RIS) connected between the stages of the power line surge suppressor that minimize interference generated in the cabinet in both the broadcast and the aircraft frequencies. Each RIS must provide a minimum attenuation of 50 decibels over a frequency range of 200 KHz to 75 MHz. Clearly label the suppressor(s) and size them at least at the rated current of the main circuit breaker but not less than 50 amperes.

Provide RIS that are hermetically sealed in a substantial metal case which is filled with a suitable insulating compound and have nickel-plated 10/24 brass stud terminals of sufficient external length to provide space to connect #8 AWG wires. Mount them so that the studs cannot be turned in the case. Properly insulate ungrounded terminals from each other, and maintain a surface linkage distance of not less than 1/4" between any exposed current conductor and any other metallic parts. The terminals must have an insulation factor of 100-200 MΩ, dependent on external circuit conditions. Use RIS designed for 120 VAC \pm 10%, 60Hz, and which meet the standards of UL and the Radio Manufacturers Association.

6. Communications Surge Protector

Equip the cabinet with properly labeled hybrid data line surge protectors that meet the following general requirements:

Surge current occurrences at 2000 ampere, 8 x 20 microsecond waveform	> 80
Surge current occurrences at 400 ampere, 10 x 700 microsecond waveform	> 80
Peak surge current for 8 x 20 microsecond waveform	10,000 A (2500 A/line)
Peak surge current for 10 x 700 microsecond waveform	500 A/line
Response time	< 1 nanosecond
Series resistance	< 15 Ω
Average capacitance	1500 pF
Temperature range	-10° F to 150° F
Clamp Voltage	As required to match equipment in application

7. Lightning Arrester

Protect the system with an UL-approved lightning arrester installed at the main service disconnect. It shall meet the following requirements:

Type of design	Silicon Oxide Varistor
Voltage	120 / 240 Single phase, 3 wires
Maximum current	100,000 amps
Maximum energy	3000 joules per pole
Maximum number of surges	Unlimited
Response time one milliamp test	5 nanoseconds
Response time to clamp 10,000 amps	10 nanoseconds
Response time to clamp 50,000 amps	25 nanoseconds
Leak current at double the rated voltage	None
Ground Wire	Separate

8. Uninterruptible Power Supply (UPS)

Provide the cabinet with an industrial grade power conditioning UPS unit to supply continuous power to operate the equipment connected to it if the primary

power fails. The UPS must detect a power failure and provide backup power within 20 milliseconds. Transition to the UPS source from primary power must not cause loss of data or damage to the equipment being supplied with backup power. Provide an UPS with at least three outlets for supplying conditioned AC voltage. Provide a unit to meet the following requirements:

- Input Voltage Range: 120VAC +12%, -25%
- Power Rating: 1000 VA, 700 Watts
- Input Frequency: 45 to 65 Hz
- Input Current: 7.2A
- Output Voltage: 120VAC +/- 3%
- Output Frequency: 50/60 +/-1 Hz
- Output Current: 8.3A
- Output Crest Factor Ratio: @50% Load Up to 4.8:1
@75% Load Up to 3.2:1
@100% Load Up to 2.4:1
- Output THD: 3% Max. (Linear)
5% Max. (Non-Linear)
- Output Overload: 110% for 10 min; 200% for 0.05 sec.
- Output Dynamic Response: +/- 4% for 100% Step Load Change
0.5 ms Recovery Time.
- Output Efficiency @ 100% Load: 90% (Normal Mode)
- Operating Temperature: -40° F to +165° F
- Humidity: 0% to 95% Non-condensing
- Remote Monitoring Interface: RS-232
- Protection: Input / Output Short Circuit
Input / Output Overload
Excessive Battery Discharge
- Specifications: UL1778, FCC Class A, IEEE 587

Provide the UPS unit capable of supplying 30 minutes of continuous backup power to the equipment connected to it when these equipment are operating at full load.

9. Controller Communications Interface

Provide the controller with the following interface ports:

- An EIA/TIA-232E port for remote communication using NTCIP
- An 10/100 Ethernet port for remote communication using NTCIP
- An EIA/TIA-232E port for onsite access using a laptop
- An EIA/TIA-232E auxiliary port for communication with a field device such as a UPS
- Fiber Optic ports for communication with the sign
- RJ45 ports for communication with the sign using CAT-5 cable
- RJ45 ports for communication with mini-controller located inside the sign enclosure

10. Controller Local User Interface

Provide the controller with a Local User Interface (LUI) for at least the following functions:

- On / Off Switch: controls power to the controller.
- Control Mode Switch: for setting the controller operation mode to either remote or local mode.
- LCD Display and Keypad: Allow user to navigate through the controller menu for configuration (display, communications parameter, etc.) running diagnostics, viewing peripherals status, message creation, message preview, message activation, and etc. Furnish a LCD display with a minimum size of 240 x 64 dots with LED back light.

11. Controller Address

Assign each DMS controller a unique address. Preface all commands from the Control Software with a particular DMS controller address. The DMS controller compares its address with the address transmitted; if the addresses match, then the controller processes the accompanying data.

12. Controller Functions

Design the DMS controller to continuously control and monitor the DMS independent of the Control Software. Design the controller to display a message on the sign sent by the Control Software, a message stored in the sign controller memory, or a message created on-site by an operator using the controller keypad.

Provide the DMS controller with a watchdog timer to detect controller failures and to reset the microprocessor, and with a battery backed-up clock to maintain an

accurate time and date reference. Set the clock through an external command from the Control Software or the Local User Interface.

13. DMS Controller Memory

Furnish each DMS controller with non-volatile memory. Use the non-volatile memory to store and reprogram at least one test pattern sequence and 500 messages containing a minimum of two pages of 45 characters per page. The Control Software can upload messages into and download messages from each controller's non-volatile memory remotely.

Messages uploaded and stored in the controller's non-volatile memory may be erased and edited using the Control Software and the controller. New messages may be uploaded to and stored in the controller's non-volatile memory using the Control Software and the controller.

14. Photo-Electric Sensors

Install three photoelectric sensors with ½-inch minimum diameter photosensitive lens inside the DMS enclosure. Use sensors that will operate normally despite continual exposure to direct sunlight. Place the sensors so they are accessible and field adjustable. Point one sensor north or bottom of the sign. Place the other two, one on the back wall and one on the front wall of the sign enclosure. Alternate designs may be accepted, provided the sensor assemblies are accessible and serviceable from inside the sign enclosure.

Provide controls so that the Engineer can field adjust the following:

- The light level emitted by the pixels elements in each Light Level Mode.
- The ambient light level at which each Light Level Mode is activated.

F. Equipment List

Provide a general description of all equipment and all information necessary to describe the basic use or function of the major system components. Include a general "block diagram" presentation. Include tabular charts listing auxiliary equipment, if any is required. Include the nomenclature, physical and electrical characteristics, and functions of the auxiliary equipment unless such information is contained in an associated manual; in this case include a reference to the location of the information. Include an itemized list of equipment costs.

Include a table itemizing the estimated average and maximum power consumption for each major piece of equipment.

G. Physical Description

Provide a detailed physical description of size, weight, center of gravity, special mounting requirements, electrical connections, and all other pertinent information necessary for proper installation and operation of the equipment.

H. Parts List

Provide a parts list that contains all information needed to describe the characteristics of the individual parts, as required for identification. Include a list of all equipment within a group and a list of all assemblies, sub-assemblies, and replacement parts of all units. Arrange this data in a table, in alpha-numerical order of the schematic reference symbols, which gives the associated description, manufacturer's name, and part number, as well as alternate manufacturers and part numbers. Provide a table of contents or other appropriate grouping to identify major components, assemblies, etc.

I. Character Set Submittal

Submit an engineering drawing of the DMS character set including 26 upper case and lower case letters, 10 numerals, an asterisk (*), a dash, a plus sign (+), a designated lane diamond, a slash, an ampersand, and arrows at 0, 45, 90, 135, 180, 225, 270, and 315 degrees.

J. Wiring Diagrams

Provide a wiring diagram for each DMS and each controller cabinet, as well as interconnection wiring diagrams for the system as a whole.

Provide complete and detailed schematic diagrams to component level for all DMS assemblies and subassemblies such as driver boards, control boards, DMS controller, power supplies, and etc. Ensure that each schematic enables an electronics technician to successfully identify any component on a board or assemblies and trace its incoming and outgoing signals.

K. Routine of Operation

Describe the operational routine, from necessary preparations for placing the equipment into operation to securing the equipment after operation. Show appropriate illustrations with the sequence of operations presented in tabular form wherever applicable. Include in this section a total list of the test instruments, aids and tools required to perform necessary measurements and measurement techniques for each component, as well as set-up, test, and calibration procedures.

L. Maintenance Procedures

Specify the recommended preventative maintenance procedures and checks at pre-operation, monthly, quarterly, semi-annual, annual, and "as required" periods to assure equipment operates reliably. List specifications (including tolerances) for all electrical, mechanical, and other applicable measurements and / or adjustments.

M. Repair Procedures

Include in this section all data and step-by-step procedures necessary to isolate and repair failures or malfunctions, assuming the maintenance technicians are capable of analytical reasoning using the information provided in the sections titled *Wiring Diagrams* and *Routine of Operation*.

Describe accuracy, limits, and tolerances for all electrical, physical, or other applicable measurements. Include instructions for disassemblies, overhaul, and re-assemblies, with shop specifications and performance requirements.

Give detailed instructions only where failure to follow special procedures would result in damage to equipment, improper operation, danger to operating or maintenance personnel, etc. Include such instructions and specifications only for maintenance that specialized technicians and engineers in a modern electromechanical shop would perform. Describe special test set-up, component fabrication, and the use of special tools, jigs, and test equipment.

N. Field Trial

At the request of the Engineer, supply a three character demonstration module with characters of the size and type specified for the project, an appropriate control device and power supply to allow character display within 30 working days of the request. Perform a field trial on this module at a time and location selected by the Engineer.

This trial will allow the Engineer or his selected representatives to test the readability of the DMS at the maximum distance required for specified character size. Test the module with the sun directly above the DMS, and near the horizon in front of and behind the DMS (washout and back-lit conditions).

O. Construction Methods**A. Description**

This article establishes practices and procedures and gives minimum standards and requirements for the installation of Dynamic Message Sign systems, auxiliary equipment and the construction of related structures.

Provide electrical equipment described in this specification that conforms to the standards of NEMA, UL, or Electronic Industries Association (EIA), wherever applicable. Provide connections between controllers and electric utilities that conform to NEC standards. Express wire sizes according to the American Wire Gauge (AWG).

Provide stainless steel screws, nuts, and locking washers in all external locations. Do not use self-tapping screws unless specifically approved by the Engineer. Use parts made of corrosion-resistant materials, such as plastic, stainless steel, brass, or aluminum. Use construction materials that resist fungus growth and moisture deterioration. Separate dissimilar metals by an inert dielectric material.

B. Layout

The Engineer will establish the actual location of each Dynamic Message Sign assembly. It is the Design-Build Team's responsibility to ensure proper elevation, offset, and orientation of all DMS assemblies. The location of service poles as well as conduit lengths shown in the plans developed by the Design-Build Team, are approximate based on available project data. Make actual field measurements to place conduit and equipment at the required location.

C. Construction Submittal

When the work is complete, submit "As Built" Plans, inventory sheets, and any other data required by the Engineer to show the details of actual construction and installation and any modifications made during installation.

The "As-Built" Plans shall show: the DMS, controller, and service pole locations; DMS enclosure and controller cabinet wiring layouts; and wire and conduit routing. Show all underground conduits and cables dimensioned from fixed objects

Include detailed drawings that identify the routing of all conductors in the system by cable type, color code, and function. Clearly label all equipment in the DMS system, controller cabinet, and DMS enclosure.

D. Conduit

Install the conduit system in accordance with Section 1715 of the 2012 *Standard Specifications for Roads and Structures* and NEC requirements for an approved watertight raceway.

Make bends in the conduit so as not to damage it or change its internal diameter. Install watertight and continuous conduit with as few couplings as standard lengths permit.

Clean conduit before, during, and after installation. Install conduit in such a manner that temperature changes will not cause elongation or contraction that might damage the system.

Attach the conduit system to and install along the structural components of the DMS structure assemblies with beam clamps or stainless steel strapping. Install strapping according to the strapping manufacturer's recommendations. Do not use welding or drilling to fasten conduit to structural components. Space the fasteners at no more than 4 feet for conduit 1.5 inches and larger or 6 feet for conduit smaller than 1.25 inches. Place fasteners no more than 3 feet from the center of bends, fittings, boxes, switches, and devices.

Flexible conduit will only be allowed when the conduits transition from the horizontal structure segment to the horizontal truss segment and from the horizontal truss segment to the rear entrance of the DMS when installing the DMS communications and feeder cables. The maximum length of flexible conduit allowed at each transition shall be five feet.

Locate underground conduit as shown in the plans developed by the Design-Build Team in a manner consistent with these Project Special Provisions.

Do not exceed the appropriate fill ratio on all cable installed in conduit as specified in the NEC.

E. Wiring Methods

Do not pull permanent wire through a conduit system until the system is complete and has been cleaned.

Color-code all conductors per the NEC. Use approved marking tape, paint, sleeves or continuous colored conductors for No. 8 AWG and larger. Do not mark a white conductor in a cable assembly any other color.

Bury underground circuits at the depth shown in the plans developed by the Design-Build Team and surround it with at least 3 inches of sand or earth back-fill free of rocks and debris. Compact backfill in 6-inch layers. Do not splice underground circuits unless specifically noted in the plans developed by the Design-Build Team and approved by the Department.

F. Equipment and Cabinet Mounting

Mount equipment securely at the locations shown in the plans developed by the Design-Build Team, in conformance with the dimensions shown. Install fasteners as recommended by the manufacturer and space them evenly. Use all mounting holes and attachment points for attaching DMS enclosures and controller cabinets to the structures.

Drill holes for expansion anchors of the size recommended by the manufacturer of the anchors and thoroughly clean them of all debris.

Provide one key-operated, pin tumbler, dead bolt padlock, with brass or bronze shackle and case, conforming to Military Specification MIL-P-17802E (Grade I, Class 2, Size 2,

Style A) for each electrical panel and switch on the project. Key all padlocks alike, and provide 10 keys to the Engineer.

Provide cabinets with all mounting plates, anchor bolts, and any other necessary mounting hardware in accordance with these Project Special Provisions and the plans developed by the Design-Build Team.

Seal all unused conduit installed in cabinets at both ends to prevent water and dirt from entering the conduit and cabinet with approved sealing material.

Install a ground bushing attached inside the cabinet on all metal conduits entering the cabinet. Connect these ground bushings to the cabinet ground bus.

G. Work Site Clean-Up

Clean the site of all debris, excess excavation, waste packing material, wire, etc. Clean and clear the work site at the end of each workday. Do not throw waste material in storm drains or sewers.

IV. NTCIP REQUIREMENTS

This section defines the detailed NTCIP requirements for the DMSs covered by these Project Special Provisions and the plans developed by the Design-Build Team.

A. References

This specification references several standards through their NTCIP designated names. The following list provides the full reference to the current version of each of these standards.

Implement the most recent version of the standard including any and all Approved or Recommended Amendments to these standards for each NTCIP Component covered by these Project Special Provisions.

Table 1: NTCIP Standards

Abbreviated Number	Full Number	Title
NTCIP 1101	NTCIP 1101:1997	<i>Simple Transportation Management Framework</i>
NTCIP 1201	NTCIP 1201:1997	<i>Global Object Definitions</i>
NTCIP 1203	NTCIP 1203:1997	<i>Object Definitions for Dynamic Message Signs</i>
NTCIP 2001	NTCIP 2001:1997	<i>Class B Profile</i>
NTCIP 2101	NTCIP 2101	<i>SP-PMPP/232 Subnet Profile for PMPP over RS-232</i>
NTCIP 2102	NTCIP 2102	<i>SP-PMPP/FSK Subnet Profile for PMPP over FSK Modem</i>
NTCIP 2103	NTCIP 2103	<i>SP-PPP/232 Subnetwork Profile for PPP over RS232 (Dial Up)</i>
NTCIP 2104	NTCIP 2104	<i>SP-Ethernet Subnet Profile for Ethernet</i>
NTCIP 2201	NTCIP 2201	<i>TP-Null Transport Profile</i>
NTCIP 2202	NTCIP 2202	<i>TP-Internet Internet Transport Profile (TCP/IP and UDP/IP)</i>
NTCIP 2301	NTCIP 2301	<i>AP-STMF AP for Simple Transportation Management Framework</i>

B. General Requirements

1. Subnet Level

Ensure each serial port on each NTCIP Component supports NTCIP 2103 over a dial-up connection with a contractor provided external modem with data rates of 28.8 kbps, 19.2 kbps, 14.4 kbps, 9600 bps, 4800 bps, 2400 bps, 1200 bps, 600 bps, and 300 bps. Enable the NTCIP Component to make outgoing and

receive incoming calls as necessary and support the following modem command sets:

- Hayes AT - Command Set
- MNP5
- MNP10
- V.42bis

Ensure each serial port on each NTCIP Component supports NTCIP 2103 over a null-modem connection with data rates of 19.2 kbps, 14.4 kbps, 9600 bps, 4800 bps, 2400 bps, 1200 bps, 600 bps, and 300 bps.

Ensure each serial port on each NTCIP Component supports NTCIP 2101 with data rates of 9600 bps, 4800 bps, 2400 bps, 1200 bps, 600 bps, and 300 bps.

Ensure NTCIP components support NTCIP 2102 and NTCIP 2104.

NTCIP Components may support additional Subnet Profiles at the manufacturer's option. At any one time, make certain only one Subnet Profile is active on a given serial port of the NTCIP Component. Ensure the NTCIP Component can be configured to allow the field technician to activate the desired Subnet Profile and provide a visual indication of the currently selected Subnet Profile.

2. Transport Level

Ensure each NTCIP Component complies with NTCIP 2201 and 2202.

NTCIP Components may support additional Transport Profiles at the manufacturer's option. Ensure Response datagrams use the same Transport Profile used in the request. Ensure each NTCIP Component supports the receipt of datagrams conforming to any of the identified Transport Profiles at any time.

3. Application Level

Ensure each NTCIP Component complies with NTCIP 1101 and 2301 and meets the requirements for Conformance Level 1 (NOTE - See Amendment to standard).

Ensure each NTCIP Component supports SNMP traps. An NTCIP Component may support additional Application Profiles at the manufacturer's option. Ensure Responses use the same Application Profile used by the request. Ensure each NTCIP Component supports the receipt of Application data packets at any time allowed by the subject standards.

4. Information Level

Guarantee each NTCIP Component provides Full, Standardized Object Range Support of all objects required by these Special Provisions unless otherwise

indicated below. Make certain the maximum Response Time for any object or group of objects is 200 milliseconds.

Design the DMS to support all mandatory objects of all mandatory Conformance Groups as defined in NTCIP 1201 and NTCIP 1203. Table 2 indicates the modified object requirements for these mandatory objects.

Table 2: Modified Object Ranges for Mandatory Objects

Object	Reference	Project Requirement
ModuleTableEntry	NTCIP 1201 Clause 2.2.3	Contains at least one row with moduleType equal to 3 (software). The moduleMake specifies the name of the manufacturer, the moduleModel specifies the manufacturer's name of the component and the modelVersion indicates the model version number of the component.
MaxGroupAddresses	NTCIP 1201 Clause 2.7.1	At least 1
CommunityNamesMax	NTCIP 1201 Clause 2.8.2	At least 3
DmsNumPermanentMsg	NTCIP 1203 Clause 2.6.1.1.1.1	At least 1*
DmsMaxChangeableMsg	NTCIP 1203 Clause 2.6.1.1.1.3	At least 21
DmsFreeChangeableMemory	NTCIP 1203 Clause 2.6.1.1.1.4	At least 20 when no messages are stored.
DmsMessageMultiString	NTCIP 1203 Clause 2.6.1.1.1.8.3	The DMS supports any valid MULTI string containing any subset of those MULTI tags listed in Table 4
DmsControlMode	NTCIP 1203 Clause 2.7.1.1.1.1	Support at least the following modes: Local External central Central Override

*** Ensure the Permanent Messages display the content shown in Table 3.**

Ensure the sign blanks if a command to display a message contains an invalid Message CRC value for the desired message.

Table 3: Content of Permanent Messages

Permanent Message Number	Description
1	Permanent Message # 1 blanks the display (i.e. consists of an empty MULTI string). It has a run-time priority of one (1)

Table 4: Required MULTI Tags

Code	Feature
f1	field 1 - time (12 hr)
f2	field 2 - time (24 hr)
f8	field 8 – day of month
f9	field 9 – month
f10	field 10 - 2 digit year
f11	field 11 - 4 digit year
fl (and /fl)	flashing text on a line by line basis with flash rates controllable in 0.5 second increments.
fo	Font
jl2	Justification – line – left
jl3	Justification – line – center
jl4	Justification – line – right
jl5	Justification – line – full
jp2	Justification – page – top
jp3	Justification – page – middle
jp4	Justification – page – bottom
Mv	moving text
Nl	new line
Np	new page, up to 2 instances in a message (i.e., up to 3 pages / frames in a message counting first page)
Pt	page times controllable in 0.5 second increments.

The NTCIP Component implements all mandatory and optional objects of the following optional conformance groups with FSORS.

5. Test Heading

a. Time Management

As defined in NTCIP 1201

b. Timebase Event Schedule

As defined in NTCIP 1201. The following list indicates the modified object requirements for this conformance group.

Table 5: Modified Object Ranges for the Timebase Event Schedule Conformance Group

Object	Reference	Project Requirement
MaxTimeBaseScheduleEntries	NTCIP 1201 Clause 2.4.3.1	At least 28
maxDayPlans	NTCIP 1201 Clause 2.4.4.1	At least 14
maxDayPlanEvents	NTCIP 1201 Clause 2.4.4.2	At least 10

c. Report

As defined in NTCIP 1201. The following list indicates the modified object requirements for this conformance group.

Table 6: Modified Object Ranges for the Report Conformance Group

Object	Reference	Project Requirement
maxEventLogConfigs	NTCIP 1201 Clause 2.5.1	At least 50
eventConfigurationMode	NTCIP 1201 Clause 2.4.3.1	The NTCIP Component supports the following Event Configuration Modes: onChange greaterThanValue smallerThanValue
MaxEventLogSize	NTCIP 1201 Clause 2.5.3	At least 200
MaxEventClasses	NTCIP 1201 Clause 2.5.5	At least 16

d. PMPP**e. Font Configuration**

As defined in NTCIP 1203. The following list indicates the modified object requirements for this conformance group.

Table 7: Modified Object Ranges for the Font Configuration Conformance Group

Object	Reference	Project Requirement
NumFonts	NTCIP 1203 Clause 2.4.1.1.1.1	At least 4*
MaxFontCharacters	NTCIP 1203 Clause 2.4.1.1.1.3	At least 127**

* Upon delivery, the first font is a standard 18” font. The second font is a double-stroke 18” font. The third font is a 28” font. The fourth font is empty.

** Upon delivery, the first three font sets are configured in accordance with the ASCII character set for the following characters:

- “A” thru “Z”- All upper case letters.
- “0” thru “9”- All decimal digits.
- Space (i.e., ASCII code 0x20).
- Punctuation marks shown in brackets [. , ! ? - ‘ ’ “ ” / ()]
- Special characters shown in brackets [# & * + < >]

f. DMS Configuration

As defined in NTCIP 1203.

g. MULTI Configuration

As defined in NTCIP 1203. The following list indicates the modified object requirements for this conformance group.

Table 8: Modified Object Ranges for the MULTI Configuration Conformance Group

Object	Reference	Project Requirement
DefaultBackgroundColor	NTCIP 1203 Clause 2.5.1.1.1.1	The DMS supports the following background colors: black
DefaultForegroundColor	NTCIP 1203 Clause 2.5.1.1.1.2	The DMS supports the following foreground colors: amber
DefaultJustificationLine	NTCIP 1203 Clause 2.5.1.1.1.6	The DMS supports the following forms of line justification: left center right full
defaultJustificationPage	NTCIP 1203 Clause 2.5.1.1.1.7	The DMS supports the following forms of page justification: top middle bottom
defaultPageOnTime	NTCIP 1203 Clause 2.5.1.1.1.8	The DMS supports the full range of these objects with step sizes no larger than 0.5 seconds
defaultPageOffTime	NTCIP 1203 Clause 2.5.1.1.1.9	The DMS supports the full range of these objects with step sizes no larger than 0.5 seconds
defaultCharacterSet	NTCIP 1203 Clause 2.5.1.1.1.10	The DMS supports the following character sets: eightBit

- h. Default Message Control** as defined in NTCIP 1203
- i. Pixel Service Control** as defined in NTCIP 1203
- j. MULTI Error Control** as defined in NTCIP 1203
- k. Illumination / Brightness Control**

As defined in NTCIP 1203. The following list indicates the modified object requirements for this conformance group.

Table 9: Modified Object Ranges for the Illumination/Brightness Control Conformance Group

Object	Reference	Project Requirement
dmsIllumControl	NTCIP 1203 Clause 2.8.1.1.1.1	The DMS supports the following illumination control modes: photocell timer manual
dmsIllumNumBrightLevels	NTCIP 1203 Clause 2.8.1.1.1.4	At least 16

l. Auxiliary I/O**m. Scheduling**

As defined in NTCIP 1203. The following list indicates the modified object requirements for this conformance group.

Table 10: Modified Object Ranges for the Scheduling Conformance Group

Object	Reference	Project Requirement
NumActionTableEntries	NTCIP 1203 Clause 2.9.1.1.1.1	At least 21

n. Sign Status as defined in NTCIP 1203

o. Status Error as defined in NTCIP 1203

p. Pixel Error Status as defined in NTCIP 1203

q. Fan Error Status as defined in NTCIP 1203

r. Power Status as defined in NTCIP 1203

s. Temperature Status as defined in NTCIP 1203

Install necessary hardware for the support of items q, r and s above.

Table 11: Some Optional Object Requirements

Object	Reference	Project Requirement
DefaultFlashOn	NTCIP 1203 Clause 2.5.1.1.1.3	The DMS supports the full range of these objects with step sizes no larger than 0.5 seconds
DefaultFlashOff	NTCIP 1203 Clause 2.5.1.1.1.4	The DMS supports the full range of these objects with step sizes no larger than 0.5 seconds
DmsMultiOtherErrorDescription	NTCIP 1203 Clause 2.7.1.1.1.20	If the vendor implements any vendor-specific MULTI tags, the DMS shall provide meaningful error messages within this object whenever one of these tags generates an error.

6. Documentation

Supply software with full documentation, including a CD-ROM containing ASCII versions of the following Management Information Base (MIB) files in Abstract Syntax Notation 1 (ASN.1) format:

- The relevant version of each official standard MIB Module referenced by the device functionality.
- If the device does not support the full range of any given object within a Standard MIB Module, a manufacturer specific version of the official Standard MIB Module with the supported range indicated in ASN.1 format in the SYNTAX and / or DESCRIPTION fields of the associated OBJECT TYPE macro. Name this file identical to the standard MIB Module, except that it will have the extension ".man".
- A MIB Module in ASN.1 format containing any and all manufacturer-specific objects supported by the device with accurate and meaningful DESCRIPTION fields and supported ranges indicated in the SYNTAX field of the OBJECT-TYPE macros.
- A MIB containing any other objects supported by the device.

Allow the use of any and all of this documentation by any party authorized by the Department for systems integration purposes at any time initially or in the future, regardless of what parties are involved in the systems integration effort.

C. NTCIP Acceptance Testing

Test the NTCIP requirements outlined above by a third party testing firm. Submit to the Engineer for approval a portfolio of the selected firm. Include the name, address, and a history of the selected firm in performing NTCIP testing along with references. Also provide a contact person's name and phone number. Submit detailed NTCIP testing plans and procedures, including a list of hardware and software, to the Engineer for review and approval 10 days in advance of a scheduled testing date. Develop test documents based on the NTCIP requirements of these Project Special Provisions. The acceptance test shall use the NTCIP Exerciser, and / or other authorized testing tools and shall follow the guidelines established in the ENTERPRISE Test Procedures. Conduct the test in North Carolina on the installed system in the presence of the Engineer. Document and certify the results of the test by the firm conducting the test and submit to the Engineer for review and approval. In case of failures, remedy the problem and have the firm retest in North Carolina. Continue process until all failures are resolved. The Department reserves the right to enhance these tests, as deemed appropriate, to ensure device compliance.

IV. DMS Testing Requirements

A. General Test Procedure

Test the DMS system in a series of design approval and functional tests. The results of each test must meet the specified requirements. These tests shall not damage the equipment. The Engineer will reject equipment that fails to fulfill the requirements of any test. Resubmit rejected equipment after correcting non-conformities and re-testing; completely document all diagnoses and corrective actions. Modify all equipment furnished under this contract, without additional cost to the North Carolina Department of Transportation, to incorporate all design changes necessary to pass the required tests.

Provide four copies of all test procedures and requirements to the Engineer for review and approval at least 30 days prior to the testing start date.

Only use approved procedures for the tests. Include the following in the test procedures:

- A step-by-step outline of the test sequence, showing a test of every function of the equipment or system tested
- A description of the expected nominal operation, output, and test results, and the pass / fail criteria
- An estimate of the test duration and a proposed test schedule
- A data form to record all data and quantitative results obtained during the test.
- A description of any special equipment, setup, manpower, or conditions required by the test

Provide all necessary test equipment and technical support. Use test equipment calibrated to National Institute of Standards and Technology (NIST) standards. Provide calibration documentation upon request.

Conform to these testing requirements and the requirements of these specifications. The Engineer will reject all equipment not tested according to these requirements. It shall be the Design-Build Team's responsibility to ensure the DMS system functions properly even after the Engineer accepts the DMS test results.

Provide 4 copies of the quantitative test results and data forms containing all data taken, highlighting any non-conforming results and remedies taken, to the Engineer for approval. An authorized representative of the manufacturer must sign the test results and data forms.

B. Design Approval Tests

Design Approval Tests are applicable to DMS systems not currently on the QPL.

The Design Approval Tests shall consist of all tests described in Section 2.2 "DMS Equipment Tests" of NEMA TS 4-2005 (Hardware Standards for Dynamic Message Signs with NTCIP Requirements). Perform all tests and submit certified results for review and approval.

PROTOTYPE – Manufacture a prototype Dynamic Message Sign and controller of the type and size described in the project special provisions. In the Engineer's presence, test the prototype according to the Design Approval and Operational Tests. When all corrections and changes (if any) have been made, the Department may accept the prototype DMS and controller as the physical and functional standard for the system furnished under this contract. The Design-Build Team may use the prototype units on this project if, after inspection and rework (if necessary), they meet all physical and functional specifications. In the case of standard product line equipment, if the Design-Build Team can provide test results certified by an independent testing facility as evidence of prior completion of successful design approval tests, then the Engineer may choose to waive these tests.

In each Design Approval Test, successfully perform the Functional Tests described below. Apply the extreme conditions to all associated equipment unless stated otherwise in these Project Special Provisions.

C. Operational Field Test (On-Site Commissioning)

Conduct an Operational Field Test of the DMS system installed on the project to exercise the normal operational functions of the equipment. The Operational Field Test shall consist of the following tests as a minimum:

A. Physical Examination

Examine each piece of equipment to verify that the materials, design, construction, markings, and workmanship comply with the mechanical, dimensional, and assembly requirements of these Project Special Provisions.

Perform the following tests as a minimum:

- Verify that all surfaces are free of dents, scratches, weld burns, or abrasions. Round sharp edges and corners
- Verify bend radius of cables is not excessive or could potentially cause damage
- Verify all modules, lamps, and components are properly secured
- Verify that there are no exposed live terminals

B. Continuity Tests

Check the wiring to assure it conforms to the requirements of these Project Special Provisions.

C. Functional Tests

Perform the following functional tests:

- Start-up and operate the DMS locally using a laptop computer
- Use automatic (photo-electric sensor controlled), DMS Control Software to switch between “dim”, “normal”, and “bright” light levels
- Operate the DMS with all display elements flashing continuously for 10 minutes at the maximum flash rate
- Exercise the DMS by displaying static messages, flashing messages, and alternating static and flashing message sequences
- Automatically poll the DMS by the Control Software at various intervals and verify the data received by Control Software from DMS
- Download and edit messages using Control Software
- Execute status request on the DMS controller
- Observe normal operations during uploading and downloading messages
- Input and select messages from the sign controller’s local user interface
- Test sequence activation at chosen intervals
- Display and verify all stored messages
- Verify resumption of standard operation upon interruption of electrical power

- Demonstrate detected failures and response functions
- Demonstrate proper operation of the Failure Log
- Set controller clock using the Control Software
- Execute system shutdown using the Control Software and local user interface
- Verify detection of a power failure in the DMS enclosure and the report feature of the failure to the Control Software

Approval of Operational Field Test results shall not relieve the Design-Build Team to conform to the requirements in these Project Special Provisions. If the DMS system does not pass these tests, document a correction or substitute a new unit as approved by the Engineer. Re-test the system until it passes all requirements.

D. 30-Day Observation Period

The 30-Day Observation Period shall be part of work to be completed by the project completion date. The 30-Day Observation Period shall begin after all signs have been installed, inspected, tested, approved, and are communicating back to the NCDOT Triad Regional Transportation Management Center (TRTMC) Transportation Management System (TMS) via the new fiber optic communications link installed under this project.

Upon successful completion of all project work, the component tests, the System Test, and the correction of all deficiencies, including minor construction items, the 30-day Observation Period may commence. This observation shall consist of a 30-day period of normal, day-to-day operations of the new field equipment in operation with the new central equipment without any failures. The purpose of this period is to ensure that all components of the system function in accordance with the project plans developed by the Design-Build Team and these Project Special Provisions.

Respond to system and / or component failures (or reported failures) that occur during the 30-day Observation Period within twenty-four (24) hours. Correct said failures within forty-eight (48) hours. Any failure that affects a major system component as defined below for more than forty-eight (48) hours shall suspend the timing of the 30-day Observation Period beginning at the time when the failure occurred. After the cause of such failures has been corrected, timing of the 30-day Observation Period will resume. System or component failures that necessitate a redesign of any component or failure in any of the major system components exceeding a total of three (3) occurrences shall terminate the 30-day Observation Period and cause the 30-day Observation Period to be restarted from day zero when the redesigned components have been installed and / or the failures corrected. The major system components are:

- DMS Field Controller
- DMS Display Module

V. DMS Structure

A. Description

This section includes all design, fabrication, furnishing, and erection of the DMS structures, maintenance platforms, walkways, and ladders for access to the DMS inspection doors, and attachment of the DMS enclosures to the structures in accordance with the requirements of these Project Special Provisions and the plans developed by the Design-Build Team. Fabricate the supporting DMS structures from tubular steel. As required in the ITS Scope of Work found elsewhere in this RFP, furnish pedestal type structures for the front access 8' x 15' DMS. Furnish a pedestal type or overhead type structure for the relocated walk-in DMS as required in the ITS Scope of Work found elsewhere in this RFP, and as approved by the Engineer. Cantilevered and Monotube (horizontal truss) DMS structures will not be allowed.

For 8' x 15' DMSs, provide pedestal DMS structures with a minimum 20-foot clearance from the high point of the road to the bottom of the DMS enclosure for front access DMS. Final structure heights must be approved by the Engineer. Maintenance platforms, walkways and ladders will not be required for front access DMS.

For the relocated DMS, provide pedestal DMS structures with a minimum of 25 feet clearance from the high point of the road to the bottom of the DMS enclosure, or provide full span, overhead DMS structures with a minimum 20-foot clearance from the high point of the road to the bottom of the DMS enclosure for full size, walk-in DMS. Maintenance platforms, walkways, and ladders shall be required for full size, walk-in DMS.

Design the DMS assemblies (including footings), DMS mounting assemblies, maintenance platforms, walkways, and access ladders and submit shop drawings to the Engineer for approval. A Professional Engineer that is registered in the state of North Carolina shall prepare such computations and drawings. These must bear his signature, seal, and date of acceptance.

The provisions of Section 900 of the NCDOT 2012 *Standard Specifications for Roads and Structures* apply to all work covered by this section.

The Design-Build Team shall furnish DMS S-dimension drawings for each proposed DMS to the Engineer for approval.

Comply with the requirements of the *Foundations and Anchor Rod Assemblies for Metal Poles and Overhead and Dynamic Message Sign Foundations* Project Special Provisions found elsewhere in this RFP.

B. Material

Use materials that meet the following requirements of the NCDOT 2012 *Standard Specifications for Roads and Structures*:

Structural Steel	Section 1072
Overhead Structures	Section 1096
Signing Materials	Section 1092
Organic-Zinc Repair Paint	Article 1080-9
Reinforcing Steel	Sub-article 1070
Direct Tension Indicators	Sections 440 and 1072

C. Construction Methods

A. General

Fabricate the new DMS assemblies, maintenance platforms, walkways, access ladders, and attachment hardware in accordance with the details shown in the approved shop drawings prepared by the Design-Build Team and the requirements of these Project Special Provisions.

No welding, cutting, or drilling in any manner will be permitted in the field, unless approved by the Engineer.

Drill bolt holes and slots to finished size. Holes may also be punched to finished size, provided the diameter of the punched holes is at least twice the thickness of the metal being punched. Flame cutting of bolt holes and slots will not be permitted.

Erect the DMS in accordance with the requirements indicated on the plans developed by the Design-Build Team and in these Project Special Provisions. Field drill two holes per connection in the Z-bars for attaching the DMS to the structure. Use two bolts at each connection. Provide two (2) U-bolts at each U-bolt connection such as 1) each truss chord to sign hanger, or 2) each truss chord to platform support. Provide two (2) U-bolts at each U-bolt connection where ends of truss chords are supported. Minimum diameter of all U-bolts shall be ½-inch.

Use two coats of a zinc-rich paint to touch up minor scars on all galvanized materials (Refer to Section 1076-6 of the 2012 *Standard Specifications for Roads and Structures*).

For high strength bolted connections, provide direct tension indicator washers.

B. Shop Drawing

Submit to the Engineer for approval a complete design for the DMS assemblies (including footings), maintenance platforms, walkways, access ladders, DMS assembly hardware, and brackets for supporting the DMS and maintenance platforms. Base the design on the line drawings and correct wind speed in accordance with the 2009 AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals*, 5th Edition, and the 2010 and 2011 Interim Revisions.

The manufacturer of the DMS assembly must ensure that design of the assembly is compatible with the DMSs for mounting and attachment.

Submit six copies of completely detailed shop drawings and one copy of the design computations for the DMS assembly to the Engineer for approval prior to fabrication. Show in the shop drawings complete design and fabrication details including foundations, provisions for attaching the DMS, maintenance platforms, walkways, and access ladders to supporting structures, applicable material specifications, and any other information necessary for procuring and replacing any part of the complete DMS assembly.

Allow a minimum of 15 working days for shop drawing approval after the Engineer receives them. If revised drawings are necessary, allow an additional 15 working days for review and approval of final shop drawings.

Approval of shop drawings by the Engineer shall not relieve the Design-Build Team of their responsibility for the correctness of drawings, or for the fit of all shop and field connections and anchors.

C. Design and Fabrication

For additional design and fabrication requirements, reference the *Overhead Sign Supports* Project Special Provision found elsewhere in this RFP.

A. Dynamic Message Sign Assemblies

Design shall be in accordance with the 2009 AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals*, 5th Edition, and the 2010 and 2011 Interim Revisions.

The Wind Pressure Map developed from the 3-second gust speeds, as provided in Article 3.8 shall be used.

The wind drag coefficient for the dynamic message sign enclosure shall be 1.7.

Fabricate the supporting structures using tubular members of steel.

Horizontal components of the supporting structures for overhead DMS shall be of a truss design to support the DMS. Truss centerline shall coincide with the centerline of the DMS design area shown on the structure line drawing developed by the Design-Build Team. Provide permanent camber in addition to dead load camber in accordance with the 2009 AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals*, 5th Edition, and the 2010 and 2011 Interim Revisions. Indicate on the shop drawings the amount of camber provided and the method employed in the fabrication of the support to obtain the camber.

For all U-bolt connections of hanger beams to overhead assembly truss chords, provide U-bolts with a flat washer, a lock washer and double nuts at each end of

the U-bolts. All double nuts that are on any U-bolt shall be the same thickness and weight. When assembled, the double nuts shall be brought tight against each other by the use of two wrenches.

Fabricate the attachment assembly for mounting DMS in a manner that will ensure easy removal of the DMS.

B. DMS Maintenance Platform (Walkway)

Provide a maintenance platform, a minimum of three feet wide with open skid-resistant surface and safety railing on the DMS assemblies for access to the DMS inspection door. Provide platforms with fixed safety railings along both sides from the beginning of the platform to the inspection door.

Ensure the design, fabrication and installation of the access platforms on new DMS structures complies with the following:

1. The top of the platform grading surface is vertically aligned with the bottom of the DMS door. Ensure the platform extends from the DMS enclosure to the access ladder.
2. The DMS door will open 90-degrees from its closed position without any obstruction from the platform or safety handrails.
3. The platform is rigidly and directly connected to the walkway brackets and there is no uneven surface between sections.
4. Install a 4" x 4" safety angle parallel to and along both sides of the platform and extend it the entire length of the platform. Design the safety angle to withstand loading equivalent to the platform.
5. Ensure the platform design allows full access to the DMS enclosure inspection door with no interference or obstructions.

C. DMS Access Ladder

Provide a fixed ladder, of the same material as the DMS structures, leading to and ending at the access platform. Equip the ladder with a security cover (ladder guard) and lock to prohibit access by unauthorized persons. Furnish locks to operate with a Corbin #2 key and furnish two keys per lock. Design the rungs on 12-inch center to center typical spacing. The first ladder rung shall be no more than 18 inches above the landing pad. Attach the security cover approximately 6 feet above the concrete landing. Design the ladder and security cover as a permanent part of the DMS assembly and include complete design details in the DMS assembly shop drawings. Fabricate the ladder and cover to meet all OSHA requirements and applicable state and local codes, including but not limited to providing a ladder cage.

Furnish and install a level concrete pad a minimum of 4 inches deep, 24 inches wide, and 36 inches long to serve as a landing pad for accessing the ladder.

Design the landing pad to be directly below the bottom rung. Access to the ladder shall not be obstructed by the DMS foundation. Provide pre-formed or cast-in place concrete pads.

HIGH DEFINITION CCTV METAL POLE AND FIELD EQUIPMENT

(06-17-15)

1. HIGH DEFINITION CCTV FIELD EQUIPMENT DESCRIPTION

The Design-Build Team shall provide and install High Definition (1080p) CCTV field equipment described in these Project Special Provisions. Ensure equipment is fully compatible with all features of the existing *VideoPro* video management software currently in use by NCDOT in this Region.

Obtain approval of the camera locations and orientation from the Engineer prior to installing the CCTV camera assemblies.

1.2 MATERIAL

General

The Design-Build Team shall provide and install new CCTV camera assemblies at the locations approved by the Engineer that consist of the following:

1. Dome CCTV camera that contains in a single enclosed unit the following:
 - a. CCTV color digital signal processing camera unit with zoom lens, filter, control circuit, and accessories
 - b. Motorized pan, tilt, and zoom
 - c. Pole-mount camera attachment assembly.
 - d. All necessary cable, connectors and incidental hardware to make a complete and operable system
2. Lightning arrestors installed in-line between the CCTV camera and the equipment cabinet components.
3. A NEMA Type 4 enclosure constructed of aluminum with a clear acrylic dome or approved equal camera unit housing.

Camera and Lens

The Design-Build Team shall provide new 1/4-inch charged-coupled device (CCD) color day / night cameras. The Design-Build Team shall provide cameras with automatic gain control (AGC) for clear images in varying light levels. The camera shall meet the following minimum requirements:

- Video signal format: NTSC compatible resolution, user selectable up to a maximum of 1920 x 1080 (1080p),
- Image sensor resolution: 768 horizontal pixels by 752 vertical pixels,
- Automatic gain control (AGC): 0-20 dB, peak-average adjustable,
- White balance: Automatic through the lens with manual override,
- Electronic-shutter: Dip-switch selectable NTSC electronic shutter with speed range from 1/2 of a second (off) to 1/30,000 of a second (NTSC),
- Overexposure protection: Built-in circuitry or a protection device to prevent any damage to the camera when pointed at strong light sources, including the sun,
- Gain control: Automatic and manual,
- Sensitivity: 1.5 lux at 90% scene reflectance,
- Sync system: Internal AC line lock, phase adjustable using remote control, V-sync,
- Signal to noise ratio: Greater than 50 dB,
- Video output connection: 1-volt peak to peak, 75 ohms terminated, BNC connector, and
- Primary voltage: 120 VAC,
- Camera voltage: 24 VAC or 24 VDC, and
- Camera power: 73 VA with heater at 24 VAC or 3A at 24 VDC.

Zoom Lens

The Design-Build Team shall provide each camera with a motorized zoom lens with automatic iris control with manual override and neutral density spot filter. The Design-Build Team shall provide lenses that meet the following optical specifications:

- Automatic focus: Automatic with manual override
- Horizontal angle of view: 55.4 degrees at 3.6 mm wide zoom and 2.9 degrees at 82 mm telephoto zoom

- Focal length: 3.6 mm to 124 mm, 30X optical zoom, 12X electronic zoom
- Zoom Speed: 2.9, 4.2 and 5.8 seconds
- Lens aperture: Minimum of f/1.6
- Maximum Sensitivity at 30 IRE: .07 lux at ½ second color, .2 lux at 1/60 second black and white, .015 lux at ½ sec. black and white
- Preset positioning: Minimum of 128 presets

The lens shall be capable of both automatic and remote manual control iris and focus override operation. The lens shall be equipped for remote control of zoom and focus, including automatic movement to any of the preset zoom and focus positions. The Design-Build Team shall provide mechanical or electrical means to protect the motors from overrunning in extreme positions. The operating voltages of the lens shall be compatible with the outputs of the camera control.

Camera Housing

The Design-Build Team shall provide new dome style enclosures for the CCTV assemblies. Equip housing with mounting assemblies for attachment to the pole mount. The enclosures shall be equipped with a sunshield and be fabricated from corrosion resistant aluminum and finished in a neutral color of weather resistant enamel. The enclosure shall meet or exceed NEMA 4X ratings. The viewing area of the enclosure shall be tempered glass.

Pan and Tilt Unit

Equip each new dome style assembly with a pan and tilt unit. The pan and tilt unit shall be integral to dome system. The pan and tilt unit shall be rated for outdoor operation, provide dynamic braking for instantaneous stopping, prevent drift, and have minimum backlash. The dome shall have an auto flip dome rotation to rotate and reposition camera for viewing objects passing below camera. The Design-Build Team shall provide electronic image stabilization. The pan and tilt units shall meet or exceed the following specifications:

- Pan: Continuous 360 degrees
- Tilt: +2 to -92 degrees minimum
- Presets: Minimum of 128 presets
- Preset accuracy: 0.1 degree
- Preset pan speed: 0.1 degrees/second to 200 degrees/second
- Preset tilt speed: 0.1 degrees/second to 400 degrees/second

- Privacy zones: Minimum of eight user configurable shapes
- Input voltage: 24 VDC or 24 VAC
- Motors: Two-phase induction type, continuous duty, instantaneous reversing
- Preset Positioning: 64 PTZ presets per camera

Control Receiver / Driver

The Design-Build Team shall provide each new camera unit with a control receiver / driver that is integral to the CCTV dome assembly. The control receiver / driver shall receive serial asynchronous data initiated from a camera control unit, decode the command data, perform error checking, and drive the pan / tilt unit, camera controls, and motorized lens. As a minimum, the control receiver/drivers shall provide the following functions:

- Zoom in / out
- Automatic focus with manual override
- Tilt up / down
- Automatic iris with manual override
- Pan right / left
- Minimum 64 preset positions for pan, tilt, and zoom

In addition, each control receiver / driver shall accept status information from the pan / tilt unit and motorized lens for preset positioning of those components. The control receiver / driver shall relay pan, tilt, zoom, and focus positions from the field to the remote camera control unit. The control receiver / driver shall accept “goto” preset commands from the camera control unit, decode the command data, perform error checking, and drive the pan / tilt and motorized zoom lens to the correct preset position. The preset commands from the camera control unit will consist of unique values for the desired pan, tilt, zoom, and focus positions.

CCTV Camera Attachment to Pole

The Design-Build Team shall provide CCTV attachments that allow for the removal and replacement of the CCTV enclosure as well as providing a weatherproof, weather tight, seal that does not allow moisture to enter the enclosure.

The Design-Build Team shall provide a CCTV camera attachment assembly that is able to withstand wind loading at the maximum wind speed and gust factor called for in these Special Provisions and can support a minimum camera unit dead load of 45 pounds (20.4 kg).

Surge Suppression

Protect all equipment with metal oxide varistors connecting each power conductor to ground.

Protect coaxial cable from each camera by a surge protector at each end of the cable.

1.3 CONSTRUCTION METHODS

General

Mount CCTV camera units at or near the top of the pole as directed by the Engineer on the metal poles provided by the Design-Build Team. Position the camera to enable viewing traffic in all directions and as approved by the Engineer.

Mount CCTV cameras on the side of poles nearest intended field of view. Avoid occluding the view with the pole.

Electrical and Mechanical Requirements

Ground all equipment as called for in the 2012 *Standard Specifications for Roads and Structures*, these Special Provisions, and the plans developed by the Design-Build Team.

Install surge protectors on all ungrounded conductors entering the CCTV enclosure. House the protectors in a small, ventilated weatherproof cabinet attached near the CCTV attachment point in a manner approved by the Engineer.

2. CCTV EQUIPMENT CABINET DESCRIPTION

The Design-Build Team shall provide 336 pole mounted cabinets to house CCTV control and communications equipment. The cabinets shall consist of a cabinet housing, 19-inch EIA mounting cage, and power distribution assembly (PDA #3 as described in the CALTRANS TSCES).

The cabinet housing shall conform to sections 6.2.2 (Housing Construction), 6.2.3 (Door Latches and Locks), 6.2.4 (Housing Ventilation), and 6.2.5 (Hinges and Door Catches) of the CALTRANS TSCES. Do not equip the cabinet housings with a police panel.

The cabinet cage shall conform to section 6.3 of the CALTRANS TSCES.

Terminal blocks on the PDA #3 Assembly have internal wiring for the Model 200 switch pack sockets. Do not use terminal blocks on PDA #3 as power terminals for cabinet devices. Do not furnish cabinet with "Input Panels" described in section 6.4.7.1 of the TSCES. Do furnish cabinet with "Service Panels" as described in section 6.4.7.1 of the TSCES and as depicted on drawing TSCES-9 in the TSCES. Use service panel #2.

The Design-Build Team shall provide terminal blocks for power for cabinet CCTV and communications devices as needed to accommodate the number of devices in the cabinet.

Do not furnish cabinets with C1, C5, or C6 harness, input file, output file, monitor units, model 208 unit, model 430 unit, or switch packs.

The Design-Build Team shall provide all conduits, shelving, mounting adapters, and other equipment as necessary to route cabling, mount equipment, and terminate conduit in equipment cabinet.

2.2 MATERIAL

Shelf Drawer

The Design-Build Team shall provide a pull out, hinged-top drawer, having sliding tracks, with lockout and quick disconnect feature in the equipment cabinet. The Design-Build Team shall provide a pullout drawer that extends a minimum of 14 inches that is capable of being lifted to gain access to the interior of the drawer. Minimum interior dimensions of the drawer shall be 1 inch high, 13 inches deep, and 16 inches wide. The Design-Build Team shall provide drawers capable of supporting a 40-pound device or component when fully extended.

Cabinet Light

Each cabinet shall include two (2) fluorescent lighting fixtures (one front, one back) mounted horizontally inside the top portion of the cabinet. The fixtures shall include a cool white lamp, and shall be operated by normal power factor UL-listed ballast. A door-actuated switch shall be installed to turn on the applicable cabinet light when the front door or back door is opened. The lights shall be mounted not to interfere with the upper door stay.

Surge Protection for System Equipment

Each cabinet shall be provided with devices to protect the CCTV and communications equipment from electrical surges and over voltages as described below.

Main AC Power Input

Each cabinet shall be provided with a hybrid-type, power line surge protection device mounted inside the power distribution assembly. The protector shall be installed between the applied line voltage and earth ground. The surge protector shall be capable of reducing the effect of lightning transient voltages applied to the AC line. The protector shall be mounted inside the Power Distribution Assembly housing facing the rear of the cabinet. The protector shall include the following features and functions:

- Maximum AC line voltage: 140 VAC
- Twenty pulses of peak current, each of which shall rise in 8 microseconds and fall in 20 microseconds to ½ the peak: 20000 Amperes
- The protector shall be provided with the following terminals:
 - Main Line (AC Line first stage terminal)
 - Main Neutral (AC Neutral input terminal)
 - Equipment Line Out (AC line second state output terminal, 19 amps)
 - Equipment Neutral Out (Neutral terminal to protected equipment)
 - GND (Earth connection)
- The Main AC line in and the Equipment Line out terminals shall be separated by a 200 Microhenry (minimum) inductor rated to handle 10 AMP AC Service.
- The first stage clamp shall be between Main Line and Ground terminals.

- The second stage clamp shall be between Equipment Line Out and Equipment Neutral.
- The protector for the first and second stage clamp shall have an MOV or similar solid state device rated at 20 KA and shall be of a completely solid state design (i.e., no gas discharge tubes allowed).
- The Main Neutral and Equipment Neutral Out shall be connected together internally and shall have an MOV similar solid state device or gas discharge tube rated at 20 KA between Main Neutral and Ground terminals.
- Peak Clamp Voltage: 350 volts at 20 KA. (Voltage measured between Equipment Line Out and Equipment Neutral Out terminals. Current applied between Main Line and Ground Terminals with Ground and Main Neutral terminals externally tied together).
- Voltage shall never exceed 350 volts.
- The Protector shall be epoxy-encapsulated in a flame-retardant material.
- Continuous service current: 10 Amps at 120 VAC RMS
- The Equipment Line Out shall provide power to cabinet CCTV and communications equipment and to the 24V power supply.

Ground Bus

The Design-Build Team shall provide a neutral bus that is not connected to the earth ground or the logic ground anywhere within the cabinet. Ensure that the earth ground bus and the neutral ground bus each have ten compression type terminals, each of which can accommodate wires ranging from number 14 through number 4 AWG.

Uninterruptible Power Supply (UPS)

The Design-Build Team shall provide and install one rack mounted UPS in each new cabinet that meet the following minimum specifications:

Output

Output Power Capacity	480 Watts / 750 VA
Max Configurable Power	480 Watts / 750 VA
Nominal Output Voltage	120V
Output Voltage Distortion	Less than 5% at full load
Output Frequency (sync to mains)	57 - 63 Hz for 60 Hz nominal
Crest Factor	up to 5:1
Waveform Type	Sine wave
Output Connections	(4) NEMA 5-15R

Input

Nominal Input Voltage	120V
Input Frequency	50/60 Hz +/- 3 Hz (auto sensing)
Input Connections	NEMA 5-15P
Cord Length	6 feet
Input voltage range for main operations	82 - 144V
Input voltage adjustable range for mains operation	75 -154 V

Battery Type

Maintenance-free sealed Lead-Acid battery with suspended electrolyte, leak-proof.

Typical recharge time	2 hours
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Communications & Management

Interface Port(s)	DB-9 RS-232, USB
Control panel	LED status display with load and battery bar-graphs

Surge Protection and Filtering

Surge energy rating	480 Joules
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Environmental

Operating Environment	32 - 104° F
Operating Relative Humidity	0 - 95%
Storage Temperature	5 - 113° F
Storage Relative Humidity	0 - 95%

Conformance

Regulatory Approvals	FCC Part 15 Class A, UL 1778
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2.3 Construction Methods

For each equipment cabinet installation, use stainless steel banding or other method approved by the Engineer to fasten cabinet to pole. Install equipment cabinets so that the height to the middle of the enclosure is 4 feet from ground level. No risers shall enter the top or sides of the equipment cabinet.

Install all conduits, condulets, and attachments to equipment cabinets in a manner that preserves the minimum bending radius of cables and creates water proof connections and seals.

Install a UPS in each cabinet and power all CCTV cameras from the UPS.

Install a level concrete technician pad measuring a minimum 4 inches thick, 24 inches wide and 36 inches long at the front door of the CCTV equipment cabinet.

3.0 CCTV METAL POLES

3.1 Description

A. CCTV Metal Poles

The Design-Build Team shall provide and install CCTV metal poles, grounding systems, and all necessary hardware. The work covered by this Project Special Provision includes requirements for the design, fabrication, and installation of custom designed CCTV metal poles and associated foundations.

The Design-Build Team shall provide designs of completed assemblies with hardware that equals or exceeds 2013 AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals*, 6th Edition. The Design-Build Team shall provide assemblies with a round or near-round (18 sides or more) cross-section, or a multi sided cross section with no less than six sides. The sides may be straight, convex, or concave.

B. Drilled Pier Foundations

Design, furnish and install foundations for CCTV metal poles with all necessary hardware in accordance with the plans developed by the Design-Build Team and these Project Special Provisions.

Design all CCTV pole foundations using actual soil conditions at each pole location. Perform soil test in accordance with sub-section (1) Soil Test of this Project Special Provision.

Any additional costs associated with a non-standard site-specific foundation including additional materials, labor and equipment will be considered incidental to the lump sum bid for the entire project. All costs for the non-standard foundation design will also be considered incidental to lump sum bid for the entire project.

Analysis procedures and formulas shall be based on AASHTO, ACI code and per FHWA manuals. Design methods based on engineering publications or research papers shall have prior approval from NCDOT prior to incorporation. The Department reserves the right to accept or disapprove any method used for the analysis.

Use a Factor of Safety of 1.33 for torsion and 2.0 for bending for the foundation design.

Foundation design for lateral load shall not exceed 1" lateral deflection at top of foundation.

Design all custom foundations to carry the maximum capacity of each metal pole.

When poor soil conditions are encountered which could create an excessively large foundation design, consideration may be given to allowing an exemption to the maximum capacity design, at the Department's sole discretion. The Design-Build Team shall gain

approval from the engineer before reducing a foundation's capacity. On projects where poor soil is known to be present, it is advisable that the Design-Build Team consider getting foundations approved before releasing poles for fabrication.

Soil Test

(a) General

Drilled piers are reinforced concrete sections, cast in place against in situ, undisturbed material. Drilled piers are of straight shaft type and vertical.

Some standard drilled piers for supporting poles with mast arms may require wing walls to resist torsional rotation. Based upon this Project Special Provision and the results of the required soil test, a drilled pier length and wing wall requirement shall be determined and constructed in accordance with the plans developed by the Design-Build Team.

For non-standard site-specific poles, the Design-Build Team's pole fabricator shall determine if the addition of wing walls is required to support foundations.

(b) Soil Test Procedure

Perform a soil test at each proposed metal pole location. Complete all required fill placement and excavation at each pole location to finished grade before drilling each boring. Soil tests performed that are not in compliance with this requirement shall be rejected. Drill one boring to a depth of 26 feet within a 25-foot radius of each proposed foundation.

Perform standard penetration tests (SPT) in accordance with ASTM D 1586 at depths of 1, 2.5, 5, 7.5, 10, 15, 20 and 26 feet. Discontinue the boring if one of the following occurs:

A total of 100 blows have been applied in any 2 consecutive 6-inch intervals,

A total of 50 blows have been applied with < 3-inch penetration.

Describe each CCTV pole location along the project corridor in a manner that is easily discernible to both the Design-Build Team's designer and NCDOT reviewers. If a CCTV pole is at an intersection, label the boring the "Intersection of (Route or SR #), (Street Name) and (Route or SR #), (Street Name), _____ County, Signal Inventory No. _____". Label borings with "B- N, S, E, W, NE, NW, SE or SW" corresponding to the quadrant location within the intersection.

If the CCTV pole is located between intersections, the Design-Build Team shall provide a coordinate location and offset, or milepost number and offset. Pole numbers shall be made available to the geotechnical drilling contractor. Include pole numbers in the boring label if they are available. If they are not available, ensure the boring labels can be cross-referenced to corresponding pole numbers or pole locations. For each boring, submit a legible (hand written or typed) boring log signed and sealed by a licensed Geologist or Professional Engineer registered in North Carolina. Include on each boring the SPT blow counts and

N-values at each depth, depth of the boring, and a general description of the soil types encountered.

Borings that can't be easily related to their specific pole location shall be returned to the Design-Build Team for clarification, or if approved by the Engineer, the foundation shall be designed using the worst case soil condition obtained as part of this project.

Standard Foundation Determination

Use the following method for determining the Design N-value:

$$N_{AVG} = \frac{(N@1' + N@2.5' + \dots + N@Deepest \text{ Boring Depth})}{\text{Total Number of N-values}}$$

$$Y = (N@1')^2 + (N@2.5')^2 + \dots + (N@Deepest \text{ Boring Depth})^2$$

$$Z = (N@1' + N@2.5' + \dots + N@Deepest \text{ Boring Depth})$$

$$N_{STD \text{ DEV}} = \left[\frac{(\text{Total Number of N-values} \times Y) - Z^2}{(\text{Total Number of N-values}) \times (\text{Total Number of N-values} - 1)} \right]^{0.5}$$

Design N-value equals lesser of the following two conditions:

$$N_{AVG} - (N_{STD \text{ DEV}} \times 0.45)$$

Or

$$\text{Average of First Four N-Values} = \frac{(N@1' + N@2.5' + N@5' + N@7.5')}{4}$$

Note: If less than 4 N-values are obtained because of criteria listed in Section 2 above, use average of N-values collected for second condition. Do not include the N-value at the deepest boring depth for above calculations if the boring is discontinued at or before the required boring depth because of criteria listed in Section 2 above. Use N-value of zero for weight of hammer or weight of rod. If N-value is greater than 50, reduce N-value to 50 for calculations.

Submit completed boring logs collected in accordance with the Soil Test Section above, along with pole loading diagrams to the Design-Build Team's pole fabricator to assist in the pole and foundation design.

If one of the following occurs, the Standard Foundations Chart shown on the plans developed by the Design-Build Team shall not be used and a non-standard foundation shall be required. In such case, contact the Engineer.

The Design N-value is less than 4,

The drilled pier length, "L", determined from the Standard Foundations Chart, is greater than the depth of the corresponding boring.

In the case where a standard foundation cannot be used, the Design-Build Team shall be responsible for all additional design and construction costs associated with the non-standard foundation.

Foundation designs shall be based on level ground around the pole. If the slope around the edge of the drilled pier is steeper than 8:1 (H:V) or the proposed foundation will be less than 10 feet from the top of an embankment slope, the Design-Build Team shall be responsible for providing slope information to the foundation designer and to the Engineer so it can be considered in the design and review, respectively.

The “Metal Pole Standard Foundation Selection Form” may be found at:

https://connect.ncdot.gov/resources/Geological/Geotech%20Forms/2012_METAL%20POLES%20-%20Standard%20Foundation%20Selection.pdf

If assistance is needed, contact the Engineer.

Non-Standard Foundation Design:

Design non-standard foundations based upon site-specific soil test information collected in accordance with the Soil Test Section above. Design drilled piers for side resistance only in accordance with Section 4.6 of the AASHTO *Standard Specifications for Highway Bridges*. Use the computer software LPILE version 5.0 or later manufactured by Ensoft, Inc. to analyze drilled piers. Use the computer software gINT version 8.0 or later manufactured by Bentley Systems, Inc. with the current NCDOT gINT library and data template to produce SPT boring logs. The Design-Build Team shall provide a drilled pier foundation for each pole with a length and diameter that result in a horizontal lateral movement of less than one inch at the top of the pier and a horizontal rotational movement of less than one inch at the edge of the pier. Prior to construction, submit all non-standard foundation designs including drawings, calculations, and soil boring logs to the Engineer for review and approval. Foundations installed without prior approval may be rejected at no additional compensation.

3.2 MATERIALS

CCTV Metal Poles

The Design-Build Team shall provide CCTV poles that are a minimum of 50 feet tall.

Fabricate CCTV metal poles from coil or plate steel to meet the requirements of ASTM A 595 Grade A tubes. For structural steel shapes, plates and bars use A572 Gr 50 min or ASTM A709 Gr 50 min. The Design-Build Team shall provide poles that are round in cross section or multisided tubular shapes and have a uniform linear taper of 0.14 in/ft. Construct shafts from one piece of single ply plate or coil so there are no circumferential weld splices. Galvanize in accordance with AASHTO M 111 and / or ASTM A 123 or an approved equivalent.

Ensure that allowable pole deflection does not exceed that allowed per 2013 AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals*, 6th Edition. Ensure that maximum deflection at the top of the pole does not exceed 2.5 percent of the pole height.

Use the submerged arc process or other NCDOT previously approved process suitable for poles to continuously weld pole shafts along their entire length. The longitudinal seam weld will be finished flush to the outside contour of the base metal. Ensure shafts have no

circumferential welds except at the lower end joining the shaft to the pole base. In the event that a circumferential weld is necessary, prior approval shall be required from the Engineer and the NCDOT Materials and Test Unit. The Design-Build Team shall provide welding that conforms to Article 1072-20 of the *Standard Specifications*, except that no field welding on any part of the pole will be permitted unless approved by the Engineer.

Refer to Metal Pole Standard Drawing Sheets M2 through M5 for fabrication details. Fabricate anchor bases from plate steel meeting, as a minimum, the requirements of ASTM A 36M or cast steel meeting the requirements of ASTM A 27M Grade 485-250, AASHTO M270 Gr 36 or an approved equivalent. Conform to the applicable bolt pattern and orientation as shown on Metal Pole Standard Drawing Sheet M2.

Ensure all hardware is galvanized steel or stainless steel. The Design-Build Team shall be responsible for ensuring that the designer / fabricator specifies connecting hardware and / or materials that do not create a dissimilar metal corrosive reaction.

Unless otherwise required by the design developed by the Design-Build Team, ensure each anchor rod is 2" diameter and 60" length. The Design-Build Team shall provide 10" minimum thread projection at the top of the rod, and 8" minimum at the bottom of the rod. Use anchor rod assembly and drilled pier foundation materials that meet the *Foundations and Anchor Rod Assemblies for Metal Poles* Project Special Provision found elsewhere in this RFP.

For each structural bolt and other steel hardware, hot dip galvanizing shall conform to the requirements of AASHTO M 232 (ASTM A 153). Ensure end caps for poles are constructed of cast aluminum conforming to Aluminum Alloy 356.0F.

The Design-Build Team shall provide a circular anchor bolt lock plate that shall be secured to the anchor bolts at the embedded end with 2 washers and 2 nuts. The Design-Build Team shall provide a base plate template that matches the bolt circle diameter of the anchor bolt lock plate. Construct plates and templates from 1/4" minimum thick steel with a minimum width of 4". Galvanizing will not be required.

The Design-Build Team shall provide 4 heavy hex nuts and 4 flat washers for each anchor bolt. For nuts, use AASHTO M291 grade 2H, DH, or DH3 or equivalent material. For flat washers, use AASHTO M293 or equivalent material.

The Design-Build Team shall provide a 2-inch hole equipped with an associated coupling and weatherhead approximately 5 feet below the top of the pole to accommodate passage of CCTV cables from inside the pole to the CCTV camera.

The Design-Build Team shall provide a 2-inch hole equipped with an associated coupling and conduit fittings / bodies approximately 18 inches above the base of the pole to accommodate passage of CCTV cables from the CCTV cabinet to the inside of the pole. Refer to Metal Pole Standard Drawing Sheet M3 for fabrication details.

The Design-Build Team shall provide a hand hole access with a watertight cover and have poles permanently stamped above the base hand hole with the identification tag details as shown on Metal Pole Standard Drawing Sheet M2.

For each pole, The Design-Build Team shall provide a 1/2 inch minimum thread diameter, coarse thread stud and nut for grounding which will accommodate #4 AWG ground wire.

Ensure that the lug is electrically bonded to the pole and is conveniently located inside the pole at the hand hole.

The Design-Build Team shall provide a removable pole cap with stainless steel attachment screws for the top of each pole. Ensure that the cap is cast aluminum conforming to Aluminum Association Alloy 356.0F. Furnish cap attached to the pole with a sturdy chain or cable approved by the Engineer. Ensure that the chain or cable is long enough to permit the cap to hang clear of the pole-top opening when the cap is removed.

After fabrication, have steel poles, required mast arms, and all parts used in the assembly hot-dip galvanized per section 1076. Design structural assemblies with weep holes large enough and properly located to drain molten zinc during galvanization process. The Design-Build Team shall provide hot-dip galvanizing on structures that meets or exceeds ASTM Standard A-123. The Design-Build Team shall provide galvanizing on hardware that meets or exceeds ASTM Standard A-153. Ensure that threaded material is brushed and retapped as necessary after galvanizing. Perform repair of damaged galvanizing that complies with the following:

Repair of GalvanizingArticle 1076-6

Standard Drawings for Metal Poles are available that supplement these Project Special Provisions. These drawings are located on the Department's website noted below:

<https://connect.nc.dot.gov/resources/safety/Pages/ITS-Design-Resources.aspx>

Comply with article 1098-1B "General Requirements" of the 2012 *Standard Specifications for Roads and Structures* for submittal requirements. The Design-Build Team shall provide shop drawings for approval. The Design-Build Team shall provide the copies of detailed shop drawings for each type of structure as summarized below. Ensure that shop drawings include material specifications for each component and identify welds by type and size on the drawing details, not in table format. Do not release structures for fabrication until shop drawings have been approved by NCDOT. The Design-Build Team shall provide an itemized bill of materials for all structural components and associated connecting hardware on the drawings.

Comply with article 1098-1A "General Requirements" of the 2012 *Standard Specifications for Roads and Structures* for Qualified Products List (QPL) submittals. All shop drawings shall include project location description, CCTV inventory number(s), and a project number or work order number on the drawings.

Summary of information required for metal pole review submittal:

Item	Hardcopy Submittal	Electronic Submittal	Comments / Special Instructions
Sealed, Approved ITS Plan / Loading Diagram	1	1	All structure design information needs to reflect the latest approved ITS plans.
Custom Pole Shop Drawings	4 sets	1 set	Submit drawings on 11" x 17" format media. Show NCDOT project number and CCTV camera number in or above the title block.
Standard Pole Shop Drawings (from the QPL)	4 sets	1 set	Submit drawings on 11" x 17" format media. Show NCDOT project number and CCTV camera number in or above the title block.
Structure Calculations	1 set	1 set	Submit calculations on 8½" x 11" format media. Show NCDOT project number and CCTV camera number in the upper right corner of each page.
Standard Pole Foundation Drawings	1 set	1 set	Submit drawings on 11" x 17" format media. Submit a completed Standard Foundation Selection form for each pole using foundation table on Metal Pole Drawing M-8.
Custom Foundation Drawings	4 sets	1 set	Submit drawings on 11" x 17" format media. Show NCDOT project number and CCTV camera number in or above the title block.
Foundation Calculations	1	1	Submit calculations on 8½" x 11" format media. Show NCDOT project number and CCTV camera number in the upper right corner of each page.
Soil Boring Logs and Report	1	1	Report should include a location plan and a soil classification report including soil capacity, water level, hammer efficiency, soil bearing pressure, soil density, etc. for each pole.

NOTE – All shop drawings and custom foundation design drawings shall be sealed by a professional Engineer licensed in the state of North Carolina. All geotechnical information shall be sealed by either a Professional Engineer or geologist licensed in the state of North Carolina. Include a title block and revision block on the shop drawings and foundation designs showing the NCDOT inventory number.

Shop drawings and foundation drawings may be submitted together or separately for approval. However, shop drawings shall be approved before foundations can be reviewed. Foundation designs will be returned without review if the associated shop drawing has not been approved. Incomplete submittals will be returned without review.

3.3 CONSTRUCTION METHODS

CCTV Metal Poles

Install anchor rod assemblies in accordance with the *Foundations and Anchor Rod Assemblies for Metal Poles* Project Special Provision found elsewhere in this RFP.

Erect CCTV metal poles only after concrete has attained a minimum allowable compressive strength of 3,000 psi. For further construction methods, see construction methods for Metal Strain Pole.

Connect poles to grounding electrodes and bond them to the electrical service grounding electrodes.

For holes in the poles used to accommodate cables, install grommets before wiring pole or arm. Do not cut or split grommets.

Attach the hand hole covers to the pole by a sturdy chain or cable. Ensure the chain or cable is long enough to permit the cover to hang clear of the opening when the cover is removed, and is strong enough to prevent vandalism. Ensure the chain or cable will not interfere with service to the cables in the pole.

Attach cap to pole with a sturdy chain or cable. Ensure the chain or cable is long enough to permit the cap to hang clear of the opening when the cap is removed.

Perform repair of damaged galvanizing that complies with the 2012 *Standard Specifications for Roads and Structures*, Article 1076-6 "Repair of Galvanizing."

Install galvanized wire mesh around the perimeter of the base plate to cover the gap between the base plate and top of foundation for debris and pest control.

Install a 1/4-inch thick plate for concrete foundation tag to include: concrete grade, depth, diameter, and reinforcement sizes of the installed foundation.

Install CCTV metal poles, hardware, and fittings as shown on the manufacturer's installation drawings. Install poles so that when the pole is fully loaded it is within 2 degrees of vertical.

Drilled Pier Foundations

Construct drilled pier foundations in accordance with the *Foundations and Anchor Rod Assemblies for Metal Poles* Project Special Provision found elsewhere in this RFP.

GEOTEXTILE FOR PAVEMENT STABILIZATION

(5-7-14)

DB 08-05

Description

Furnish and place geotextile for pavement stabilization in accordance with the Geotechnical Engineering Scope of Work found elsewhere in this RFP. Geotextile for pavement stabilization may be required to prevent pavement cracking and provide separation between the subgrade and pavement section at locations shown in the plans developed by the Design-Build Team and as directed by the Engineer.

Materials

Refer to Division 10 of the 2012 *Standard Specifications for Roads and Structures*.

Item	Section
Geotextiles	1056

Provide Type 5 geotextile for geotextile for pavement stabilization that meets the following requirements:

GEOTEXTILE FOR PAVEMENT STABILIZATION REQUIREMENTS		
Property	Requirement (MARV ^A)	Test Method
Tensile Strength @ 5% Strain (MD & CD ^A)	1,900 lb/ft	ASTM D4595
Ultimate Tensile Strength (MD & CD ^A)	4,800 lb/ft	ASTM D4595
Melting Point	300° F	ASTM D276

A. Define “minimum average roll value” (MARV), “machine direction” (MD) and “cross-machine direction” (CD) in accordance with ASTM D4439.

Sampling

For the top half of all embankments, the Design-Build Team shall take soil samples of the embankment material as it is constructed. The Design-Build Team shall sample the embankment in three-foot thick zones at a minimum frequency of one sample per 1,000 feet, per each lane, for classification tests. For the aforementioned tests, a lane shall be considered up to 28 feet wide in one direction for sampling purposes. Additional samples shall be taken to ensure that all the predominant soil types, limits of distribution of these soils and different site conditions have been represented. For embankments less than 1,000 feet in length a minimum of one sample shall be required per three-foot thickness of embankment. The sample in the top most three-foot zone (after the project has been graded to within two inches of final sub-grade elevation) may also serve as the sample for the lime or cement mix design test if it also meets the testing requirements in the *Cement and Lime Stabilization of Sub-Grade Soils* Project Special Provision found elsewhere in this RFP.

In lieu of testing the embankment material, the Design-Build Team shall provide geotextile for pavement stabilization that meets the requirements in the table above for all embankments that are a minimum of ten feet in height (as measured vertically from the toe of the embankment to the elevation of outer edge of pavement) and 200 feet in length.

Submittals for Review and Approval Prior to Construction

The Design-Build Team shall adhere to the following submittal guidelines:

- Submit all laboratory test results for review to the Geotechnical Engineering Unit – Geopavement Section within five days of completion.

- Submit a sketch in plan view showing areas of the project to be stabilized by geotextile for pavement stabilization.
- Submit any other documentation that supports the Design-Build Team's recommendations.

Construction Methods

The Design-Build Team shall determine if geotextile for pavement stabilization is required. The Design-Build Team shall show proposed locations in the plan views developed by the Design-Build Team and at other locations as directed by the Engineer. Allow ten days after lab tests are received to determine if geotextile for pavement stabilization is required in additional locations. In areas with geotextile for pavement stabilization, the limits of the geotextile shall match limits of the stabilized subgrade.

Place geotextile for pavement stabilization on top of the finished subgrade as shown in the plans developed by the Design-Build Team and in slight tension free of kinks, folds, wrinkles or creases. Install geotextiles with the MD perpendicular to the roadway centerline. The MD is the direction of the length or long dimension of the geotextile roll. Do not splice or overlap geotextiles in the MD so splices or overlaps are parallel to the roadway centerline. Extend geotextile for pavement stabilization 12" beyond the base course as shown in the plans developed by the Design-Build Team.

Completely cover subgrades with geotextile for pavement stabilization so geotextiles are adjacent to each other in the CD, i.e., perpendicular to the MD. The CD is the direction of the width or short dimension of the geotextile roll. Overlapping geotextiles in the CD is permitted but not required. Overlap geotextiles in the direction that base course will be placed to prevent lifting the edge of the top geotextile.

For asphalt base courses, asphalt mixture temperatures in the truck shall not exceed 315° F at the time of placement. Do not damage geotextile for pavement stabilization when constructing base courses. Place and compact base courses in accordance with the 2012 *Standard Specifications for Roads and Structures*. Do not operate heavy equipment on geotextiles any more than necessary to construct pavement sections. Replace any damaged geotextiles to the satisfaction of the Engineer.

FOUNDATIONS AND ANCHOR ROD ASSEMBLIES FOR METAL POLES

(1-17-12) (Rev. 4-10-15)

9, 14, 17

DB9 R05

Description

Foundations for metal poles include foundations for signals, cameras, overhead and dynamic message signs (DMS) and high mount and low level light standards supported by metal poles or upright trusses. Foundations consist of footings with pedestals and drilled piers with or without grade beams or wings. Anchor rod assemblies consist of anchor rods (also called anchor bolts) with nuts and washers on the exposed ends of rods and nuts and a plate or washers on the other ends of rods embedded in the foundation.

Construct concrete foundations with the required resistances and dimensions and install anchor rod assemblies in accordance with the contract and accepted submittals. Construct drilled piers consisting of cast-in-place reinforced concrete cylindrical sections in excavated holes. Provide temporary casings or polymer slurry as needed to stabilize drilled pier excavations. Use a prequalified Drilled Pier Contractor to construct drilled piers for metal poles. Define “excavation” and “hole” as a drilled pier excavation and “pier” as a drilled pier.

This provision does not apply to materials and anchor rod assemblies for standard foundations for low level light standards. See Section 1405 of the 2012 *Standard Specifications for Roads and Structures* and Roadway Standard Drawing No. 1405.01 for materials and anchor rod assemblies for standard foundations. For construction of standard foundations for low level light standards, standard foundations are considered footings in this provision.

This provision does not apply to foundations for signal pedestals; see Section 1743 of the 2012 *Standard Specifications for Roads and Structures* and Roadway Standard Drawing No. 1743.01.

Materials

Refer to the 2012 *Standard Specifications for Roads and Structures*.

Item	Section
Conduit	1091-3
Grout, Type 2	1003
Polymer Slurry	411-2(B)
Portland Cement Concrete	1000
Reinforcing Steel	1070
Rollers and Chairs	411-2(C)
Temporary Casings	411-2(A)

Provide Type 3 material certifications in accordance with Article 106-3 of the 2012 *Standard Specifications for Roads and Structures* for conduit, rollers, chairs and anchor rod assemblies. Store steel materials on blocking at least 12" above the ground and protect it at all times from damage; and when placing in the work make sure it is free from dirt, dust, loose mill scale, loose rust, paint, oil or other foreign materials. Load, transport, unload and store foundation and anchor rod assembly materials so materials are kept clean and free of damage. Bent, damaged and / or defective materials shall be rejected.

Use conduit type in accordance with the contract. Use Class A concrete for footings and pedestals, Class Drilled Pier concrete for drilled piers and Class AA concrete for grade beams and wings including portions of drilled piers above bottom of wings elevations. Corrugated temporary casings may be accepted at the sole discretion of the Engineer. A list of approved polymer slurry products is available from:

connect.ncdot.gov/resources/Geological/Pages/Products.aspx

Provide anchor rod assemblies in accordance with the contract consisting of the following:

- A. Straight anchor rods
- B. Heavy hex top and leveling nuts and flat washers on exposed ends of rods
- C. Nuts and either flat plates or washers on the other ends of anchor rods embedded in foundations

Do not use lock washers. Use steel anchor rods, nuts and washers that meet ASTM F1554 for Grade 55 rods and Grade A nuts. Use steel plates and washers embedded in concrete with a thickness of at least 1/4". Galvanize anchor rods and exposed nuts and washers in accordance with Article 1076-4 of the 2012 *Standard Specifications for Roads and Structures*. It is not necessary to galvanize nuts, plates and washers embedded in concrete.

Construction Methods

Install the required size and number of conduits in foundations in accordance with the plans developed by the Design-Build Team and accepted submittals. Construct top of piers, footings, pedestals, grade beams and wings flat, level and within 1" of elevations shown in the plans developed by the Design-Build Team or approved by the Engineer. Provide an Ordinary Surface finish in accordance with Subarticle 825-6(B) of the 2012 *Standard Specifications for Roads and Structures* for portions of foundations exposed above finished grade. Do not remove anchor bolt templates or pedestal or grade beam form or erect metal poles or upright trusses onto foundations until concrete attains a compressive strength of at least 3,000 psi.

(A) Drilled Piers

Before starting drilled pier construction, hold a predrill meeting to discuss the installation, monitoring and inspection of the drilled piers. Schedule this meeting after the Drilled Pier Contractor has mobilized to the site. The Resident or Division Traffic Engineer, Design-Build Team and Drilled Pier Contractor Superintendent shall attend this predrill meeting.

Do not excavate holes, install piles or allow equipment wheel loads or vibrations within 20 feet of completed piers until 16 hours after Drilled Pier concrete reaches initial set.

Check for correct drilled pier alignment and location before beginning drilling. Check plumbness of holes frequently during drilling.

Construct drilled piers with the minimum required diameters shown in the plans developed by the Design-Build Team. Install piers with tip elevations no higher than shown in the plans developed by the Design-Build Team or approved by the Engineer.

Excavate holes with equipment of the sizes required to construct drilled piers. Depending on the subsurface conditions encountered, drilling through rock and boulders may be required. Do not use blasting for drilled pier excavations.

Contain and dispose of drilling spoils and waste concrete as directed and in accordance with Section 802 of the 2012 *Standard Specifications for Roads and Structures*. Drilling spoils shall consist of all materials and fluids removed from excavations.

If unstable, caving or sloughing materials are anticipated or encountered, stabilize holes with temporary casings and / or polymer slurry. Do not use telescoping temporary casings. If it becomes necessary to replace a temporary casing during drilling, backfill the excavation, insert a larger casing around the casing to be replaced or stabilize the excavation with polymer slurry before removing the temporary casing.

If temporary casings become stuck or the Design-Build Team proposes leaving casings in place, temporary casings shall be installed against undisturbed material. Unless otherwise approved, do not leave temporary casings in place for mast arm poles or cantilever signs. The Engineer will determine if casings may remain in place. If the Design-Build Team proposes leaving temporary casings in place, do not begin drilling until a casing installation method is approved.

Use polymer slurry and additives to stabilize holes in accordance with the slurry manufacturer's recommendations. Provide mixing water and equipment suitable for polymer slurry. Maintain polymer slurry at all times so slurry meets Table 411-3 of the 2012 *Standard Specifications for Roads and Structures* except for sand content.

Define a "sample set" as slurry samples collected from mid-height and within two feet of the bottom of holes. Take sample sets from excavations to test polymer slurry immediately after filling holes with slurry, at least every four hours thereafter and immediately before placing concrete. Do not place Drilled Pier concrete until both slurry samples from an excavation meet the required polymer slurry properties. If any slurry test results do not meet the requirements, the Engineer may suspend drilling until both samples from a sample set meet the required slurry properties.

Remove soft and loose material from bottom of holes using augers to the satisfaction of the Engineer. Assemble rebar cages and place cages and Drilled Pier concrete in accordance with Subarticle 411-4(E) of the 2012 *Standard Specifications for Roads and Structures*, except for the following:

- (1) Inspections for tip resistance and bottom cleanliness are not required
- (2) Temporary casings may remain in place, if approved
- (3) Concrete placement may be paused near the top of pier elevations for anchor rod assembly installation and conduit placement

- (4) If applicable, concrete placement may be stopped at bottom of grade beam or wings elevations for grade beam or wing construction.

If wet placement of concrete is anticipated or encountered, do not place Drilled Pier concrete until a concrete placement procedure is approved by the Engineer. If applicable, temporary casings and fluids may be removed when concrete placement is paused or stopped in accordance with the exceptions above provided holes are stable. Remove contaminated concrete from exposed Drilled Pier concrete after removing casings and fluids. If holes are unstable, do not remove temporary casings until a procedure for placing anchor rod assemblies and conduit or constructing grade beams or wings is approved by the Engineer.

Use collars to extend drilled piers above finished grade. Remove collars after Drilled Pier concrete sets and round top edges of piers.

If drilled piers are questionable, pile integrity testing (PIT) and further investigation may be required in accordance with Article 411-5 of the 2012 *Standard Specifications for Roads and Structures*. A drilled pier shall be considered defective in accordance with Subarticle 411-5(D) of the 2012 *Standard Specifications for Roads and Structures* and drilled pier acceptance shall be based in part on the criteria in Article 411-6 of the 2012 *Standard Specifications for Roads and Structures* except for the top of pier tolerances in Subarticle 411-6(C) of the 2012 *Standard Specifications for Roads and Structures*.

If a drilled pier is under further investigation, do not grout core holes, backfill around the pier or perform any work on the drilled pier until the Engineer accepts the pier. If the drilled pier is accepted, dewater and grout core holes and backfill around the pier with approved material to finished grade. If the Engineer determines a pier is unacceptable, remediation shall be required in accordance with Article 411-6 of the 2012 *Standard Specifications for Roads and Structures*. No additional compensation or extension of completion date or time will be allowed for remediation of unacceptable drilled piers or post repair testing.

Permanently embed a plate in or mark top of piers with the pier diameter and depth, size and number of vertical reinforcing bars and the minimum compressive strength of the concrete mix at 28 days.

(B) Footings, Pedestals, Grade Beams and Wings

Excavate as necessary for footings, grade beams and wings in accordance with the plans developed by the Design-Build Team, accepted submittals and Section 410 of the 2012 *Standard Specifications for Roads and Structures*. If unstable, caving or sloughing materials are anticipated or encountered, shore foundation excavations as needed with an approved method. Notify the Engineer when foundation excavation is complete. Do not place concrete or reinforcing steel until excavation dimensions and foundation material are approved by the Engineer.

Construct cast-in-place reinforced concrete footings, pedestals, grade beams and wings with the dimensions shown in the plans developed by the Design-Build Team and in accordance with Section 825 of the 2012 *Standard Specifications for Roads and Structures*. Use forms to construct portions of pedestals and grade beams protruding above finished grade. Provide a chamfer with a 3/4" horizontal width for pedestal and grade beam edges exposed above finished grade. Backfill and fill in accordance with Article 410-8 of the 2012 *Standard Specifications for Roads and Structures*. Proper compaction around footings and wings is critical for foundations to resist uplift and torsion forces. Place concrete against undisturbed soil and do not use forms for standard foundations for low level light standards.

(C) Anchor Rod Assemblies

Size anchor rods for design and the required projection above top of foundations. Determine required anchor rod projections from nut, washer and base plate thicknesses, the protrusion of three to five anchor rod threads above top nuts after tightening and the distance of one nut thickness between top of foundations and bottom of leveling nuts.

Protect anchor rod threads from damage during storage and installation of anchor rod assemblies. Before placing anchor rods in foundations, turn nuts onto and off rods past leveling nut locations. Turn nuts with the effort of one workman using an ordinary wrench without a cheater bar. Report any thread damage to the Engineer that requires extra effort to turn nuts.

Arrange anchor rods symmetrically about center of base plate locations as shown in the plans developed by the Design-Build Team. Set anchor rod elevations based on required projections above top of foundations. Securely brace and hold rods in the correct position, orientation and alignment with a steel template. Do not weld to reinforcing steel, temporary casings or anchor rods.

Install top and leveling (bottom) nuts, washers and the base plate for each anchor rod assembly in accordance with the following procedure:

- (1) Turn leveling nuts onto anchor rods to a distance of one nut thickness between the top of foundation and bottom of leveling nuts. Place washers over anchor rods on top of leveling nuts.
- (2) Determine if nuts are level using a flat rigid template on top of washers. If necessary, lower leveling nuts to level the template in all directions or if applicable, lower nuts to tilt the template so the metal pole or upright truss will lean as shown in the plans developed by the Design-Build Team. If leveling nuts and washers are not in full contact with the template, replace washers with galvanized beveled washers.
- (3) Verify the distance between the foundation and leveling nuts is no more than one nut thickness.

- (4) Place base plate with metal pole or upright truss over anchor rods on top of washers. High mount luminaires may be attached before erecting metal poles but do not attach cables, mast arms or trusses to metal poles or upright trusses at this time.
- (5) Place washers over anchor rods on top of base plate. Lubricate top nut bearing surfaces and exposed anchor rod threads above washers with beeswax, paraffin or other approved lubricant.
- (6) Turn top nuts onto anchor rods. If nuts are not in full contact with washers or washers are not in full contact with the base plate, replace washers with galvanized beveled washers.
- (7) Tighten top nuts to snug-tight with the full effort of one workman using a 12" wrench. Do not tighten any nut all at once. Turn top nuts in increments. Follow a star pattern cycling through each nut at least twice.
- (8) Repeat (7) for leveling nuts.
- (9) Replace washers above and below the base plate with galvanized beveled washers if the slope of any base plate face exceeds 1:20 (5%), any washer is not in firm contact with the base plate or any nut is not in firm contact with a washer. If any washers are replaced, repeat (7) and (8).
- (10) With top and leveling nuts snug-tight, mark each top nut on a corner at the intersection of two flats and a corresponding reference mark on the base plate. Mark top nuts and base plate with ink or paint that is not water-soluble. Use the turn-of-nut method for pretensioning. Do not pretension any nut all at once. Turn top nuts in increments for a total turn that meets the following nut rotation requirements:

NUT ROTATION REQUIREMENTS (Turn-of-Nut Pretensioning Method)	
Anchor Rod Diameter, inch	Requirement
$\leq 1 \frac{1}{2}$	1/3 turn (2 flats)
$> 1 \frac{1}{2}$	1/6 turn (1 flat)

Follow a star pattern cycling through each top nut at least twice.

- (11) Ensure nuts, washers and base plate are in firm contact with each other for each anchor rod. Cables, mast arms and trusses may now be attached to metal poles and upright trusses.

- (12) Between four and 14 days after pretensioning top nuts, use a torque wrench calibrated within the last 12 months to check nuts in the presence of the Engineer. Completely erect mast arm poles and cantilever signs and attach any hardware before checking top nuts for these structures. Check that top nuts meet the following torque requirements:

TORQUE REQUIREMENTS	
Anchor Rod Diameter, inch	Requirement, ft-lb
7/8	180
1	270
1 1/8	380
1 1/4	420
$\geq 1 \frac{1}{2}$	600

If necessary, retighten top nuts in the presence of the Engineer with a calibrated torque wrench to within ± 10 ft-lb of the required torque. Do not overtighten top nuts.

- (13) Do not grout under base plate.

OVERHEAD SIGN SUPPORTS

(8-27-12)

DB11 R012

Description

Design, fabricate, furnish and erect various types of overhead sign assemblies. Fabricate supporting structures using tubular members of either aluminum or steel. The types of overhead sign assemblies included in this specification are span structures and cantilever structures.

Materials

Structural Steel.....	Section 1072
Overhead Sign Structures.....	Section 1096
Signing Materials.....	Section 1092
Organic Zinc Repair Paint	Article 1080-9
Reinforcing Steel	Section 1070
Direct Tension Indicators.....	Sections 440 and 1072

Construction Methods

A. General

Fabricate overhead sign assemblies in accordance with the details shown in the approved working drawings and the requirements of these specifications.

No welding, cutting or drilling will be permitted in the field, unless approved by the Engineer.

Drill bolt holes and slots to finished size. Holes may also be punched to finished size, provided the diameter of the punched holes is at least twice the thickness of the metal being punched. Flame cutting of bolt holes and slots is not permitted.

Erect sign panels in accordance with the requirements for Type A or B signs as indicated in the plans developed by the Design-Build Team or Roadway Standard Drawings. Field drill two holes per connection in the Z bars for attaching signs to overhead structures. Provide two U-bolts at each U-bolt connection such as each truss chord to sign hanger and each truss chord to walkway support or light support. Provide two U-bolts at each U-bolt connection where ends of truss chords are supported. The minimum diameter of all U-bolts shall be ½ inch.

For all U-bolt connections of hanger beams to overhead assembly truss chords, provide all U-bolts with a flat washer and double nuts at each end of the U-bolts. All double nuts that are on any U-bolt shall be the same thickness and weight. When assembled, the double nuts shall be brought tight against each other by the use of two wrenches.

Use two coats of a zinc-rich paint to touch up minor scars on all galvanized materials.

For high strength bolted connections, use direct tension indicators. Galvanize bolts, nuts and washers in accordance with the 2012 *Standard Specifications for Roads and Structures*.

B. Shop Drawings

Design the overhead sign supports, including foundations, prior to fabrication. Submit design calculations and working drawings of the designs to the Engineer for review and acceptance.

Have a professional engineer registered in the State of North Carolina perform the computations and render a set of sealed, signed and dated drawings detailing the construction of each structure.

Submit to the Engineer for review and acceptance complete design and fabrication details for each overhead sign assembly, including foundations and brackets for supporting the signs, and maintenance walkways, if applicable, electrical control boxes, and lighting luminaires. Base design upon the revised structure line drawings, wind load area and the wind speed shown in the plans developed by the Design-Build Team, and in accordance with the 2009 AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals*, 5th Edition, and the 2010 and 2011 Interim Revisions.

Submit thirteen (13) copies of completely detailed working drawings and one copy of the design calculations including all design assumptions for each overhead sign assembly to the Engineer for approval prior to fabrication. Working drawings shall include complete design and fabrication details (including foundations); provisions for attaching signs, maintenance walkways (when applicable), lighting luminaires to supporting structures, applicable material specifications, and any other information necessary for procuring and replacing any part of the complete overhead sign assembly.

Allow 15 days for initial working drawing review after the Engineer receives them. If revisions to working drawings are required, an additional 15 days shall be required for review and approval of the final working drawings.

Approval of working drawings by the Engineer shall not relieve the Design-Build Team of responsibility for the correctness of the drawings, or for the fit of all shop and field connections and anchors.

C. Design and Fabrication

The following criteria govern the design of overhead sign assemblies:

Design shall be in accordance with the 2009 AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals*, 5th Edition, and the 2010 and 2011 Interim Revisions.

Within this Specification, there are several design criteria that are owner specified. They include:

- Overhead cantilever sign structures shall include galloping loads (exclude four-chord horizontal trusses).
- The natural wind gust speed in North Carolina shall be assumed to be 11.6 mph.
- The fatigue importance category used in the design, for each type of structure, shall be for:
 - Cantilever structures with span greater than 50 feet – Fatigue Category I
 - Cantilever structures with span less than or equal to 50 feet – Fatigue Category II
 - Non-cantilever structures – Fatigue Category II

The following Specification interpretations or criteria shall be used in the design of overhead sign assemblies:

- For design of supporting upright posts or columns, the effective length factor for columns “K”, as provided for in Appendix B, Section B.5, shall be taken as the following, unless otherwise approved by the Engineer:
 - Case 1 For a single upright post of cantilever or span type overhead sign structure, the effective column length factor, “K”, shall be taken as 2.0.
 - Case 2 For twin post truss-type upright post with the post connected to one chord of a horizontal truss, the effective column length factor for that column shall be taken as 2.0.
 - Case 3 For twin post truss-type upright post with the post connected to two truss chords of a horizontal tri-chord or box truss, the effective column length factor for that column shall be taken as 1.65
- For twin post truss-type uprights, the unbraced length of the post shall be from the chord to post connection to the top of base plate.

For twin post truss-type uprights, when the post is subject to axial compression, bending moment, shear, and torsion the post shall satisfy the 2009 AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals*, 5th Edition, and the 2010 and 2011 Interim Revisions Equations 5-17, 5-18 and 5-19. To reduce the effects of secondary bending, in lieu of Equation 5-18, the following equation may be used:

$$\frac{f_a}{F_a} + \frac{f_b}{\left(1 - \frac{0.6f_a}{F_e}\right)F_b} + \left(\frac{f_v}{F_v}\right)^2 \leq 1.0$$

Where f_a = Computed axial compression stress at base of post

- The base plate thickness for all uprights and poles shall be a minimum of 2” but not less than that determined by the following criteria and design.
 - Case 1 Circular or rectangular solid base plates with the upright pole welded to the top surface of base plate with full penetration butt weld, and where no stiffeners are provided. A base plate with a small center hole, which is less than 1/5 of the upright diameter, and located concentrically with the upright pole, may be considered as a solid base plate.

The magnitude of bending moment in the base plate, induced by the anchoring force of each anchor bolt shall be calculated as $M = (P \times D_1) / 2$.

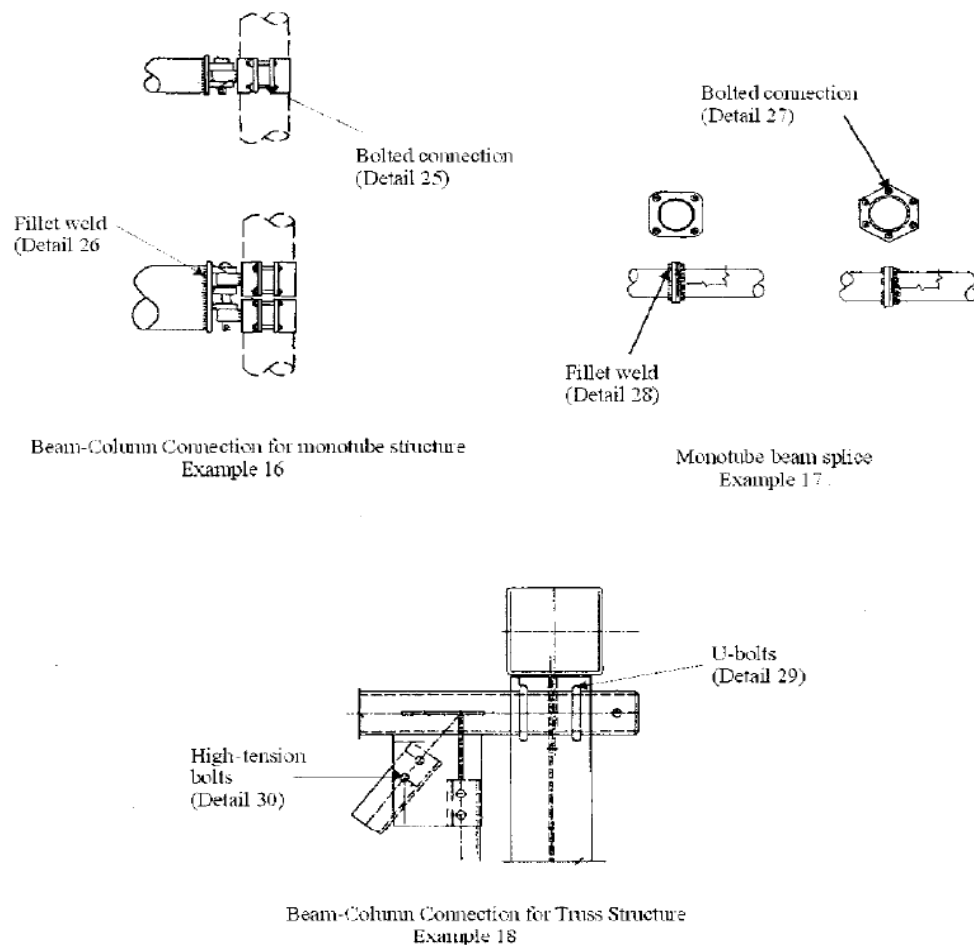
Case 2 Circular or rectangular base plate with the upright pole socketed into and attached to the base plate with two lines of fillet weld, and where no stiffeners are provided, or any base plate with a center hole that is larger in diameter than 1/5 of the upright diameter

The magnitude of bending moment induced by the anchoring force of each anchor bolt shall be calculated as $M = P \times D_2$.

- M - bending moment at the critical section of the base plate induced by one anchor bolt
 - P - anchoring force of each anchor bolt
 - D₁ - horizontal distance between the center of the anchor bolt and the outer face of the upright, or the difference between the radius of the bolt circle and the outside radius of the upright
 - D₂ - horizontal distance between the face of the upright and the face of the anchor bolt nut
- The critical section shall be located at the face of the anchor bolt and perpendicular to the radius of the bolt circle. The overlapped part of two adjacent critical sections shall be considered ineffective.
 - The thickness of Case 1 base plate shall not be less than that calculated based on formula for Case 2.
 - Uprights, foundations, and trusses that support overhead signs shall be designed in accordance with the *Overhead and Dynamic Message Sign Foundations* Project Special Provision found elsewhere in this RFP for the effects of torsion. Torsion shall be considered from dead load eccentricity of these attachments, as well as for attachments such as walkways, supporting brackets, lights, etc., that add to the torsion in the assembly. Truss vertical and horizontal truss diagonals in particular and any other assembly members shall be appropriately sized for these loads.
 - Uprights, foundations, and trusses that support overhead mounted signs shall be designed for the proposed sign wind area and future wind areas. The design shall consider the effect of torsion induced by the eccentric force location of the center of wind force above (or below) the center of the supporting truss. Truss vertical and horizontal truss diagonals in particular and any other assembly members shall be appropriately sized for these loads.

For non-cantilevered monotube sign support structures, the following table and figures are considered as a required addition to the 2009 AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals*, 5th Edition, and the 2010 and 2011 Interim Revisions:

Construction	Detail	Stress Category	Application	Example
Mechanically Fastened Connections	25. Bolts in Tension	D	Beam column connection for monotube structures	16
Fillet Weld Connections	26. Fillet welded with one side normal to applied stress	E'	Beam column connection for monotube structures	17
Mechanically Fastened Connections	27. High strength bolts in tension	D	Monotube or truss-chord splice	17
Fillet Weld Connections	28. Fillet welded with one side normal to applied stress	E'	Monotube or truss-chord splice	17
Mechanically Fastened Connections	29. U-bolts tied to transverse truss column to keep chords in place	D	Horizontal truss connection with vertical truss	18
Mechanically Fastened Connections	30. Net section of full-tightened, high tension bolts in shear	B	Truss bolted joint	18

Add to the Specifications, Figure 11-1:

Fabricate all overhead sign assemblies, including but not limited to foundations, in accordance with the details shown on the approved shop drawings and with the requirements of these Specifications.

Fabricate the span and cantilever supporting structures using tubular members of either aluminum or steel, using only one type of material throughout the project.

Horizontal components of the supporting structures for overhead signs may be of a truss design or a design using singular (monotube) horizontal members to support the sign panels.

Truss or singular member centerline must coincide with the centerline of sign design area shown on the structure line drawing.

Provide permanent camber in addition to dead load camber in accordance with the 2009 AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals*, 5th Edition, and the 2010 and 2011 Interim Revisions.

Indicate on the shop drawings the amount of camber provided and the method employed in the fabrication of the support to obtain the camber.

Use cantilever sign structures that meet the following design criteria:

- a. Do not exceed an $L / 150$ vertical dead load deflection at the end of the arm due to distortions in the arm and vertical support, where L is the length of the arm from the center of the vertical support to the outer edge of the sign.
- b. Do not exceed an $L / 40$ horizontal deflection at the end of the arm due to distortions in the arm and vertical support, as a result of design wind load.

Fabricate attachment assemblies for mounting signs in a manner that allows easy removal of sign panels for repair.

OVERHEAD AND DYNAMIC MESSAGE SIGN FOUNDATIONS

(9-1-11)

DB11 R013

Description

Sign foundations include foundations for overhead and dynamic message signs (DMS) supported by metal poles or upright trusses. Sign foundations consist of footings with pedestals or drilled piers with or without grade beams or wings, conduit and anchor rod assemblies. Construct sign foundations in accordance with the contract and accepted submittals. Define “cantilever sign” as an overhead cantilever sign support in accordance with Figure 1-1 of the 2009 AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals*, 5th Edition, and the 2010 and 2011 Interim Revisions.

Materials

Use sign foundation materials that meet the *Foundations and Anchor Rod Assemblies for Metal Poles* Project Special Provision found elsewhere in this RFP.

Assumed Subsurface Conditions

Assume the following soil parameters and groundwater elevation for sign foundations unless these subsurface conditions are not applicable to sign locations:

- (A) Unit weight = 120 lb/cf
- (B) Friction angle = 30 degrees
- (C) Cohesion = 0 lb/sf
- (D) Groundwater 7 feet below finished grade

A subsurface investigation shall be required if the Engineer determines these assumed subsurface conditions do not apply to a sign location and the sign cannot be moved. Subsurface conditions

requiring a subsurface investigation shall include, but are not limited to, weathered or hard rock, boulders, very soft or loose soil, muck or shallow groundwater. No extension of completion date or time will be allowed for subsurface investigations.

Subsurface Investigations

Use a prequalified geotechnical consultant to perform one standard penetration test (SPT) boring in accordance with ASTM D1586 at each sign location requiring a subsurface investigation. Rough grade sign locations to within two feet of finished grade before beginning drilling. Drill borings to two drilled pier diameters below anticipated pier tip elevations or refusal, whichever is higher.

Use the computer software gINT version V8i or later manufactured by Bentley Systems, Inc. with the current NCDOT gINT library and data template to produce SPT boring logs. Provide boring logs sealed by a geologist or engineer licensed in the state of North Carolina.

Sign Foundation Designs

Design sign foundations for the appropriate wind zone and the clearances shown in the plans developed by the Design-Build Team and the slope of finished grade at each sign location. Use the assumed soil parameters and groundwater elevation above for sign foundation designs unless a subsurface investigation is performed or required by the Engineer. For sign locations requiring a subsurface investigation, design sign foundations for the subsurface conditions at each sign location. Design footings, pedestals, drilled piers, grade beams and wings in accordance with the 2009 AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals*, 5th Edition, and the 2010 and 2011 Interim Revisions. In some instances, conflicts with drainage structures may dictate sign foundation types.

Design footings in accordance with Section 4.4 of the AASHTO *Standard Specifications for Highway Bridges*. Do not use an allowable bearing pressure of more than 3,000 lb/sf for footings.

Design drilled piers for side resistance only in accordance with Section 4.6 of the AASHTO *Standard Specifications for Highway Bridges* except reduce ultimate side resistance by 25% for uplift. Use the computer software LPILE version 6.0 or later manufactured by Ensoft, Inc. to analyze drilled piers. Provide drilled pier designs with a horizontal deflection of less than 1" at top of piers. For cantilever signs with single drilled pier foundations supporting metal poles, use wings to resist torsion forces. Provide drilled pier designs with a factor of safety of at least 2.0 for torsion.

For drilled pier sign foundations supporting upright trusses, use dual drilled piers connected with a grade beam having a moment of inertia approximately equal to that of either pier. The Broms' method is acceptable to analyze drilled piers with grade beams instead of LPILE. Use a safety factor of at least 3.5 for the Broms' design method in accordance with C13.6.1.1 of the 2009 AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals*, 5th Edition, and the 2010 and 2011 Interim Revisions.

Submit boring logs, if any, working drawings and design calculations for acceptance in accordance with Article 105-2 of the 2012 NCDOT *Standard Specifications for Roads and Structures*. Submit working drawings showing plan views, required foundation dimensions and elevations and typical sections with reinforcement, conduit and anchor rod assembly details. Include all boring logs, design calculations and LPILE output for sign foundation design submittals. Have sign foundations designed, detailed and sealed by an engineer licensed in the state of North Carolina.

Construction Methods

Construct footings, pedestals, drilled piers, grade beams and wings and install anchor rod assemblies for sign foundations in accordance with the *Foundations and Anchor Rod Assemblies for Metal Poles* Project Special Provision found elsewhere in this RFP.

HIGH MOUNT FOUNDATIONS

(9-1-11)

DB11 R014

Description

High mount foundations for high mount standards consist of drilled piers or footings with pedestals, conduit and anchor rod assemblies. Construct high mount foundations in accordance with the contract and either Roadway Standard Drawing No. 1402.01 or the accepted submittals. Define “high mount standard foundation” as a drilled pier including the conduit and anchor rod assembly that adheres to Roadway Standard Drawing No. 1402.01.

Materials

Use high mount foundation materials that meet the *Foundations and Anchor Rod Assemblies for Metal Poles* Project Special Provision found elsewhere in this RFP.

High Mount Standard Foundations

Construct high mount standard foundations for the appropriate wind zone and high mount heights shown in the plans developed by the Design-Build Team unless the following assumed site conditions are not applicable to high mount locations:

- (A) Soil with unit weight (γ) \geq 120 lb/cf and friction angle (ϕ) \geq 30° ,
- (B) Groundwater at least 7 feet below finished grade, and
- (C) Slope of finished grade 6:1 (H:V) or flatter.

A subsurface investigation and high mount foundation design shall be required if the Engineer determines these assumed site conditions do not apply to a high mount location and the high mount cannot be moved. Subsurface conditions requiring a high mount foundation design include but are not limited to weathered or hard rock, boulders, very soft or loose soil, muck or shallow groundwater. No extension of completion date or time shall be allowed for subsurface investigations or high mount foundation designs.

Subsurface Investigations

Use a prequalified geotechnical consultant to perform one standard penetration test (SPT) boring in accordance with ASTM D1586 at each high mount location requiring a subsurface investigation. In fill sections, rough grade high mount locations to within two feet of finished grade before beginning drilling. Drill borings to two drilled pier diameters below anticipated pier tip elevations or refusal, whichever is higher.

Use the computer software gINT version V8i or later manufactured by Bentley Systems, Inc. with the current NCDOT gINT library and data template to produce SPT boring logs. Provide boring logs sealed by a geologist or engineer licensed in the state of North Carolina.

High Mount Foundation Designs

Design high mount foundations for the wind zone and high mount heights shown in the plans developed by the Design-Build Team and the slope of finished grade and subsurface conditions at each high mount location. Design drilled piers, footings and pedestals in accordance with the *AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals*, 6th Edition.

Design drilled piers for side resistance only in accordance with Section 4.6 of the *AASHTO Standard Specifications for Highway Bridges*. Use the computer software LPILE version 6.0 or later manufactured by Ensoft, Inc. to analyze drilled piers. Provide drilled pier designs with a horizontal deflection of less than 0.5" at top of piers.

Design footings in accordance with Section 4.4 of the *AASHTO Standard Specifications for Highway Bridges*. Do not use an allowable bearing pressure of more than 3,000 lb/sf for footings.

Submit boring logs, working drawings and design calculations for acceptance in accordance with Article 105-2 of the 2012 *Standard Specifications for Roads and Structures*. Submit working drawings showing plan views, required foundation dimensions and elevations and typical sections with reinforcement, conduit and anchor rod assembly details. Include all boring logs, design calculations and LPILE output for high mount foundation design submittals. Have high mount foundations designed, detailed and sealed by an engineer licensed in the state of North Carolina.

Construction Methods

Grade a three-foot diameter level work area around high mount locations with cut and fill slopes as shown on Roadway Standard Drawing No. 1402.01. Construct drilled piers, footings and pedestals and install anchor rod assemblies for high mount foundations in accordance with the *Foundations and Anchor Rod Assemblies for Metal Poles* Project Special Provision found elsewhere in this RFP.

SANITARY SEWER

(10-7-13)

1520

DB15 R20

Revise the 2012 *Standard Specifications for Roads and Structures* as follows:

Page 15-11, Article 1520-3(A)(2) Testing, line 5, replace the second paragraph with the following:

Test all 24" and smaller gravity sewer lines for leakage using infiltration, exfiltration, or air test. Perform visual inspection on gravity sewer lines larger than 24". Perform line and grade testing and deflection testing on all gravity sewer lines.

SOUND BARRIER WALL - GROUND MOUNTED

(3-6-15)

(A) DESCRIPTION

This work consists of furnishing precast panels, structural steel, concrete columns, and all other materials; handling, transporting, fabricating, galvanizing, and storing materials; furnishing erection drawings, pile excavation, backfilling, erecting and installing the sound barrier wall members and all other materials as required by the plans developed by the Design-Build Team, the 2012 *Standard Specifications for Roads and Structures* and this Project Special Provision.

Unless otherwise approved by the Engineer, the Design-Build Team has a choice of ten or 15-foot pile spacing. Pile spacing greater than 15 feet will not be permitted. Provide consistent pile spacing the entire length of the wall. Use odd pile spacing, if necessary, only at the ends of the wall and at turning points, as approved by the Engineer.

A maximum one-foot drop or rise in top of wall elevation between wall sections will be permitted. Elevation changes greater than one foot, if necessary, will be allowed only at the end of the wall. Top of wall elevation changes that result in a jagged appearance shall not be allowed. Unless otherwise approved by NCDOT, the wall shall adhere to the September 8, 2014 U-2827B Design Noise Report, May 15, 2015 U-2827B Design Noise Report Addendum and May 6, 2016 U-2827B Design Noise Report Memorandum provided by the Department.

(B) ALTERNATE PILE SPACING

As an alternate, the Design-Build Team may submit plans for pile spacing greater than 10 feet and less than 15 feet for review and approval. A submittal reducing the post spacing shall include the material and design specifications. The submittal shall also include an elevation view depicting the revised post spacing and proposed top of wall elevations. The proposed top of wall elevations shall be equal to or greater than the dimensions shown in the September 8, 2014 U-2827B Design Noise Report and May 15, 2015 U-2827B Design Noise Report Addendum. The excavated hole diameter, excavation depth and reinforcing steel shall be equal to the amount required for 15-foot pile spacing. A variance in the

reinforcing steel will be allowed for the length of horizontal and number of vertical reinforcement bars in the precast panel for the alternate pile spacing.

Submit two sets of detailed plans for review. Include all details in the plans developed by the Design-Build Team, including the size and spacing of required reinforcement necessary to fabricate the precast panels. Have a North Carolina Registered Professional Engineer check, seal and date the aforementioned plans.

(C) ALTERNATE WALL TYPE

Walls that have been assigned “Approved” or “Approved for Provisional Use” status by the Product Evaluation Program will be considered for substitution to the detailed Standard Sound Barrier Wall only when approved by the Department. Alternate walls shall meet all design and construction requirements of this RFP. Alternate wall structural stability and connection details shall conform to the current edition of the AASHTO LRFD Bridge Design Specifications.

Prior to submittal of Working Drawings, as described herein, submit a copy of the signed NCDOT Product Status Notification Letter and two sets of preliminary plans for review and acceptance. Include material specifications for all components. Once preliminary plans are accepted, submit Working Drawings in accordance with all applicable portions of the requirements herein, including details necessary to fabricate and construct the proposed alternate.

Have a North Carolina Registered Professional Engineer check, seal and date the plans developed by the Design-Build Team and, when requested, calculations.

MATERIALS AND FABRICATION

Provide materials and fabricate members in accordance with the *Architectural Concrete Surface Treatment* Project Special Provision found elsewhere in this RFP, and the requirements of Division 10 of the 2012 *Standard Specifications for Roads and Structures*.

Provide precast panels that are nominally 4 inches \pm 1/4 inch thick with a simulated stone masonry textured surface on both faces. All texture shall extend outward from the nominal panel thickness. Furnish three 24" x 24" samples for approval which establish the acceptable variations in color, texture and uniformity. After the color, texture and uniformity of the furnished samples are approved, produce a full scale panel unit meeting design requirements. This mock-up and the furnished samples establish the standard quality for determining approval of the panels. When producing the final installed panels, use fine and coarse aggregate, retarder, and cement from the same source as those used in the approved sample panels.

CONSTRUCTION METHODS

Complete the final survey of existing ground profile after clearing the sound barrier wall area, but prior to submitting any Working Drawings. Submit the final groundline survey with the Working Drawings.

Excavate holes with the diameters shown on the plans developed by the Design-Build Team. Perform pile excavation to the depths shown on the aforementioned plans and install piles as shown on the plans developed by the Design-Build Team with a tolerance of ½-inch per foot from vertical. Backfill excavations with concrete after placing piles.

1. Pile Excavation

Use equipment of adequate capacity and capable of drilling through soil and non-soil including rock, boulders, debris, man-made objects and any other materials encountered. Blasting shall not be permitted to advance the excavation. Blasting for core removal shall only be permitted when approved by the Engineer. Dispose of drilling spoils in accordance with Section 802 of the 2012 *Standard Specifications for Roads and Structures* and as directed by the Engineer. Drilling spoils shall consist of all excavated material, including but not limited to water removed from the excavation either by pumping or drilling tools.

If unstable, caving or sloughing soils are anticipated or encountered, stabilize excavations with either slurry or steel casing. When using slurry, submit slurry details including product information, manufacturer's recommendations for use, slurry equipment information and written approval from the slurry supplier that the mixing water is acceptable before beginning drilling. When using steel casing, use either the sectional type or one continuous corrugated or non-corrugated piece. Steel casings shall consist of clean watertight steel of ample strength to withstand handling and driving stresses and the pressures imposed by concrete, earth or backfill. Use steel casings with an outside diameter equal to the hole size and a minimum wall thickness of ¼-inch.

2. Concrete Placement

Before placing concrete, center and support the pile in the excavation and check the water inflow rate in the excavation after any pumps have been removed. If the inflow rate is less than six inches per half hour, remove any water and free fall the concrete into the excavation. Ensure that concrete flows completely around the pile. If the water inflow rate is greater than six inches per half hour, propose a concrete placement procedure to the Engineer. The Engineer shall approve the concrete placement procedure before placing any concrete.

Fill the excavation with Class A concrete in accordance with Section 1000 of the 2012 *Standard Specifications for Roads and Structures*, except as modified herein. Provide concrete with a slump of six to eight inches. Use an approved high-range water reducer to achieve this slump. Place concrete in a continuous manner and remove all casings.

WORKING DRAWINGS

In accordance with Article 1077-2 of the 2012 *Standard Specifications for Roads and Structures*, submit casting drawings for the precast face panels for approval prior to casting.

Show the inserts, method of handling, and support details used for transportation on casting drawings. Submit metalwork fabrication drawings for approval prior to fabrication of steel wall components. Submit an erection plan and concrete face panel placing plan, including location of various heights of panels, for review and acceptance prior to fabrication of metalwork. Submit five sets of detail drawings for review and acceptance.

SOUND BARRIER WALL - BRIDGE MOUNTED

(3-31-16)

DESCRIPTION

This work consists of furnishing panels, planks, structural steel, form liners, coloring stains, and all other materials; handling, transporting, fabricating, galvanizing, and storing materials; furnishing erection drawings, erecting and installing the sound barrier wall members and all other materials as required by the plans developed by the Design-Build Team, the 2012 NCDOT *Standard Specifications for Roads and Structures* and this Project Special Provision.

Unless otherwise approved by the Engineer, post spacing greater than 15 feet and less than 10 feet will not be permitted. Provide consistent post spacing the entire length of the wall. Use odd post spacing, if necessary, only at the ends of the wall and at turning points, as approved by the Engineer.

The wall height shall be consistent across the bridge. Unless otherwise approved by NCDOT, the wall shall adhere to the September 8, 2014 U-2827B Design Noise Report, May 15, 2015 U-2827B Design Noise Report Addendum and May 6, 2016 U-2827B Design Noise Report Memorandum provided by the Department.

Submit two sets of detailed plans for review and acceptance. Include all details in the plans developed by the Design-Build Team, including the size, spacing and materials of required posts. Have a North Carolina Registered Professional Engineer check, seal and date the aforementioned plans.

WALL TYPE

Walls that have been assigned “Approved” or “Approved for Provisional Use” status by the Product Evaluation Program will be considered for use as the Sound Barrier Wall (Bridge Mounted) planks / panels. Wall plank / panel design details and materials shall meet all design and construction requirements of this RFP and the applicable loadings, except that the wall will not be required to meet the traffic loading requirements. Wall structural stability and connection details shall conform to the current edition of the AASHTO *LRFD Bridge Design Specifications*, except that traffic loading shall not be applied to the sound barrier wall.

The wall shall meet the following aesthetic requirements. The traffic and non-traffic faces of the wall planks / panels shall be configured such that only the post flanges extend beyond the face of the planks / panels such that a uniform surface is visible from the traffic

and non-traffic sides of the wall. This uniform surface appearance shall extend from the top of wall to the bottom of the vertical post members. The bottom of the wall shall be detailed for free and complete drainage of wall areas. Additionally, the plank / panel configuration shall allow for visual inspection of the post to concrete barrier rail bolts from the bottom of the wall without the need to remove any components.

Prior to submittal of Working Drawings, as described herein, submit a copy of the signed NCDOT Product Status Notification Letter and two sets of preliminary plans for review and acceptance. Include material specifications for all components. Once preliminary plans are accepted, submit Working Drawings in accordance with all applicable portions of the requirements herein, including details necessary to fabricate and construct the proposed components.

Have a North Carolina Registered Professional Engineer check, seal and date the plans developed by the Design-Build Team and, when requested, calculations.

MATERIALS AND FABRICATION

Non-Transparent Sound Barrier Walls

Provide materials and fabricate members in accordance with the requirements of Division 10 of the 2012 *Standard Specifications for Roads and Structures*. The structural planks for the Sound Barrier Wall (Bridge Mounted) shall have the following properties:

Flexural Strength	57,000 psi	ASTM D-790
Tensile Strength	60,000 psi	ASTM D-638
Compressive Strength	65,000 psi	ASTM D-695
Tensile Modulus	3,500,000 psi	ASTM D-638
Flexural Modulus	1,600,000 psi	ASTM D-790
Specific Gravity	1.88 (typ)	ASTM D-792

The structural planks shall be colored and shall be uniform throughout the pultruded composite. The texture and color shall be approved by the Engineer before the planks are delivered to the jobsite.

The structural planks shall exhibit good workmanship and shall be free of burrs, cracks or other objectionable marks which would adversely affect the barrier's performance or serviceability. All cracked, discolored, burned or damaged structural planks will be rejected either at the fabrication shop or the construction site even after installation, but prior to acceptance of the project.

The structural steel shall meet the requirements of the 2012 *Standard Specifications for Roads and Structures*. The posts, backing angles, bolts, nuts and washers shall be painted to match the structural planks. The paint system used shall be System 1, as described in Section 442 of the 2012 *Standard Specifications for Roads and Structures*, with the exception that the surfaces shall not be cleaned to an SSPC SP-10 finish after being galvanized and the top coat color shall be approved by the Engineer. After erection, the bolts, nuts, and washers shall be primed by brush, then the entire support system of posts,

backing angles, bolts, nuts and washers shall be top-coated. The structural planks shall be masked off so no overspray or spatters occur. The Design-Build Team shall provide three samples of paint close to the color of the structural planks to the Engineer for his / her selection of the final color. The limits of the painting shall be from the top of the posts to the bottom of the lowest plank.

Transparent Sound Barrier Walls

Provide materials and fabricate members in accordance with the requirements of Division 10 of the 2012 *Standard Specifications for Roads and Structures*. The structural panels for the Sound Barrier Wall (Bridge Mounted) shall have the following properties:

Flexural Strength	475,000 psi	ASTM D-790
Tensile Strength	400,000 psi	ASTM D-638
Compressive Strength	18,000 psi	ASTM D-695
Specific Gravity	1.19 (typ)	ASTM D-792

The structural panels shall be tinted blue or gray in color and shall be uniform throughout the pultruded composite. The Engineer shall approve the color prior to the structural panels being delivered to the jobsite.

The structural panels shall retain all broken pieces by employing either an internal and / or external restraint system. The Design-Build Team shall certify, in writing, that the structural panels will retain all broken pieces after ten or more years of outdoor exposure.

A bird deterrence feature shall be included on all structural panels. The structural panels shall have a pattern capable of minimizing bird impacts. The bird deterring pattern shall be an integral part of the structural panel, capable of withstanding graffiti removal efforts. Application of films in a secondary, post production, process will not be allowed.

The Design-Build Team shall recommend an effective, compatible graffiti remover and, upon request, furnish a product sample and provide a graffiti removal demonstration.

The structural panels shall have a warranty against yellowing for a minimum of thirty years.

The structural panels shall exhibit good workmanship and shall be free of burrs, cracks or other objectionable marks which would adversely affect the barrier's performance or serviceability. All cracked, discolored, burned or damaged structural panels will be rejected either at the fabrication shop or the construction site, even after installation, but prior to acceptance of the project.

The structural steel shall meet the requirements of the 2012 *Standard Specifications for Roads and Structures*. The posts, backing angles, bolts, nuts and washers shall be painted to coordinate with the structural panels. The paint system used shall be System 1, as described in Section 442 of the 2012 *Standard Specifications for Roads and Structures*, with the exception that the surfaces shall not be cleaned to an SSPC SP-10 finish after

being galvanized, and the top coat color shall be approved by the Engineer. After erection, the bolts, nuts, and washers shall be primed by brush, then the entire support system of posts, backing angles, bolts, nuts and washers shall be top-coated. The structural panels shall be masked off so no overspray or spatters occur. The Design-Build Team shall provide the Engineer three samples of paint that are close to the structural panel color for final color selection. The limits of the painting shall be from the top of the posts to the bottom of the lowest panel.

CONSTRUCTION METHODS

The erection of the sound barrier components shall not begin until the concrete in the bridge railing has reached a minimum compressive strength of 3,000 psi. Install posts as shown on the plans developed by the Design-Build Team or in the accepted submittals with a tolerance of ½-inch per foot from vertical or as necessary to conform to the plank / panel design, if more restrictive.

WORKING DRAWINGS

In accordance with the 2012 *Standard Specifications for Roads and Structures*, submit plank design calculations and specifications for approval prior to purchasing the plank / panel materials. Submit metalwork fabrication drawings for approval prior to fabrication of steel wall components. This submittal shall clearly indicate access for visual inspection of the post attached bolts. Submit an erection plan and plank / panel support components, for review and acceptance prior to fabrication of metalwork. Submit five sets of detail drawings for review and acceptance.

ARCHITECTURAL CONCRETE SURFACE TREATMENT

(1-28-15)

1.0 GENERAL

The work covered by this Project Special Provision shall consist of constructing a stained, simulated stone masonry textured surface on both faces of pre-cast concrete panels used in ground mounted sound barrier walls as indicated on the plans developed by the Design-Build Team and herein. The Design-Build Team shall furnish all materials, labor, equipment and incidentals necessary for the construction of architectural concrete surface treatment using simulated stone masonry form liners (molds) and a compatible concrete coloring system.

TRAFFIC SIDE OF GROUND MOUNTED SOUND BARRIER WALLS

The Design-Build Team shall use the same source of form liner and color stains for all sound barrier wall panels facing the traffic side. The architectural concrete surface treatment shall match the appearance (stone size, stone shape, stone texture, pattern and relief) of natural stone to resemble an ashlar stone pattern with panel staining on the traffic side that matches the Grey Palette Color # FS 36270 found in the *Federal Standard 595B – Colors Used in Government Procurement*. All texture shall be in

addition to the nominal thickness of the wall panels of four inches \pm ¼ inch. Maximum relief of the textured surface shall be 1¼ inch or less. The top 1'-0" of the top panel within each wall segment shall have a smooth, non-textured and non-stained finish to resemble faux coping. Concrete columns shall remain unstained in their natural concrete color. There shall be an appreciable contrast between the colors of the unstained concrete columns and the stained panels. For information purposes only, sources of form liners in the ashlar stone pattern include, but are not limited to:

Scott System, Inc.
10777 E. 45th Avenue
Denver, Colorado 80239
<http://www.scottsystem.com/>
Pattern: Ashlar Stone # 167B

Architectural Polymers, Inc.
1220 Little Gap Road
Palmerton, Pennsylvania 18071
<http://www.architecturalpolymers.com/>
Pattern: Ashlar Stone # 904A

Fitzgerald Form Liners
1500 East Chestnut Avenue
Santa Ana, California 92701
<http://formliners.com/>
Pattern: Georgia Ashlar # 16999

The Design-Build Team has the option of supplying an alternative pattern of simulated stone form liner, as long as the pattern selected is approved, in writing, as an equal or approved alternative by the Engineer.

RESIDENTIAL SIDE OF GROUND MOUNTED SOUND BARRIER WALLS

The Design-Build Team shall use the same source of form liner and color stains for all sound barrier wall panels facing the residential side. The architectural concrete surface treatment shall match the appearance (stone size, stone shape, stone texture, pattern and relief) of natural stone to resemble an ashlar stone pattern with panel staining on the residential side that matches the Grey Palette Color # FS 36270 found in the *Federal Standard 595B – Colors Used in Government Procurement*. All texture shall be in addition to the nominal thickness of the wall panels of four inches \pm ¼ inch. Maximum relief of the textured surface shall be 1¼ inch or less. The top 1'-0" of the top panel within each wall segment shall have a smooth, non-textured and non-stained finish to resemble faux coping. Concrete columns shall remain unstained in their natural concrete color. There shall be an appreciable contrast between the colors of the unstained concrete columns and the stained panels. For information purposes only, sources of form liners in the ashlar stone pattern include, but are not limited to:

Scott System, Inc.
10777 E. 45th Avenue
Denver, Colorado 80239
<http://www.scottsystem.com/>
Pattern: Ashlar Stone # 167B

Architectural Polymers, Inc.
1220 Little Gap Road
Palmerton, Pennsylvania 18071
<http://www.architecturalpolymers.com/>
Pattern: Ashlar Stone # 904A

Fitzgerald Form Liners
1500 East Chestnut Avenue
Santa Ana, California 92701
<http://formliners.com/>
Pattern: Georgia Ashlar # 16999

The Design-Build Team has the option of supplying an alternative pattern of simulated stone form liner, as long as the pattern selected is approved, in writing, as an equal or approved alternative by the Engineer.

2.0 SUBMITTALS

Shop Drawings – The Design-Build Team shall submit for review and acceptance, plan and elevation views and details showing overall simulated stone pattern, joint locations, form tie locations, and end, edge or other special conditions. The drawings shall include typical cross sections of applicable surfaces, joints, corners, stone relief, stone size, pitch / working line, mortar joint and bed depths. If necessary, the Design-Build Team shall revise the shop drawings until the proposed form liner patterns and arrangement have been accepted by the Engineer. Shop drawings shall be of sufficient scale to show the detail of all stone and joint patterns. The size of the sheets used for the shop drawings shall be 22" x 34".

The form liner shall be patterned such that long continuous horizontal or vertical lines do not occur on the finished exposed surface. The line pattern shall be random in nature and shall conceal construction joint lines. Special attention shall be given to details for wrapping form liners around corners.

Shop drawings shall be reviewed and accepted prior to fabrication of any form liners.

Sample Panels – After shop drawings have been reviewed and accepted by the Engineer, the Design-Build Team shall construct three 24" x 24" transportable sample panel(s) at the project site. The materials used in construction of the sample panel(s) shall comply with Section 420 of the 2012 *Standard Specifications for Roads and Structures*. The sample panel(s) shall be constructed using form liners approved by the Engineer. Any

sample panel that is not approved by the Engineer shall be removed from the project site and a new sample panel produced at no additional expense to the Department.

After the color, texture and uniformity of the furnished samples are approved by the Engineer, produce a full scale unit meeting the design requirements. This mock-up and the furnished samples shall establish the standard quality for determining the panel approval.

Architectural surface treatments and patterns of the finished work shall achieve the same final effect as demonstrated on the approved sample panel(s). Upon approval by the Engineer, the sample panel(s) shall be used as the quality standard for the project. After the approval of the completed structure, the Design-Build Team shall dispose of the sample panels, as directed by the Engineer.

3.0 MATERIAL REQUIREMENTS

Form Liner – The form liner shall be a high quality, reusable product manufactured of high strength urethane rubber or other approved material which attaches easily to the form work system, and shall not compress more than ¼-inch when concrete is poured at a rate of ten vertical feet per hour. The form liners shall be removable without causing deterioration of the surface or underlying concrete.

Form Release Agent – Form release agent shall be a non-staining petroleum distillate free from water, asphaltic, and other insoluble residue, or an equivalent product. Form release agents shall be compatible with the color system applied and any special surface finish.

Form Ties – Form ties shall be set back a minimum of two inches from the finished concrete surface. The ties shall be designed so that all material in the device to a depth of at least two inches back of the concrete face (bottom of simulated mortar groove) can be disengaged and removed without spalling or damaging the concrete. The Design-Build Team shall submit the type of form ties to the Engineer for approval.

Concrete Color System / Stain – Special surface color system shall be performed using approved coloring systems / stains suitable for the purpose intended and applied in a manner consistent with the design intent of the project. The approved sample panel shall be the basis for determining the appropriate color / stain application.

Color stains shall be a special penetrating stain mix as provided by the manufacturer and shall be medium to dark gray to achieve a full, natural color in the finished surface. The stain shall create a surface finish that is breathable (allowing water vapor transmission), and that resists deterioration from water, acid, alkali, fungi, sunlight, and / or weathering. Stain mix shall meet the requirements for mildew resistance of Federal Test Method Standard 144, Method 6271, and requirements for weathering resistance of 1,000 hours accelerated exposure measures by Weatherometer, in accordance with ASTM G 26.

Color samples shall be submitted for approval by the Engineer. Final coloring system and the Grey Palette Color # FS 36122 shall be subject to approval by the Engineer.

Quality Standards – Manufacturer of simulated stone masonry form liners and custom coloring system shall have at least five years' experience making stone masonry molds and color stains to create formed concrete surfaces to match the natural stone shapes, surface textures and colors.

The Design-Build Team shall schedule a pre-installation conference with a manufacturer representative and the Engineer to assure understanding of simulated stone masonry form liner use, color application, requirements for construction of sample panel(s), and to coordinate the work. The Design-Build Team shall disclose their source of simulated stone masonry manufacturer and final coloration contractor at the Preconstruction Conference.

4.0 CONSTRUCTION

Form Liner Preparation – Prior to each concrete pour, the form liners shall be clean and free of build-up. Each liner shall be visually inspected for blemishes and tears. Repairs shall be made in accordance with the manufacturer's recommendations. Repairs shall be approved by the Engineer before being used. Form liner panels that do not perform as intended or are no longer repairable shall be replaced.

Form Liner Attachment – Form liners shall be securely attached to forms in accordance with the manufacturer's recommendations, with less than a ¼-inch seam. Blend form liner butt joints into the stone pattern and finish off the final concrete surface. Create no visible vertical or horizontal seams or conspicuous form liner butt joint marks. At locations where the form liners are joined, carefully blend to match the balance of the stone pattern. Form liners shall be installed to withstand anticipated concrete placement pressures without leakage and without causing physical or visual defects. Wall ties shall be coordinated with the form liner system. The Design-Build Team shall have a technical representative from the form liner manufacturer on site for technical supervision during the installation and removal of form liners. Unless allowed by the Engineer, installation and removal of form liners shall not be permitted if the aforementioned technical representative is not present.

Form Release Agent – Form release agent shall be applied in accordance with the manufacturer's recommendations. The material shall be compatible with the form liner material and the concrete coloring system and in accordance with this Project Special Provision. Form release agent shall be worked into all areas, especially pattern recesses.

Patching – Using patching materials and procedures in accordance with the manufacturer's recommendations, all form tie holes and other defects in finished uncolored surface shall be filled or repaired within 48 hours of form removal.

Surface Finish – All surfaces that are to receive coloring agent application shall be free of all laitance, dirt, dust, grease, efflorescence, paint or any other foreign material prior to the application of coloring agent. Cleaning of surfaces shall be accomplished by pressure washing with water set at 3000 psi to remove laitance. The fan nozzle shall be held perpendicular to the surface at a distance of one to two feet. Sandblasting shall not be permitted.

Final surface shall be free of blemishes, discolorations, surface voids, and other irregularities. All patterns shall be continuous without visual disruption.

Reinforced concrete shall be finished in accordance with the 2012 *Standard Specifications for Roads and Structures*, except that curing of concrete shall be done to accommodate the application of coloring and surface finish treatment.

Grout Pattern Joints – Grout pattern joints shall be constructed to simulate the appearance of mortared joints produced in laid up masonry work. Grout pattern joints shall be produced in accordance with the form liner / concrete color system manufacturer.

Color / Stain Application – Finished concrete and patches shall stand in place 30 days after form liners are removed prior to application of coloring / staining agent. Maintain the concrete temperature between 40° F and 85° F during color / stain application and for 48 hours after color / stain application. Consult the manufacturer's recommendations for preparation, application, curing and storage of coloring agents / stains. The Design-Build Team shall provide a Color Application Artist who is trained in the special techniques to achieve realistic surface appearances, if requested by the Engineer. Treated surfaces located adjacent to exposed soil or pavement shall be temporarily covered to prevent dirt or soil splatter from rain.

Following the completion of all work, repairs of any damage made by other construction operations shall be made to the form lined and colored surfaces, as directed by the Engineer.

Experience and Qualifications – The Design-Build Team shall have a minimum of three consecutive years' experience in architectural concrete surface treatment construction on similar types of projects. The Design-Build Team shall furnish to the Engineer five references who were responsible for supervision of similar projects and will testify to the successful completion of these projects. Include name, address, telephone number, and specific type of application.

CUTTING OF STEEL SIGN HANGERS ON OVERHEAD SIGNS

(2-29-16)

SPI

Description

Cut and dispose of the portion of the sign hangers that is extended below the bottom edge of the signs for the mounting of sign lighting. Cut and dispose of the portion of the sign hangers that extends above the top edge of the signs that have been repositioned on the overhead sign structure.

Materials

Organic Non-Aerosol Zinc Repair PaintArticle 1080-9

Construction Methods

The sign hangers shall be cut at a distance specified by the Engineer. The hangers shall be cut in a manner that does not damage existing signing components or roadway facility. Areas disturbed or damaged in performance of this work shall be repaired by the Design-Build Team at no cost to the Department.

Cutting of the sign hangers shall be done by a method approved by the Engineer. Oxygen cutting shall be done in accordance with Section 1072-11 of the 2012 *Standard Specifications for Roads and Structures*. Repair the cut and / or any damaged members of the sign hangers with two coats of an approved organic non-aerosol zinc repair paint. Paint materials used shall be in accordance with Section 1080-9 of the 2012 *Standard Specifications for Roads and Structures*.

All material shall be removed and disposed of in accordance with State and Local codes, regulations, and ordinances and shall be in accordance with the Section 907 of the 2012 *Standard Specifications for Roads and Structures*.

GREENWAYS AND MULTI-USE PATHS

(1-17-14)

SPI 6-19

Description

“Greenway” shall be defined as a paved multi-use path intended to carry primarily pedestrians, bicyclists, and light maintenance vehicles, but not designed or intended to carry typical highway traffic. Structures, such as footbridges, pedestrian bridges, and multi-use greenway structures are not included in this provision. These structures shall be designed in accordance with the latest edition of the AASHTO *LRFD Guide Specifications for the Design of Pedestrian Bridges*.

Materials

Refer to the 2012 NCDOT *Standard Specifications for Roads and Structures* except as noted in these Project Special Provisions.

Item	Section
Portland Cement Concrete, Class B	1000
Select Material	1016
Aggregate for Stabilization	1008
Geotextile for Soil Stabilization, Type 4	1056

For treated timber, use preservatives and retention of preservative as required by the plans developed by the Design-Build Team. For steel and iron products, conform to Subarticle 106-1(B) of the 2012 *Standard Specifications for Roads and Structures*.

Use materials on the NCDOT Approved Products List (APL) where applicable.

Construction Methods

Construct the Greenway in accordance with the plans developed by the Design-Build Team, 2012 *Standard Specifications for Roads and Structures*, and this Project Special Provision.

Perform clearing and grubbing for a distance of five feet on each side of the Greenway. Trees greater than 15 inches in diameter may remain, provided they are at least two feet clear of the Greenway. Provide ten-foot vertical clearance from the Greenway to the tree canopy. In accordance with Section 1660 of the 2012 *Standard Specifications for Roads and Structures*, grade the greenway shoulders to drain and seed a minimum of two feet on both sides.

Construct the Greenway in compliance with the Americans with Disabilities Act of 1990 (ADA) as amended, the NCDOT's *North Carolina Bicycle Facilities Planning and Design Guidelines* and the AASHTO *Guide for the Development of Bicycle Facilities*.

In accordance with Section 505 of the 2012 *Standard Specifications for Roads and Structures*, perform shallow undercut up to 12 inches, as necessary, to remove unsuitable material. The Design-Build Team may elect to use Class III Select Material in lieu of Aggregate Base Course (ABC).

For all embankments, compact each layer to a density equal to at least 90% of that obtained by compacting a sample of material in accordance with AASHTO T99, as modified by NCDOT. Copies of these modified testing procedures are available upon request from the Materials and Tests Unit.

Embankment testing for density shall be performed to verify equipment and roller patterns achieve maximum density during initial embankment construction and test results shall be submitted to the Engineer. Perform a minimum of one embankment test per Greenway. Subsequent testing shall be required if equipment changes, compactive effort changes, or

stability issues are observed. Embankments shall be visually stable under construction equipment.

In accordance with Section 500 of the *Standard Specifications for Roads and Structures*, perform fine grading of the subgrade. Compact the subgrade to a density of 92% of that obtained by compacting a sample of material in accordance with AASHTO T99, as modified by NCDOT. A tolerance of plus or minus one inch will be permitted after the subgrade has been graded to a uniform surface.

Subgrade density testing shall be performed to verify density during initial subgrade construction and test results shall be submitted to the Engineer. Perform a minimum of one subgrade test per Greenway. Subsequent testing shall be required if equipment changes or stability issues are observed.

In accordance with Article 270-3 of the 2012 *Standard Specifications for Roads and Structures*, install geotextile for soil stabilization, if applicable. Do not operate heavy equipment on geotextiles until geotextiles are covered with ABC.

Place ABC in accordance with Section 520 of the 2012 *Standard Specifications for Roads and Structures*, except sampling and acceptance of ABC shall be in accordance with the *Aggregate QC/QA Program Manual* only and a mechanical spreader will not be required. Minimum compaction thickness and sand seal requirements will be waived. The QA/QC program results shall be used for acceptance. Roadway samples will not be required, unless material is visually segregated or density cannot be achieved. If roadway samples become necessary, use proper sampling procedures in accordance with the *Aggregate Sampling Manual* on the Materials and Tests Unit's website:

<https://connect.ncdot.gov/resources/Materials/MaterialsResources/ABC%20Sampling%20Manual.pdf>

Compact the ABC to a density of 92% of that obtained by compacting a sample of material in accordance with AASHTO T180 as modified by NCDOT for both nuclear and ring tests.

ABC density testing shall be performed to verify density during initial ABC construction and test results shall be submitted to the Engineer. Subsequent testing shall be required if equipment changes or material source changes.

Construct concrete greenways in accordance with Section 848 of the 2012 *Standard Specifications for Roads and Structures* and Roadway Standard Drawing No. 848.01. The width of the concrete greenway shall be based on the plans developed by the Design-Build Team. Place groove joints at a spacing equal to the width of the greenway. Transverse Expansion Joints shall be required every 40 feet.

Final surface testing will not be required.

CONTROL OF NOISE

The Design-Build Team shall minimize the noise impact on adjoining property between 11:00 p.m. and 6:00 a.m. The exterior noise level resulting from the work shall not exceed 80 decibels or shall not exceed the background noise by more than 5 decibels, whichever is greater. Background noise shall be defined as the measured ambient noise level associated with all existing environmental, transportation, and community noise sources in the absence of any audible construction activity. Noise levels shall be measured at the right of way line adjacent to occupied residential property at a height of five feet above the ground.

Work shall be performed in a manner to prevent nuisance conditions such as noise which exhibits a specific audible frequency or tone (e.g. back-up alarms, improperly maintained equipment, brake squeal, etc.) or impact noise (e.g. jackhammers, hoe rams, truck tailgates, pile drivers, rock drilling, concrete pavement demolition, etc.). The Engineer will determine whether or not nuisance noise conditions exist. All equipment shall be operated in accordance with the manufacturer's specifications and be equipped with all noise reducing equipment in proper operating condition.

EPOXY PAVEMENT MARKING MATERIAL

Description

This work shall consist of applying black epoxy pavement marking material on concrete or asphalt pavements.

Materials

Epoxy Pavement Marking Material shall conform to the requirements of Section 1087 of the 2012 *Standard Specifications for Roads and Structures* and the following:

Epoxy Composition

Epoxy pavement marking shall conform to the following materials:

Component	By Weight
Binder - Epoxy Resin	77% Max.
Titanium Dioxide (ASTM D-476-73 Type II & III)	18% Min.
Chrome Yellow (for yellow markings) (ASTM D-211 Type III)	23% Min.

The epoxy resin proportion of component A white, and component A yellow shall be identical, if the same component B is used for both white and yellow.

Combine the two components of the resin in the manner and proportions as recommended by the manufacturer based on tested pavement marking performance.

Epoxy Pavement Marking Material

(A) Formulation

Use epoxy pavement marking material consisting of 100% solid two-part system formulated and designed to provide a simple volumetric mixing ratio of the two components.

(B) Epoxide Value: ASTM D1652

WPE of the epoxy resin shall be 250 ± 50 for both white and yellow component A on a pigment free basis.

(C) Amine Value ASTM D2074

The total amine value of the curing agent (component B) shall be 450 ± 50

(D) Requirements

(1) Color

Black: Shall meet ASTM standard

(2) Hardness: ASTM D2240

Minimum Shore D hardness: 80

(3) Abrasion Resistance: ASTM C-501

Minimum wear index of catalyzed sample: 80

(4) Adhesion to Concrete: ASTM D4541

At 100% concrete failure: greater than 325 psi

(5) Tensile Strength: ASTM D638

Minimum average tensile strength: 6000 psi

(6) Compressive Strength: ASTM D695

Minimum compressive strength: 12000 psi

(7) Drying Time: ASTM D711

Maximum drying time at 75±2°F: 10 minutes

(8) Gel Time: ASTM D2471

Maximum gel time: 3 minutes

(E) Material Certification: Type 3 Material Certification and Type 4 Material Certification

Construction Methods

Epoxy Pavement Marking Material shall conform to the requirements of Section 1205 of the 2012 *Standard Specifications for Roads and Structures*.

(A) Application Equipment

Use epoxy application equipment, which is equipped with or capable of the following:

Precisely metering the two components in the ratio of proportion recommended by the manufacturer.

Producing the required amount of heat at the mixing head and gun tip.

Maintaining temperatures within the tolerances recommended.

Gauges for each proportioning pump so that any pressure difference can be easily monitored.

A minimum 24" long static mixer unit for proper mixing of the two components of the epoxy marking material.

Each component of the epoxy pavement marking shall be in a homogeneous state prior to mixing,

Have the capability to totally mix component A with component B immediately prior to the marking application.

Have the capability to spray both yellow and white pavement marking material and have the equipment mounted on a truck of sufficient size and stability with an adequate power source to produce uniform lines of the specified dimension.

A metering device to register the accumulated installed footage for each gun

(B) Weather Limitations

Apply epoxy pavement marking only when the ambient air temperature and the pavement surface temperature is a minimum of 35° F and rising.

(C) Application

Produce epoxy pavement marking lines that have a minimum dry thickness of 15 mils when placed on concrete pavements and 20 mils when placed on asphalt pavements.

Use **Type I** epoxy material (fast dry) for epoxy pavement markings except when otherwise specified in the contract documents.

Type II epoxy material may be used with lane closures as approved by the Engineer to allow for curing time.

Do not place epoxy markings on fresh asphalt pavements until 15 days have elapsed after the last asphalt layer is placed.

Using the epoxy application equipment, apply the pavement marking materials simultaneously. Hot-spray the epoxy resin, mixed in accordance with the manufacturer's recommendations, onto the pavement surface within an application temperature range recommended by the manufacturer. Inject retroreflective glass beads into the molten (liquid) Epoxy Marking.

Individual Components: Before mixing, heat the individual components to within the temperature range of 100° F to 170° F. Do not exceed the upper limit of the manufacturer's recommended heating temperature at any time under any circumstances.

Mixed Material: After mixing, ensure that the application temperatures for the combined materials at the gun tip are within the temperature range recommended by the manufacturer for the particular product used.

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

(D) Observation Period

Epoxy pavement markings shall be subject to a 30-day observation period.

Maintain responsibility for the pavement markings for a 30-day observation period beginning upon the satisfactory completion of all work required in the plans developed by the Design-Build Team. Guarantee the markings under the payment and performance bond in accordance with Article 105-17 of the 2012 *Standard Specifications for Roads and Structures*.

Have traffic operating on the facility during the entire 30-day observation period unless otherwise directed.

Provide pavement marking material, which during the 30-day observation period, shows no signs of failure due to blistering, excessive cracking, chipping, bleeding, staining, discoloration, oil content of the pavement materials, smearing or spreading under heat, deterioration due to contact with grease deposits, oil, diesel fuel, or gasoline drippings, spilling, poor adhesion to the pavement materials, vehicular damage, debonding and normal wear.

Replace, at no additional expense to the Department, any pavement markings that do not perform satisfactorily under traffic during the 30-day observation period.

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 on the website noted below:

<https://www.nctreasurer.com/inside-the-department/OpenGovernment/Pages/Iran-Divestment-Act-Resources.aspx>

By submitting the Price Proposal, the Prime Contractor certifies that, as of the date of this bid, it is not on the then-current List created by the State Treasurer. The Prime 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 Prime 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 Prime 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.

CARGO PREFERENCE ACT

(2-16-16)

Privately owned United States-flag commercial vessels transporting cargoes shall be subject to the Cargo Preference Act (CPA) of 1954 requirements and regulations found in 46 CFR 381.7. Contractors are directed to clause (b) of 46 CFR 381.7 as follows:

- (b) Contractor and Subcontractor Clauses. "Use of United States-flag vessels: The contractor agrees-

“(1) To utilize privately owned United States-flag commercial vessels to ship at least 50 percent of the gross tonnage (computed separately for dry bulk carriers, dry cargo liners, and tankers) involved, whenever shipping any equipment, material, or commodities pursuant to this contract, to the extent such vessels are available at fair and reasonable rates for United States-flag commercial vessels.

(2) To furnish within 20 days following the date of loading for shipments originating within the United States or within 30 working days following the date of loading for shipments originating outside the United States a legible copy of a rated, 'on-board' commercial ocean bill-of-lading in English for each shipment of cargo described in paragraph (b) (1) of this section to both the Engineer (through the prime contractor in the case of subcontractor bills-of-lading) and to the Division of National Cargo, Office of Market Development, Maritime Administration, Washington, DC 20590.

(3) To insert the substance of the provisions of this clause in all subcontracts issued pursuant to this contract."

WORK ZONE TRAFFIC "PATTERN MASKING"

(8-25-15)

Description

In accordance with this RFP, the Design-Build Team shall furnish and install Work Zone Traffic "Pattern Masking" material for placement on existing asphalt or concrete pavements during work zone operations. The Work Zone Traffic "Pattern Masking" material shall be black in color and used during temporary traffic patterns to completely cover the entire pavement surface; thus masking / concealing the existing pavement markings and allowing the revised work zone pavement markings to be placed on a newly applied black surface. The purpose of the Work Zone Traffic "Pattern Masking" is to eliminate the grind marks and "ghost markings" on pavement surfaces which can create motorist confusion and pavement damage while providing an incomparable contrast between the revitalized black pavement color and newly applied pavement markings for work zone patterns of up to a year.

Materials

A) General

Use materials in accordance with the Manufacturer's recommendations that shall retain a black color for a period of at least 12 months. The black material shall be a flat black color when fully cured and shall completely mask / conceal the existing pavement markings for the same minimum 12-month period.

The black material shall not exhibit glare or retroreflectance in either day or night conditions. To ensure the black material provides ample concealment and does not exhibit excessive glare, the

material opaqueness shall be a minimum of 95% and the retroreflective properties shall not exceed 4 mcd/lux/m².

The black material shall not adversely affect the ability of the pavement to drain water or make the pavement adversely slick in either dry or wet conditions. The black material shall adhere to the skid properties as described in Section (C) below.

The black material shall not contain any petroleum components or any Volatile Organic Compounds (VOC's).

The black material shall not crack or cause any cracking / distress to the pavement surface after placement.

The black material shall be manufactured to bond successfully to both asphalt and concrete pavements. The black material shall allow resurfacing treatments to be applied directly over its surface without having to be removed to obtain successful bonding of the new asphalt or concrete overlays.

The black material shall be manufactured to receive any type of polyurea, epoxy, polymer, cold applied plastic, and / or thermoplastic pavement marking materials.

B) Material Qualifications / Certifications

The Design-Build Team shall only use Work Zone Traffic "Pattern Masking" materials that are on the NCDOT Approved Products List. In accordance with Article 106-3 of the 2012 NCDOT *Standard Specifications for Roads and Structures*, the Design-Build Team shall 1) provide a Type 3 (Manufacturers) Certification that ensures the black material meets or exceeds the requirements in this provision and 2) provide a Type 5 (Typical Certified Test Report) Certification that ensures the black material has been tested by an independent testing company to verify that the braking / skid requirements, as described in Section (C) below, are met or exceeded.

C) Performance

In accordance with the ASTM E274 or ASTM E303-93 test standards (2008), the Design-Build Team shall provide independent testing laboratory results on the Work Zone Traffic "Pattern Masking" material skid properties.

The black material shall provide the minimum frictional resistance numbers noted below when tested with either test standard:

- The minimum average Skid Number (SN) for ASTM E274 shall be 37.
- The minimum average British Pendulum Number (BPN) for ASTM E303-93 (2008) shall be 37.

At any time the black material fails to adequately keep underlying existing pavement markings concealed, in the Department's sole discretion, the Design-Build Team shall immediately replace the section of the material required to conceal the pavement markings. The work zone travel lane shall retain its black distinguishable appearance throughout the life of the temporary traffic pattern. Normal wearing is expected in the travel lane wheel paths, but the work zone travel lanes shall always have a noticeable black appearance during the minimum 12-month pattern masking life. The Design-Build Team shall replace any material that prematurely fails to keep the underlying existing pavement markings concealed or does not retain its black color contrast, in the Department's sole discretion, for the required minimum 12-month duration.

If a temporary traffic pattern duration is longer than 12 months and the black material does not continue to meet the requirements herein, the Design-Build Team shall replace the material at no cost to the Department.

Construction Methods

A) Application Equipment

Except as allowed below, the equipment to apply Work Zone Traffic "Pattern Masking" material shall be truck mounted pneumatic or airless spray machines with suitable arrangement of atomizing nozzles and controls to assure complete and uniform coverage of the entire pavement surface with consistent thickness as required in this provision.

The Design-Build Team may only use hand applied manual application methods, or any other non-truck mounted application equipment or device, to install black material for applications shorter than 1,000 feet.

The application spray equipment shall be set up in such a manner to apply the Work Zone Traffic "Pattern Masking" material in spray pattern widths to ensure complete and uniform coverage of the entire travelway and to reduce the overlap from multiple passes. A 1" overlap width shall be required when applying the material in widths less than the full width of a travel lane.

B) Material Application

Regardless of the temporary pattern / traffic shift width, the Work Zone Traffic "Pattern Masking" material shall be applied to the full width and length of the pavement surface. Specifically, throughout the limits of the traffic pattern / traffic shift changes, the Work Zone Traffic "Pattern Masking" material shall mask / conceal the existing pavement markings and provide a new black uniform surface for the placement of the revised pavement markings.

The masking / concealment of individual pavement marking edge lines, skips, mini skips, lane lines or gore lines shall be prohibited.

The Work Zone Traffic "Pattern Masking" material shall be applied at a uniform thickness of 16 mils.

The Work Zone Traffic “Pattern Masking” material shall be set and / or cured in order to receive pavement markings in 10 minutes or less according to the temperature requirements stated elsewhere in this provision.

C) Surface Preparation

- **Asphalt** - The existing pavement surface shall be swept clean and prepared in accordance with the Manufacturer’s recommendations to receive the Work Zone Traffic “Pattern Masking” material. Although, no existing pavement marking line removal is required, any loose, flaking or other laitance material from existing markings shall be machine broomed or scarified as directed by the Manufacturer before placing the Work Zone Traffic “Pattern Masking” material.
- **Concrete** - The *existing* concrete surface shall be swept clean and prepared in accordance with the Manufacturer’s recommendations to receive the Work Zone Traffic “Pattern Masking” material. Although, no existing pavement marking line removal is required, any loose, flaking or other laitance material from existing markings shall be machine broomed or scarified as directed by the Manufacturer before placing the Work Zone Traffic “Pattern Masking” material.

NOTE: For newly placed concrete pavements, newly installed concrete bridge decks or existing concrete pavements that do not receive a pavement surface treatment, Work Zone Traffic “Pattern Masking” Material shall not be placed. The conflicting pavement marking lines shall be removed by water blasting methods only.

D) Temperature and Weather Limitations

Work Zone Traffic “Pattern Masking” material shall not be applied unless the ambient air temperature and the pavement temperature is 40° F or higher. Do not install Work Zone Traffic “Pattern Masking” material unless the pavement surface is completely dry. Do not install Work Zone Traffic “Pattern Masking” material within 4 hours of a significant rain event such as a thunderstorm with rainfall intensities equal to or greater than 1 inch / per hour. Always follow the Manufacturer’s recommendations for placement during periods of excessive humidity.

Maintenance

There should be no required maintenance of the Work Zone Traffic “Pattern Masking” material. The Design-Build Team shall replace any Work Zone Traffic “Pattern Masking” material that prematurely fails to keep pavement markings masked / concealed and / or retain its black color, in the Department’s sole discretion, for the full minimum 12-month duration. Any traffic control and / or material costs due to replacement shall be at no cost to the Department.

NONWOVEN GEOTEXTILE INTERLAYER

(01-13-14)

SPI 10-07

Description

Furnish and install a nonwoven geotextile interlayer at locations shown on the plans developed by the Design-Build Team.

General

A minimum of three weeks prior to beginning paving operations, schedule a Pre-Pave Meeting to discuss installation and construction procedures for the nonwoven geotextile interlayer with the Engineer, Roadway Inspector, Area Roadway Construction Engineer, Division Construction Engineer, State Pavement Construction Engineer, and representatives from the Design-Build Team, including but not limited to, the Paving Superintendent, Subcontractor, and Geotextile Manufacturer.

Materials

The geotextile interlayer shall be constructed of a non-woven needle-punched geotextile, with no thermal treatment (calendaring or IR). The material shall be resistant to chemicals, mildew, and rot, and shall not have any tears or holes that will adversely affect the in-situ performance and physical properties of the installed material.

In accordance with Article 106-3 of the 2012 *Standard Specifications for Roads and Structures*, furnish, with each shipment, a Type 3 Certification certifying that the paving mat is a non-woven needle-punched geotextile with no thermal treatment (calendaring or IR) meeting the requirements below:

Physical Properties of Non-Woven Geotextile Interlayer			
Property	Test Method	Units	Value
Minimum mass per unit area	ASTM D 5261	oz/yd ²	15.0
Minimum thickness under load (a) at 2 kPa (0.29 psi) (b) at 20 kPa (2.9 psi) (c) at 200 kPa (29 psi)	ASTM D 5199	in	(a) 0.12 (b) 0.10 (c) 0.04
Minimum wide-width tensile strength	ASTM D 4595	lb/ft	685
Maximum wide-width elongation	ASTM D 4595	%	130
Minimum water permeability in normal direction under load (pressure) at 20 kPa (2.9 psi)	Mod. ASTM D 5493 or ASTM D 4491	ft/s	3.3×10^{-4}
Minimum in-plane water permeability (transmissivity) under load (pressure) (a) at 20kPa (2.9 psi) (b) at 200kPa (29 psi)	Mod. ASTM D 6574 or ASTM D 4716	ft/s	(a) 1.6×10^{-3} (b) 6.6×10^{-4}
Minimum weather resistance retained strength	ASTM D 4355 at 500 hrs. exposure	%	60
Alkali resistance, minimum polypropylene/polyethylene	Manufacturer certification of polymer	%	96

Note: Requirements must be met for 95 percent of samples.

General Requirements

A trained and experienced installer, certified by the Geotextile Manufacturer, shall be present on-site during the installation of the geotextile and until the crew has a comfort level working with this material.

Ensure that any potential for keying of the two cementitious layers is minimized through proper repair techniques. Clean the underlying surface to remove loose debris before applying the interlayer. Roll the geotextile out on the underlying layer. The geotextile shall be tight and without excess wrinkles and folds. No more than 650 feet of geotextile shall be installed in advance of the paving operation at a given time. The interlayer shall be placed no more than three days before concrete placement.

Keep driving on the interlayer to a minimum. Tight radius turns and excessive acceleration and braking shall be avoided.

The geotextile shall be secured to the underlying layer with pins or nails punched through 2 to 2.75 inch galvanized washers or disks every six feet or less. Additional fasteners shall be used as needed to ensure that the geotextile does not shift or fold before or during concrete placement. Edges of the geotextile shall overlap by 8 +/- 2 inches. No more than three layers of geotextile shall overlap at any location. Transverse seams of adjacent rolls shall be staggered to

prevent four layers from coinciding at any location. The free edge of the geotextile shall extend beyond the edge of the new concrete into a location that facilitates drainage.

APPLICATION OF BASE AND ANTI-GRAFFITI COATING

(6-2-16)

SP

GENERAL

This work consists of preparing and cleaning concrete and galvanized surfaces as well as furnishing and applying a colored base coating with a compatible anti-graffiti finish coating to the surfaces described herein. The base coating and anti-graffiti coating shall be applied to all surfaces indicated on the plans developed by the Design-Build Team and / or as directed by the Engineer and shall be applied only after the surface preparation specified herein has been completed, inspected and approved by the Engineer.

Alternate coating methods may be submitted for review and approval.

MATERIALS

The base coating shall be compatible with the anti-graffiti finish coating and must be designed specifically for coating galvanized surfaces or damp, uncured concrete. The coating material shall be delivered to the job site in sealed containers bearing the manufacturer's original labels. The brand, color, and type shall be clearly marked on each container. A copy of the manufacturer's Materials Safety Data Sheet and a copy of the manufacturer's printed instructions shall be presented to the Engineer at the time of delivery.

The coating material shall be stored in airtight, upright containers. The containers shall be stored in a dry location where the temperature remains above 40° F and below 100° F.

The coating material shall have a shelf life of not less than 12 months. After application, the base coating shall be dry to the touch within 48 hours and shall achieve a final cure within two to three weeks. After application, the anti-graffiti coating shall be dry to the touch within one hour and shall achieve a final cure within three hours.

The color of the base coating and area of application shall be in accordance with the Federal Standard 595 and the approved aesthetic design.

The color of the anti-graffiti coating shall be clear after full cure.

Prior to application, provide one gallon of graffiti remover, thinners, dryers and all necessary components recommended by the manufacturer to the NCDOT Materials and Tests Unit, Chemical Testing Engineer for review and acceptance.

MATERIAL TESTING AND CERTIFICATION

Prior to applying coating material, a Type 2 certification shall be provided to the Engineer attesting that the product furnished is in accordance with the same formula as that previously subjected to the tests specified below and approved. Copies of the current tests reports shall be

attached to the certification. Reports for tests made more than four years prior to shipment to the project site will not be accepted.

All testing shall be performed by a qualified commercial testing laboratory that has been approved by the NCDOT Materials and Tests Unit.

Prior to application, the coating shall be subjected to, and shall satisfy, the requirements of the tests listed below:

Freeze-Thaw

1. Three concrete specimens, not less than four inches by six inches by six inches, of the mix design for the structure shall be cast and cured. Fourteen days moist curing with a drying period at room temperature, 60° F to 80° F, for 24 hours shall be required before applying the coating material to the specimens. Caution shall be taken that there be no excessive oil on specimen forms. The coating shall be applied to the sides of specimens at a spreading rate of 50 ± 10 square feet per gallon. Brush application will be permitted. Cementitious coatings shall be cured at room temperature and 30 percent relative humidity for 24 hours; at room temperature and 90 percent relative humidity for 48 hours; and at room temperature and 50 percent relative humidity for four days; for a total curing time of seven days.
2. The specimens shall be immersed in water at room temperature for three hours, then removed.
3. The specimens shall be placed in cold storage at -15° F for one hour and then removed.
4. The specimens shall be thawed at room temperature for one hour.
5. Steps 3 and 4 shall be repeated for a total of 250 cycles. At the end of 250 cycles, the specimens shall show no visible defects.

Accelerated Weathering

Coating shall be subjected to a 7,500-hour exposure test in a Twin-Carbon-Arc-Weatherometer, ASTM G 23, Type D, at an opening temperature of 145° F. The test shall be made at 20-minute cycles consisting of 17 minutes of light; and three minutes of water spray plus light. At the end of the exposure test, the exposed samples shall show no chipping, flaking, or peeling. The panels for this test shall be prepared by applying the coating at a spreading rate of 50 ± 10 square feet per gallon to both sides and edges of panels cut from asbestos cement shingles in accordance with Federal Specification S-S-346, Type I. Curing time shall be in accordance with Freeze-Thaw Test curing time.

Fungus Growth Resistance

In accordance with Federal Specification TT-P-29g, coating shall pass a fungus resistance test. Fungus growth shall not be indicated after a minimum incubation period of 21 days.

Abrasion Resistance

In accordance with Method 6191 Abrasion Resistance-Falling Sand, Federal Test Method Standard 141a, ASTM D968-81, coating shall pass the 2,000 litre sand abrasion test. The specimens for this test shall be prepared by applying the coating to a cleaned steel panel at a spreading rate of 50 ± 10 square feet per gallon. The specimens shall be cured at room temperature for 21 days.

Impact Resistance

Coating shall be applied to a concrete panel prepared in accordance with the Federal Test Method Standard 141a, Method 2051, at a spreading rate of 50 ± 10 square feet per gallon, and allowed to cure for 21 days at room temperature. The test shall then be run using the Gardner Mandrel Impact Tester in accordance with ASTM D 2794, using a one-half inch indenter with an impact load of six inch-pounds. The coating shall show no chipping under this impact load.

Salt-Spray Resistance

A concrete specimen shall be coated at the rate of 50 ± 10 square feet per gallon and cured for 21 days at room temperature. In accordance with ASTM B 117, the coated specimen shall be exposed to a five percent salt solution for 2,500 hours where the atmospheric temperature is maintained at $90^{\circ} \pm 2^{\circ}\text{F}$. At the end of the 2,500 hours of exposure, the coating shall show no ill effects, loss of adhesion, or deterioration.

Flexibility

A sheet metal specimen shall be coated at a rate of 50 ± 10 square feet per gallon and allowed to cure for 48 hours at room temperature. The coated specimen shall be bent at 180 degrees over a one-inch round mandrel. After bending, the coating shall show no breaking.

In addition to the certification and test reports required above, a service record shall be supplied showing that the coating material has a satisfactory service record on concrete and, when applicable, galvanized surfaces for a period of not less than five years prior to the date of submission of the service record. The coating shall also have shown satisfactory service characteristics without peeling, chipping, flaking, and non-uniform change in texture or color. The structure for the specific product shall be named in the service record.

In addition to the above requirements, each batch delivered to the project shall be sampled and tested for color and the following product analysis data submitted:

- (a) Weight per gallon
- (b) Viscosity in Kreb units
- (c) Weight percent pigment
- (d) Weight percent vehicle solids
- (e) Infrared spectra of vehicle solution
- (f) Drying time

SURFACE PREPARATION

Prepare concrete surfaces and galvanized surfaces in accordance with Section 420-17(B) and Section 442-12 of the 2012 *Standard Specifications for Roads and Structures*, respectively, or the manufacturer's recommendations, whichever is more restrictive. All surfaces to be coated shall be free of efflorescence, flaking coatings, dirt, oil, curing compounds, release agents and other deleterious substances prior to the application of the coating.

Concrete curing compounds and release agents shall be removed. Water blasting will be allowed; however, the blasting operation shall not remove or damage the concrete.

Prior to application of the coating, all concrete surfaces to be coated shall be sprayed with water. If the water soaks into the concrete surfaces, the coating may be applied once all surfaces dry. If the water beads up and is repelled, the surfaces require further cleaning before application of the coating.

APPLICATION

The coating application, including equipment used, shall be in accordance with the manufacturer's recommendations. The coating shall be applied by qualified personnel with previous experience similar to the work outlined in the plans developed by the Design-Build Team.

The material shall be thoroughly mixed in its original container and shall not be thinned. Containers with coatings that have formed skins shall not be permitted for use.

The base coating may be applied over damp, but not wet concrete surfaces and shall be applied at a rate of 50 ± 10 square feet per gallon. The application rate shall produce a uniform color texture. The base coating shall be applied only when the ambient temperature is between 40° F and rising, and 100° F. It shall not be applied over frozen surfaces or if rain is imminent. If a freshly applied surface is damaged by rain, re-coating may be necessary based solely on the Engineer's assessment of the damage.

Schedule the application of the base coating as one of the final finishing operations or when construction-generated dust will be minimal. To prevent lap marks, a wet edge shall be maintained at all times. Stopping and starting in mid-sections will not be allowed. Start or end at natural breaks in the surface (e.g. at panel edges, corners or joints). When applying the base coating with a roller, the material shall be applied in vertical strokes initially, cross rolled for even film and appearance, and then finished with vertical strikes.

Apply the anti-graffiti coating by brush, roller or airless spray when the ambient temperature is between 45° F and 90° F, and the surface temperature is between 50° F and 100° F. Ensure the surface is clean and dry before applying the anti-graffiti coating.

FINISHED PRODUCT

All coating material in the finished state shall be capable of accommodating the thermal and elastic expansion ranges of the concrete or, when applicable, galvanized surfaces without cracking.

The texture of the completed finish coat shall be similar to that of rubbed concrete. The completed finished coating shall be tightly bonded to the structure and present a uniform appearance and texture. Additional coats may be required by the Engineer in order to produce the desired surface texture and uniformity.

Coatings shall be entirely removed from the structure and reapplied if there is failure to positively adhere as evident by chipping, flaking, peeling, or the desired surface appearance is not achieved.

The average thickness of the completed finish coating shall not exceed 1/8 of an inch. The minimum dry film thickness of the anti-graffiti coating shall be 2.0 mils.

REQUIREMENTS FOR CABLES CROSSING RAILROADS

Railroad Crossings

The Design-Build Team shall acquire all necessary Railroad Agreements and / or Letters of Acknowledgement on the Department's behalf to cross either aerially or under the property owned by Norfolk Southern Railway Corporation (NSRC). The Department will sign the Railroad Agreements once they are approved by NSRC. The Design-Build Team shall be responsible for all applicable fees associated with obtaining the Railroad Agreements and / or Letters of Acknowledgement; and shall provide the General Contractor's Liability Insurance and the Railroad Protective Liability Insurance. To initiate this process, the Design-Build Team shall fully complete the application process as described at the website noted below:

<http://www.nscorp.com/content/nscorp/en/real-estate/norfolk-southern-services/wire-pipeline-fiber-optic-projects.html>

Do not commence cable routings over or under railroad-owned facilities until notification and coordination with the Engineer and NSRC has occurred. All work associated with the crossings shall conform to the NSRC's specifications.

The NSRC crossings are located at mileposts L 2.41 (Crossing # 722152R) and K 24.91 (Crossing # 722055G).

Flagging Protection or Watchman Service

The Design-Build Team shall provide a minimum of 30 days advance written notice to NSRC in order that flagging service can be arranged and provided. The Design-Build Team shall not undertake any work within the NSRC right of way until the flagman is at the job site.

Delays Caused by Operations of Others

Neither the Department nor NSRC assumes any responsibility for any work performed by others in connection with the construction of the project, and the Design-Build Team shall have no claim whatsoever against the Department or NSRC for any inconvenience, delay, or additional cost incurred by the Design-Build Team on account of such operations by others.

Cooperation with Others

The Design-Build Team shall cooperate with others participating in the construction of the project to the end that all work may be carried on to the best advantage.

Authority of Railroad Engineer

The authorized representative of NSRC, hereinafter referred to as the Railroad Engineer, shall have the final authority in all matters affecting the safe maintenance of railroad traffic of his company.

Interference with Railroad Operations

The Design-Build Team shall arrange and conduct work so that there will be no interference with railroad operations, including train, signal, telephone and telegraphic services, or damage to the NSRC property or to the poles, wire, and other facilities of tenants on the rights of way of NSRC. Wherever work is liable to affect the operations or safety of trains, the Design-Build Team shall first submit the method of doing such work to the Railroad Engineer for review and approval. However, such approval will not relieve the Design-Build Team from liability.

Should conditions arise from or in connection with the Design-Build Team's construction and / or construction methods that require immediate and unusual provisions be made to protect train operations and / or NSRC property, the Design-Build Team shall be responsible for making such provisions and if, in the judgment of the Railroad Engineer such provisions are insufficient, the Railroad Engineer or the Department may, at the expense of the Design-Build Team, require or provide such provisions as may be deemed necessary.

Storage of Materials

Do not store materials or equipment where they will interfere with railroad operations, nor on the NSRC rights of way without first obtaining permission from the Railroad Engineer. Such permission will be with the understanding that NSRC will not be liable for damage to such material or equipment from any cause, and that the Railroad Engineer may move or require the Design-Build Team to move, at the Design-Build Team's expense, such material and equipment.

Completion and Acceptance of Work

Upon completion of the work, remove from within the limits of the NSRC rights of way all machinery, equipment, surplus materials, or rubbish and leave such rights of way in a neat and orderly condition. After the final inspection has been made and work found to be completed in a satisfactory manner acceptable to the Department and NSRC, the Department will be notified of NSRC's acceptance in writing by NSRC.

Failure to Comply

In the event the Design-Build Team violates or fails to comply with any of the RFP requirements:

- (1) The Railroad Engineer may require that the Design-Build Team vacate NSRC property.
- (2) The Engineer may withhold all monies due the Design-Build Team on monthly statements.

Any such orders shall remain in effect until the Design-Build Team has remedied the situation to the satisfaction of the Railroad Engineer and the Engineer.

Railroad Site Data

The Design-Build Team shall verify with NSRC the number of tracks, the number of trains per day and the maximum train speed at these locations. The Design-Build Team shall have no claims whatsoever against either NSRC or the Department for any delays or additional costs incurred based on changes in this information.

Preconstruction Meeting

The Design-Build Team shall invite representatives from NSRC to the project's Preconstruction Meeting.

Regardless of the need for an agreement, the Design-Build Team shall adhere to all the requirements contained in the NSCR Special Provisions for Protection of Railway Interests provided by the Department, which by reference, shall be incorporated and made a part of this contract.

GABIONS**A. GENERAL**

In accordance with the details and dimensions shown on the plans developed by the Design-Build Team and accepted by the Department, the Design-Build Team shall design

and construct gabions and gabion structures. The term “gabion” shall be used generically to refer to any proprietary system able to satisfy this project special provision and the aforementioned plans. The appearance of finished gabions shall meet the aesthetic requirements herein. (Reference the Aesthetics Scope of Work found elsewhere in this RFP and the Aesthetic Guidelines provided by the Department)

B. MATERIALS

Refer to the 2012 *Standard Specifications for Roads and Structures*.

Item	Section
Geotextiles, Type 2	1056

For gabions, the Design-Build Team shall adhere to the following:

Provide Type 2 geotextile for separation geotextiles.

Wire

Use wire for the manufacture of the gabions and lacing wire that has a maximum tensile strength of 75,000 psi as per ASTM A641/A641-03. Perform all tests on the wire prior to manufacturing the mesh. Use wire that complies with ASTM A975-97, Style 3 coating, galvanized and PVC coated steel wire.

Woven Wire Mesh Type 8 x 10

Use mesh and wire for the manufacture of the gabions with characteristics that meet the requirements of ASTM A975-97 Table 1, Mesh Type 8 x 10 and PVC coated. The nominal mesh opening, D, shall equal 3.25 inches. The minimum mesh properties for strength and flexibility shall be in accordance with the following:

- 1) When tested in accordance with ASTM A975-97, Section 13.1.1, a minimum Mesh Tensile Strength of 2,900 lb/ft shall be required
- 2) When tested in accordance with ASTM A975-97, Section 13.1.4, a minimum Punch Test resistance of 5,300 lb shall be required.
- 3) When tested in accordance with ASTM A975-97, a minimum Connection to Selves of 1,200 lb/ft shall be required.

Polyvinyl Chloride (PVC) Coating

The technical characteristics and the resistance of the PVC to aging shall meet the relevant standards. The main values for the PVC material shall be as follows:

- 1) The initial property of the PVC coating shall be in compliance with ASTM A975-97, Section 8.2.
- 2) Prior to UV and abrasion degradation, the PVC polymer coating shall have a projected minimum durability of 60 years when tested in accordance with UL 746B Polymeric Material – Long Term Property Evaluation for heat aging test.

Fabrication at Manufacturing Facility

Manufacture and ship gabions with all components mechanically connected at the production facility. The front, base, back, and lid of the gabions shall be woven into a single unit. Factory connect the ends and diaphragm(s) to the base. Selvedge all perimeter edges of the mesh forming the basket and top, or lid, with wire having a greater diameter. The gabion shall be divided into cells by means of diaphragms positioned at approximately three-foot centers. Secure the diaphragms in position to the base so that no additional lacing is necessary at the jobsite.

1) Lacing Wire

Use lacing wire meeting all of the physical characteristics outlined herein and having a minimum diameter of 0.127 inch.

2) Ring Fasteners

Stainless steel ring fastener may be used instead of, or to compliment, the lacing wire. Use ring fasteners meeting the requirements of ASTM A975-97, Section 6.3. Use ring fasteners with a minimum open dimension of 1.75 inch, a maximum closed diameter of 0.75 inch, and a nominal overlap of one inch after closure. Do not exceed a spacing of 6 inches between each ring fastener.

3) Preformed Stiffeners

Preformed stiffeners manufactured for supporting the exposed face of a gabion. The exposed face shall be any side of a gabion cell that will be exposed or unsupported after the structure is completed.

4) Cross Tie / Stiffener Wire

Cross tie / stiffener wire may be used instead of, or to compliment, the preformed stiffeners. Use cross tie / stiffener wire (lacing wire) meeting all of the physical characteristics outlined herein and having a minimum diameter of 0.127 inch.

Rock

The rock for gabions shall be hard, angular to round, durable and of such quality that they shall not disintegrate on exposure to water or weathering during the life of the structure. Not more than five percent by weight of clean spalls resulting from loading and shipment will be allowed in any truckload. The rock may be unwashed quarry material provided it meets all requirements of this project special provision and is placed in conformance with all requirements of the environmental permits (including but not limited to water quality requirements). Prior to construction, submit testing results and certifications that all proposed construction materials meet all requirements of the 2012 *Standard Specifications for Roads and Structures* to the Resident Engineer. The minimum unit weight of the rock shall be 164 pounds per cubic foot (saturated surface dry) and the absorption shall be less than four percent. Rock containing organic matter or soft, friable particles in quantities considered objectionable to the Engineer shall be rejected. Only crystalline rock obtained by quarrying will be allowed. Use rock that ranges in dimension from a minimum of four inches to a maximum of eight inches. The range in sizes shall allow for a variation of 5% oversize and / or 5% undersize

stone, provided it is not placed on the gabion exposed surface. The size shall be such that a minimum of three layers of rock must be achieved when filling the gabion.

3.0 PRECONSTRUCTION REQUIREMENTS

A. Gabion Gravity Wall Designs

Where multiple levels of gabions are connected together as a structure to retain earth, a gabion gravity wall design shall be required. Before beginning gabion gravity wall design, survey existing ground elevations shown in the plans developed by the Design-Build Team and other elevations in the vicinity of the gabion gravity wall locations, as needed. For proposed slopes above or below gabion gravity walls, survey existing ground elevations to at least ten feet beyond the slope stake limits. Based on these elevations, finished grades and actual gabion gravity wall dimensions, details and batter, submit revised wall envelopes to the Department for review and acceptance. The Design-Build Team shall use accepted wall envelopes for revised designs.

For gabion gravity wall designs, the Design-Build Team shall submit 11 copies of working drawings and three copies of design calculations, including a PDF copy of each, a minimum of 30 days before the preconstruction meeting. Do not begin gabion gravity wall construction until a design submittal has been reviewed and accepted by the Department.

The Design-Build Team shall design gabion gravity walls in accordance with the plans developed by the Design-Build Team and Article 11.11 of the AASHTO *LRFD Bridge Design Specifications*, unless otherwise allowed by the Department. If walls are located in Seismic Zone 2 based on Figure 2-1 of the *Structure Design Manual*, the Design-Build Team shall design gabion gravity walls for seismic loading. The Design-Build Team shall not locate gabion units outside right of way.

When noted in the plans developed by the Design-Build Team, design gabion gravity walls for a live load (traffic) surcharge of 250 lb/sf, in accordance with Figure C11.5.6-3(a) of the AASHTO LRFD specifications. For steel beam guardrail with eight-foot posts above gabion gravity walls, the Design-Build Team shall analyze walls for a horizontal load (P_{HI}) of 300 lb/ft of wall, in accordance with Figure 3.11.6.3-2(a) of the AASHTO LRFD specifications.

Unless required otherwise in the plans developed by the Design-Build Team, embed gabion gravity walls at least two feet below grade in front of the wall. Separation geotextiles shall be required between gabions and backfill or natural ground.

The Design-Build Team shall submit working drawings and design calculations for acceptance in accordance with Article 105-2 of the 2012 *Standard Specifications for Roads and Structures*. The Design-Build Team shall submit working drawings showing plan views, wall profiles with required resistances, typical sections, geotextile locations and details of gabion units, etc. If necessary, the Design-Build Team shall include details on working drawings for obstructions extending through walls. The Design-Build Team shall submit design calculations for each wall section with different

surcharge loads, geometry or material parameters. When designing gabion gravity walls with computer software, a hand calculation shall be required for the tallest wall section. The Design-Build Team shall provide gabion gravity wall designs sealed by an engineer licensed in the state of North Carolina.

B. Preconstruction Meeting

Before starting gabion gravity wall construction, the Design-Build Team shall hold a preconstruction meeting to discuss the construction and inspection of the gabion gravity walls. If this meeting occurs before all gabion gravity wall submittals have been reviewed and accepted by the Department, additional preconstruction meetings may be required before beginning construction of the gabion gravity walls. The Resident or Bridge Maintenance Engineer, Bridge Construction Engineer, Geotechnical Operations Engineer, Design-Build Team and Gabion Gravity Wall Installer Superintendent shall attend all preconstruction meetings.

4.0 CONSTRUCTION REQUIREMENTS

The Design-Build Team shall use reasonable care in handling, assembling and installing the gabions to prevent damage, including but not limited to damage to the PVC coating. Gabions damaged shall be repaired in a manner satisfactory to the Engineer or replaced at no cost to the Department.

Work Experience

The Design-Build Team shall assign a field supervisor with experience on at least three (3) projects of similar scope to this project, completed over the past five (5) years. The on-site foreman must have completed three (3) projects within the last five (5) years involving gabion installations of similar scope and size. The Department may suspend the construction work if the the Design-Build Team substitutes unqualified personnel; and the Design-Build Team shall be liable for additional costs resulting from the suspension.

The Design-Build Team shall submit the above experience qualifications list and personnel list for approval prior to gabion wall design submittals.

Assembly

Gabions shall be supplied folded flat and packed in bundles. The units shall be assembled individually by erecting the sides, ends, and diaphragms, ensuring that all panels are in the correct position, and the tops of all the sides are aligned. First, connect the four corners, followed by the internal diaphragms to the outside walls. Use lacing wire or fasteners for all connections.

The procedure for using lacing wire shall consist of cutting a sufficient length of wire, and first looping and / or twisting to secure the lacing wire to the wire mesh. Proceed to lace with alternating double and single loops through every mesh opening approximately every six inches, pulling each loop tight and finally securing the end of the lacing wire to the wire mesh by looping and / or twisting.

Installation

After initial assembly, the gabions shall be carried to their final position and shall be securely joined together along vertical and top edges of their contact surfaces using the same connecting procedure(s) previously described. Whenever a structure requires more than one layer, the upper empty baskets shall also be connected to the top of the lower layer along the front and back edges of the contact surface using the same connecting procedure(s) previously described.

Filling Gabions

Fill gabions with rock specified in the Materials Section and meeting the contract aesthetic requirements. During the filling operation, some manual rock placement shall be required to minimize voids. The exposed faces of vertical structures shall be carefully hand-placed to give a neat, flat and compact appearance. Care shall be taken when placing fill material to ensure that the sheathing on the PVC coated baskets is not damaged.

Fill the cells in stages so that local deformation shall be avoided. Do not fill any one cell to a depth exceeding one foot higher than an adjoining cell. It is also recommended to slightly overfill the baskets by one to two inches to allow for settlement of the rock. Behind gabion walls, compact the backfill material simultaneously to the same level as the filled gabions.

Preformed Stiffeners / Internal Connecting Wires

For gabions, use preformed stiffeners or lacing wire as internal connecting wires when a structure requires more than one layer of gabions to be stacked on top of each other. Connect internal connecting wires to the exposed face of a cell to the adjacent side of the cell. Preformed stiffeners shall be installed at 45 degree to the face / side of the unit, extending an equal distance along each side to be braced (approximately one foot). Cross tie / stiffener wire (lacing wire) may be used instead of, or to compliment, the preformed stiffeners. An exposed face shall be any side of a gabion cell that will be exposed or unsupported after the structure is completed.

Three-Foot High Gabions

Fill three-foot gabions in three layers, one foot at a time. Install preformed stiffeners / connecting wire after the placement of each layer, that is, at one foot high and two-foot high.

1.5-Foot High Gabions

1.5-foot high gabions will not require preformed stiffeners / connecting wire unless the baskets are used to build vertical structures and turned on their side. In some cases, these units shall be filled in two layers, nine inches at a time. Connecting wires shall be installed after the placement of the first layer, which shall be nine inches high.

Lid Closing

Once the gabion baskets are completely full, pull the lids tight until the lid meets the perimeter edges of the basket. A tool such as a lid closer can be used. Tightly lace and / or fasten the lid along all edges, ends, and tops of diaphragm(s) in the same manner previously described.

Mesh cutting and folding

Where shown on the plans developed by the Design-Build Team and / or as directed by the Engineer, cut the gabion, fold and fasten together to suit the existing site conditions. Cleanly cut the mesh, fold back the surplus mesh, and neatly wire to an adjacent basket face. Securely fasten the cut edges of the mesh with lacing wire or fasteners in the manner previously described. Assemble, install, fill and close any reshaped as specified in the previous sections.

GENERAL

The State will not be bound by oral explanations or instructions given at any time during the bidding process or after award. Only information that is received in response to this RFP will be evaluated; reference to information previously submitted will not suffice as a response to this solicitation.

NO CONTACT CLAUSE

To ensure that information is distributed equitably to all short-listed Design-Build Teams, all questions and requests for information shall be directed to the State Contract Officer through the Design-Build e-mail address. This precludes any Design-Build team member, or representative, from contacting representatives of the Department, other State Agencies or Federal Agencies either by phone, e-mail or in person concerning the Design-Build Project.

USE OF TERMS

Throughout this RFP and all manuals, documents and standards referred to in the RFP the terms Contractor, Bidder, Design-Builder, Design-Build Team, Team, Firm, Company and Proposer are synonymous.

Throughout this RFP and all manuals, documents and standards referred to in the RFP, the terms NCDOT, Department, Engineer and State are synonymous.

Throughout this RFP and all documents referred to in the RFP, references to the Technical Proposal include all Technical Proposal supplemental information that may be submitted in response to a Best and Final Offer RFP.

DESIGN REFERENCES

Design references developed and published by NCDOT and those developed and published by other agencies and adopted for use by NCDOT which are to be used in the design of this project may be obtained by contacting Contract Standards and Development Unit within the Technical Services Division. Standard prices for materials, which the Department normally sells for a fee, will be in effect. The Design-Build Team shall be responsible for designing in accordance with the applicable documents and current revisions and supplements thereto.

REVIEW OF SUBMITTALS

Major design milestones and required design submittals shall be identified as activities on a CPM, bar chart or other scheduling tool. This schedule shall be submitted to the Design-Build Unit and Resident Engineer concurrently with the first design submittal, or within 30 days of the contract award, whichever is earlier. The schedule shall be revised and resubmitted as design milestones change or as directed by the Design-Build Unit. Submittals will be reviewed within 10 working days (15 days for temporary structures, overhead sign assemblies, MSE walls, FEMA compliance documents, curved steel girder working drawings and temporary shoring) from the date of receipt by NCDOT unless otherwise stipulated in the scope of work. All submittals shall be prepared and submitted in accordance with the *Design-Build Submittal*

Guidelines, which by reference are incorporated and made a part of this contract. All submittals shall be made simultaneously to the Design-Build Unit and the Resident Engineer. The Department will not accept subsequent submittals until prior submittal reviews have been completed for that item. The Design-Build Team shall inform the Design-Build Unit in writing of any proposed changes to the NCDOT preliminary designs, Technical Proposal and / or previously reviewed submittals and obtain approval prior to incorporation. The Design-Build Team shall prioritize submittals in the event that multiple submittals are made based on the current schedule. All submittals shall include pertinent Special Provisions. No work shall be performed prior to Department review and acceptance of the design submittals.

OVERVIEW

The Design-Build Project U-2827B / C-5620A reconstructs US 421 / I-40 Business from west of Fourth Street to east of Church Street, a distance of approximately 1.2 miles. The Project will modify four interchanges, remove two interchanges, provide intersection safety improvements in proximity to the US 421 / I-40 Business corridor, and construct Phase 1A of the multi-use path from Fourth Street to Liberty Street.

Project services shall include, but are not limited to:

- **Design Services** – completion of construction plans, including Record Drawings
 - **Construction Services** – necessary to build and ensure workmanship of the designed facility
 - **Permit Preparation / Application** - development of all documents for required permits
 - **Right of Way** – acquisition of right of way necessary to construct project
 - **As-Constructed Drawings**
 - **As-Built Plans**
- The U-2827B Environmental Assessment (EA) was approved on February 28, 2014.
 - The U-2827B Finding of No Significant Impact (FONSI) was approved on February 27, 2015.

NCDOT is currently developing the C-5620A Categorical Exclusion (CE) which is anticipated to be completed in June 2016. It is important for Proposers to note, at this time, the proposed Project remains in the environmental process and that final environmental approvals have not been secured. Additional alternatives, including a no-build alternative, are always considered in the environmental process, and it is possible that the project scope may need to be modified to comply with the environmental process, or that a no-build alternative may be adopted. Nothing contained in the RFP is intended to modify, limit, or otherwise constrain the environmental process or commit NCDOT to undertake any action with respect to this project.

Construction Engineering Inspection will be provided by the NCDOT Division personnel or will be performed under a separate contract.

GENERAL SCOPE

The scope of work for this project includes design, construction and management of the project. The design work includes all aspects to reconstruct approximately 1.2 miles of

US 421 / I-40 Business, from west of Fourth Street to east of Church Street; modify interchanges and replace bridges on US 421 / I-40 Business; provide intersection safety improvements in proximity to the US 421 / I-40 Business corridor; and construct a multi-use path from Fourth Street to Liberty Street. Unless allowed otherwise elsewhere in this RFP, the designs shall meet all appropriate latest versions of AASHTO *Policy on Geometric Design of Highways and Streets*, AASHTO *LRFD Bridge Design Specifications*, *Manual of Uniform Traffic Control Devices* and all NCDOT design policies that are current as of the Technical and Price Proposal submission date or the Best and Final Offer submission date.

Unless noted otherwise elsewhere in this RFP, all documents referenced herein shall be the edition / version, including all interim revisions, effective on the Design-Build submittal date.

Construction shall include, but not be limited to, all necessary clearing, grading, roadway, drainage, structures, utility coordination and relocation, and erosion and sediment control work items for the proposed four-lane facility and installation of the control of access fence. Construction engineering and management shall be the responsibility of the Design-Build Team. Construction shall comply with 2012 NCDOT *Standard Specifications for Roads and Structures* and any special provisions.

Areas of work required for this project shall include, but are not limited to the following items:

1. Roadway Design
2. Structure Design
3. Hydraulic Design
4. Permit Application
5. Geotechnical
6. Geoenvironmental
7. Subgrade Stabilization
8. Foundation Design for Structures and Roadway
9. Erosion and Sedimentation Control Design and Implementation
10. Utility Construction
11. R/W Utilities, Conflicts and / or Construction
12. Transportation Management Plan Design and Implementation
13. Pavement Marking Design
14. Sign Design
15. Intelligent Transportation Systems (ITS) Design
16. Traffic Management and Signal System Design
17. Construction
18. Project Management
19. Design and Construction Management
20. Construction Surveying
21. Location and Surveys
22. Lighting (Construction only for roadway lighting / Design and construction for decorative pedestrian lighting)
23. Right of Way Acquisition
24. Public Information
25. Aesthetics

All designs shall be in Microstation format using Geopak software (current version used by the Department).

DESIGN AND CONSTRUCTION PERFORMED BY DESIGN-BUILD TEAM

The design work consists of the preparation of all construction documents for reconstructing approximately 1.2 miles of US 421 / I-40 Business; modifying interchanges and replacing bridges on US 421 / I-40 Business; providing intersection safety improvements in proximity to the US 421 / I-40 Business corridor; and constructing a multi-use path as outlined in the Scope of Work section of this RFP. The Design-Build Team shall prepare final designs, construction drawings and special provisions.

Unless noted otherwise elsewhere in this RFP, the Design-Build Team shall acknowledge that project documents furnished by the Department are preliminary and provided solely to assist the Design-Build Team in the development of the project design. The Design-Build Team shall be fully and totally responsible for the accuracy and completeness of all work performed under this contract and shall save the State harmless and shall be fully liable for any additional costs and all claims against the State which may arise due to errors, omissions and negligence of the Design-Build Team in performing the work required by this contract.

There shall be no assignment, subletting or transfer of the interest of the Design-Build Team in any of the work covered by the Contract without the written consent of the State, except that the Design-Build Team may, with prior written notification of such action to the State, sublet property searches and related services without further approval of the State.

The Design-Build Team shall certify all plans, specifications, estimates and engineering data furnished by the Team.

All work by the Design-Build Team shall be performed in a manner satisfactory to the State and in accordance with the established customs, practices, and procedures of the North Carolina Department of Transportation, and in conformity with the standards adopted by the American Association of State Highway Transportation Officials, and approved by the U.S. Secretary of Transportation as provided in Title 23, U.S. Code, Section 109 (b). The decision of the Engineer / State / Department shall control in all questions regarding location, type of design, dimension of design, and similar questions.

Alternate designs, details and / or construction practices (such as those employed by other states, but not standard practice in NC) are subject to Department review and approval, and will be evaluated on a case by case basis.

The Design-Build Team shall not change team members, subconsultants or subcontractors identified in the Statement of Qualifications (SOQ) or Technical Proposal without written consent of the Engineer or the State Contract Officer. In addition, subconsultants and subcontractors not identified in the SOQ or Technical Proposal shall not perform any work without written consent by the Engineer. Individual offices of the Design-Build Team not identified in the Statement of Qualifications or the Technical Proposal submitted shall not perform any work without written consent by the Engineer. Failure to comply with this

requirement may be justification for removing the Team from further consideration for this project and disqualification from submitting on future Design-Build Projects.

All firms shall be prequalified by the Department for the work they are to perform. Joint Ventures, LLCs or any legal structure that are different than the existing prequalification status must be prequalified prior to the Technical and Price Proposal submittal deadline. Subcontractors need only be prequalified prior to performing the work. Design firms should be prequalified prior to the Technical and Price Proposal submittal deadline. If not prequalified at the time of the Technical and Price Proposal submittal deadline, the prime contractor shall be solely responsible for either (1) ensuring that the design firm is prequalified prior to its first design submittal or (2) replacing that firm with a prequalified firm. Design firms and Natural Systems firms are prequalified by the particular office performing the work. If the work is to be performed by an office other than the one that is prequalified, that office shall be prequalified prior to any design submittals.

ACCESS TO PROVIDED MATERIALS

To facilitate distribution of documents that may be helpful to the Design-Build Teams in their development of a Technical and Price Proposal and subsequent designs, project material will be made accessible through a secure web portal. The Design-Build Project Manager for each short-listed team shall provide a list of team members that will require access to this portal. This list shall include the name, e-mail address and North Carolina Identity Management (NCID) for each individual team member. Once the list is complete, it shall be submitted to the Design-Build e-mail address (designbuild@ncdot.gov). No distribution of Provided Materials will be possible prior to this list being submitted and the access privileges established as noted herein.

To create an NCID account, each individual shall go to NCDOT's Connect website (<https://connect.ncdot.gov>) and click on the "How to get an Account" link and then, "Create NCID".

The Department will obtain access rights for these individuals and notify the Design-Build Project Manager accordingly. Individuals may then re-enter the "Connect" site and login with their NCID account. Once logged in, the Teamsite "U-28278B_C-5620A" link will be apparent on the left side of the webpage.

Please note that all material provided, including the material provided through this portal, is provided for informational purposes only and is provided solely to assist the Design-Build Team in the development of the project design unless noted otherwise elsewhere in this RFP. By submitting a Technical Proposal and Price Proposal, the Design-Build Team acknowledges that they are fully and totally responsible for the project design, including the use of portions of the Department design, modification of such design, or other designs as may be submitted by the Design-Build Team, unless noted otherwise elsewhere in this RFP. The Design-Build Team further acknowledges that they are fully and totally responsible for the accuracy and completeness of all work performed, including the determination of the accuracy of the information provided through this portal, and to the extent that the Design-Build Team chooses to rely on such information.

ELECTRONIC PLAN SUBMITTALS AND E-SIGNATURES

The Design-Build Team shall submit all Release for Construction Plans in accordance with the NCDOT e-Signature requirements, including but not limited to providing signed and sealed searchable .pdf files. Reference the website noted below for additional information:

<https://connect.ncdot.gov/projects/roadway/pages/private-engineering-firm-resources.aspx>

ETHICS POLICY

Employees employed by the Design-Build Team or employees employed by any subconsultant for the Design-Build Team to provide services for this project shall comply with the Department's Ethics Policy. Failure to comply with the Ethics Policy will result in the employee's removal from the project and may result in removal of the Company from the Department's appropriate prequalified list.

APPROVAL OF PERSONNEL

The Department will have the right to approve or reject any personnel, assigned to a project by the Design-Build Team.

In the event of engagement of a former employee of the Department, the Design-Build Team or their subcontractors shall restrict such person or persons from working on any of the Design-Build Team's contracted projects in which the person or persons were "formerly involved" while employed by the State. The restriction period shall be for the duration of the contracted project with which the person was involved. *Former Involvement* shall be defined as active participation in any of the following activities:

- Drafting the contract
- Defining the contract scope
- Design-Build Team selection
- Negotiation of the contract cost (including calculating manhours or fees)
- Contract administration

An exception to these terms may be granted when recommended by the Secretary and approved by the Board of Transportation.

Failure to comply with the terms stated above in this section shall be grounds for termination of this contract and / or not being considered for selection of work on future contracts for a period of one year.

SUBMITTAL OF TECHNICAL AND PRICE PROPOSALS

Technical and / or Price Proposals that do not adhere to all the requirements noted below may be considered non-responsive and may result in the Department not considering the Design-Build Team for award of the contract or reading their Price Proposal publicly.

GENERAL

Technical and Price Proposals will be accepted until **4:00 p.m. Local Time on Tuesday, August 9, 2016** at the office of the State Contract Officer:

Mr. Randy A. Garris, PE
Contract Standards and Development
1020 Birch Ridge Drive
Century Center Complex - Building B
Raleigh, NC 27610

No Proposals will be accepted after the time specified.

Proposals shall be submitted in two separate, sealed parcels containing the Technical Proposal in one and the Price Proposal in the other parcel.

TECHNICAL PROPOSAL- Hard Copies

Hard copies of the Technical Proposal shall be submitted in a sealed package. The outer wrapping shall clearly indicate the following information:

Technical Proposal – Hard Copies
Submitted By: (Design-Build Team's Name)
Design-Build Team Address
Contract Number C203862
TIP Number U-2827B / C-5620A
Forsyth County

US 421 / I-40 Business Pavement Reconstruction, Bridge Replacements and Interchange
Modifications from west of Fourth Street to east of Church Street;
and Multi-Use Path from Fourth Street to Liberty Street

If delivered by mail, the sealed envelope shall be placed in another sealed envelope and the outer envelope addressed to the Contract Officer as stated in the Request for Proposals. The outer envelope shall also bear the statement "Technical Proposal for the Design-Build of State Highway Contract No. C203862".

Technical Proposal Requirements

12 Copies
8 ½ inch by 11 inch pages
No fold-out sheets allowed
Printed on one side only
Double-spaced
Font size 12

Minimal font size 10 is permissible within embedded tables, charts, or graphics. No more than 50 pages, excluding the introductory letter to Mr. Randy Garris, P.E. (two-page maximum length) and the 11 inch by 17 inch appropriate plan sheets - 24 x 36 inch fold out sheets will only be allowed to present interchange plans

The aforementioned introductory letter to Mr. Randy Garris, P.E. shall include a statement acknowledging that the NCDOT may destroy all Technical Proposals not retained by the Department, **or** that the NCDOT should return all Technical Proposals not retained by the Department.

Project team members, identified in the Statement of Qualifications, shall not be modified in the Technical Proposal without written approval of the Department. Any such request should be sent to the attention of Mr. Randy Garris, PE, at the address below:

NCDOT- Contract Standards and Development
Century Center Complex - Building B
1020 Birch Ridge Drive
Raleigh, NC 27610

TECHNICAL PROPOSAL- Electronic Copy

An electronic copy of the Technical Proposal shall be submitted in a sealed package. The electronic copy shall be created by converting the original MicroStation / GeoPak files into PDF format. The electronic copy shall be scaled to reproduce to the appropriate page format, as defined above. The outer wrapping shall clearly indicate the following information:

Technical Proposal – Electronic Copy
Submitted By: (Design-Build Team's Name)
Design-Build Team Address
Contract Number C203862
TIP Number U-2827B / C-5620A
Forsyth County
US 421 / I-40 Business Pavement Reconstruction, Bridge Replacements and Interchange
Modifications from west of Fourth Street to east of Church Street;
and Multi-Use Path from Fourth Street to Liberty Street

If delivered by mail, the sealed envelope shall be placed in another sealed envelope and the outer envelope addressed to the Contract Officer as stated in the Request for Proposals. The outer envelope shall also bear the statement "Technical Proposal for the Design-Build of State Highway Contract No. C203862"

PRICE PROPOSAL

Price Proposals shall be submitted in a sealed package. The outer wrapping shall clearly indicate the following information:

Price Proposal
Submitted by (Design-Build Team's Name)
Design-Build Team Address
Contract Number C 203862
TIP Number U-2827B / C-5620A
Forsyth County

US 421 / I-40 Business Pavement Reconstruction, Bridge Replacements and Interchange
Modifications from west of Fourth Street to east of Church Street;
and Multi-Use Path from Fourth Street to Liberty Street

The Price Proposal shall be submitted by returning the Request for Proposals with the item sheets completed, and all required signatures and bonds. Failure to execute the required documents may render the Price Proposal non-responsive.

If delivered by mail, the sealed envelope shall be placed in another sealed envelope and the outer envelope addressed to the Contract Officer as stated in the Request for Proposals. The outer envelope shall also bear the statement "Price Proposal for the Design-Build of State Highway Contract No. C203862".

EVALUATIONS

Decisions based on cost alone will not establish the design standards for the project. Technical Proposals shall address the technical elements of the design and construction of the project. The Technical Review Committee will consider the understanding of the project, the anticipated problems and the solutions to those problems, in addition to other evaluation criteria identified herein.

The Design-Build Team's Technical Proposal shall be developed using narratives, tables, charts, plots, drawings and sketches as appropriate. The purpose of the Technical Proposal is to document the Design-Build Team's understanding of the project, demonstrate the Design-Build Team's capabilities to complete the project, document their selection of appropriate design criteria and state their approach and schedule for completing all design and construction activities.

The review of design plans by the Department is not intended to reflect a reviewer's personal preferences, but rather to ensure that all contract requirements are met, sound engineering judgment is exercised by the Design-Build Team, and that the Design-Build Team adheres to all referenced documents, including but not limited to, design standards, codes, memos and manuals. As such, the Award of the Design-Build contract does not in any way imply that the NCDOT accepts the details of the Technical Proposal submitted by the Design-Build Team.

The Technical Proposal will be evaluated in each of the following major categories:

EVALUATION FACTORS	POINTS
1. Management	8
2. Responsiveness to Request for Proposal	35
3. Long Term Maintenance	5
4. Schedule and Milestones	30
5. Innovation	10
6. Maintenance of Traffic and Safety Plan	7
7. Oral Interview	5

TECHNICAL PROPOSAL EVALUATION CRITERIA**1. Management – 8 points*****Design-Build Team Management***

- Describe the Design-Build Team's concept of design management. The proposal shall identify key positions and subordinate organizational units.
- Describe the plan for the coordination of civil / structural, utilities, traffic maintenance, constructability and environmental responsibility.
- Provide a narrative description of the proposed location of the design office(s) and their respective responsibilities.
- Describe how the designs developed by different firms and offices will be integrated.
- Describe how design personnel will interface with the construction personnel.
- Describe the overall strengths of the Design Team and their ability to fulfill the design requirements of this project.
- List projects, including description and similarity to the subject project, that the Design-Build Team's designer(s) have developed Transportation Management Plans, Pavement Marking Plans, ITS & Signals Plans and Signing Plans.
- List projects, including description and similarity to the subject project, that the Design-Build Team's right of way firm has performed right of way acquisition services.

Quality Management

- Describe how the Design-Build Team will comply with the quality control requirements for both design and construction. Specifically, include a narrative describing the Design-Build Team's understanding of the Department's construction quality control philosophy for this project and how the Design-Build Team will implement it.
- The Design-Build Team should detail the number of inspectors they expect the Department to furnish, during various phases, to allow satisfactory progress of project construction.
- Describe any significant quality control issues experienced on NCDOT projects in the last ten years and how those issues will be addressed for this project.
- The narrative shall include both design and construction activities.

Construction Management

- Describe the Design-Build Team's concept of the project construction management organization and how it interrelates with the other elements of the Design-Build Team's organization for the project.
- Provide a brief narrative description of the Design-Build Team's proposed plan for performing construction on the project. This description shall include at least the following:

- A construction organization chart for the project, showing the relationships between functions shown on the chart and the functional relationships with subcontractors.
- The chart shall indicate how the Design-Build Team intends to divide the project into work segments to enable optimum construction performance.
- Descriptions of those categories of work that the Design-Build Team anticipates will be performed by the Design-Build Team's own direct labor force and those categories that will be performed by subcontractors.
- The Design-Build Team's plans and procedures to insure timely deliveries of materials to achieve the project schedule.
- Describe the overall strengths of the construction team and their ability to fulfill the construction and construction management requirements of this project.
- Describe the Design-Build Team's approach to site access and material staging.

2. Responsiveness to RFP – 35 points

Natural Environmental Responsibility

- Describe the Design-Build Team's approach to addressing environmental concerns within the project boundaries.
- Identify efforts to minimize impacts on wetlands, streams, riparian buffers and other environmentally sensitive areas. Describe any temporary impacts and associated minimization approaches.
- Describe the Design-Build Team's understanding of the overall approach to permitting and the Team's comfort level with obtaining the required permits within the allowed timeframe.
- Identify methods of construction in wetlands, streams and buffers.
- Describe all project / construction related Notice of Violations (NOVs) received by any team member within the last five years on projects in the United States and the disposition of each listed NOV.
- Describe the Design-Build Team's approach to Sedimentation and Erosion Control for the project.
- Describe efforts to minimize excavation within the contaminated sites and associated disturbance to underlying soil.
- Provide a narrative overview of the Design-Build Team's Vegetation Management Procedure.

Design Features

- Show plan view of design concepts with key elements noted.
- Identify preliminary horizontal and vertical alignments of all roadway elements.
- Identify the functional horizontal and vertical designs of the replacement of the Fourth Street Bridge over US 421 / I-40 Business, as well as a Design Exception Checklist.

- Show mainline typical sections.
- Identify proposed deviations to the preliminary design provided by the Department.
- Identify drainage modifications and designs to be implemented.
- Identify all hydraulically deficient box culverts and / or pipes within the existing / proposed right of way and their proposed hydraulic mitigation or replacement.
- For all major hydraulic crossings with a conveyance greater than the capacity of a single 72" diameter pipe, indicate the rise in the floodplain water elevation.
- Discuss the extent and limits of the rise in water elevation in the floodplain(s), identify potentially impacted structures, specify areas anticipated to require additional surveys and estimate the anticipated additional right of way impacts outside the project construction limits.
- Identify the appropriate design criteria for each feature, if not provided herein.
- Identify all bridge types to be constructed, including any special design features or construction techniques needed.
- Provide functional horizontal and vertical alignments for all MUP phases shown in the U-2827B Preliminary Plans, and indicate how the MUP future phases can be constructed without modifying the proposed permanent structures.
- Provide conceptual designs and renderings for all aesthetic elements, including but not limited to the Green Street pedestrian bridge and the Strollway bridge.
- Identify the roadway bridges over US 241 / I-40 Business that will be designed and constructed with a median bent.
- Specify the mainline pavement Alternate(s) chosen. The pavement Alternate(s) chosen for the mainline will not be a part of the Technical Proposal evaluation and the selection thereof will not impact the Technical Scores; although an alternate pavement design, as approved as an ATC, may be considered in the evaluation.
- Specify the base option chosen (ABC or asphalt) for Liberty Street.
- Specify the proposed mainline subgrade stabilization, or combination, with approximate limits of each type.
- If applicable, specify where all underlying longitudinal joints will be located and demonstrate how the underlying longitudinal joint location will minimize reflective cracking.
- Indicate how longitudinal joints will be located on a lane line or lane midpoint
- Identify any deviations, including proposed design exceptions, from the established design criteria that will be utilized. Explain why the deviation is necessary.
- Describe any geotechnical investigations to be performed by the Design-Build Team and note any deviations to NCDOT requirements for subsurface investigations noted in the Geotechnical Scope of Work.
- Identify any aesthetics considerations not required herein that will be part of the design.
- Describe how utility conflicts will be addressed and any special utility design considerations. Describe how the Design-Build Team's design and construction methods minimize the Department's utility relocation costs.
- Identify the months the Department should schedule the interagency hydraulic design review meeting and interagency permit impact meeting.
- Describe how the design will affect the Department's right of way costs.
- Identify types of any retaining walls and / or sound barrier walls, if applicable.

- Provide a Preliminary Signing Concept Map that includes, at a minimum, all proposed overhead sign structure locations, overhead signs, and ground mounted guide signs for the Signing Project limits.

3. Long Term Maintenance – 5 points

- Describe any special materials, not referenced elsewhere in this RFP, incorporated into the project that would result in long term reduction in maintenance.
- Describe any special designs or construction methods that would reduce future maintenance costs to the Department.
- Estimate a minimum ten-year cost saving resulting from incorporation of these special materials, design or construction methods into the project.

4. Schedule and Milestones – 30 points

- Provide a detailed schedule for the project including both design and construction activities. The schedule shall show the sequence and continuity of operations, as well as the month of delivery of usable segments of the project.
- Indicate how the Design-Build Team will maintain the project schedule if the right of way acquisition process and / or the utility relocations are delayed.
- Specify the duration, in days, for ICT #1
- Specify the duration, in days, for ICT #6, ICT #7, ICT #8, and ICT #14 through ICT #21
- The schedule shall also include the Design-Build Team's final completion date and, if proposed, their substantial completion date. **These dates shall be clearly indicated on the Project Schedule and labeled "Final Completion Date" and "Substantial Completion Date".**

5. Innovation – 10 points

- Identify any aspects of the design or construction elements that the Design-Build Team considers innovative. Include a description of alternatives that were considered whether implemented or not.

6. Maintenance of Traffic and Safety Plan – 7 points

Maintenance of Traffic

- Provide a Transportation Management Phasing Concept (TMPC).
- Describe any traffic control requirements that will be used for each construction phase.
- Describe how traffic will be maintained as appropriate and describe the Design-Build Team's understanding of any time restrictions noted in the RFP.

- Identify any self-imposed liquidated damages and associated Intermediate Contract Time(s), if applicable.
- Specifically describe how business, school and residential access will be maintained, if applicable.
- Address how hauling will be conducted, including but not limited to, hauling of any materials to and from the site and hauling material within NCDOT right of way.
- Describe the Design-Build Team's approach to providing the public with communication access to project personnel to inquire as to traffic impacts, including vehicular and pedestrian.
- If a temporary portable barrier system will be utilized, provide the type and why it is needed.
- Identify the type of US 421 / I-40 Business positive median cross-over protection proposed and replacement / resetting requirements.
- If temporary shoring will be required, provide the type and why it is required.
- Include all proposed road closures and / or offsite detours; reason for need and duration, including but not limited to the duration, in days, for ICT #14 through #21.
- ****NOTE****: Deleted bullet
- Address where and how law enforcement officers will be used. Identify the need for a Work Zone Speed Limit Reduction Ordinance.
- Identify the need for a Speeding Penalty Ordinance.
- Identify a Traffic Control Supervisor and briefly describe their qualifications for this role.

****Note**** Relocated bullet on durations for ICT#14 through #21

Safety Plan

- Describe the safety considerations specific to the project.
- Discuss the Design-Build Team's overall approach to safety.
- Describe any proposed improvements that will be made prior to or during construction that will enhance the safety of the work force and / or travelling public both during and after the project construction.

7. Oral Interview – 5 points

- The Design-Build Team's Project Management Team shall present a brief introduction of the project team and design / construction approach.
- Introductory comments shall be held to no more than 30 minutes.
- The Department will use this interview to ask specific questions about the Design-Build Team's Technical Proposal, background, philosophies and project approach.
- Presentation, questions, and answers shall not exceed 90 minutes. No more than ten people from the Design-Build Team may attend.

The Department will use the information presented in the oral interview to assist in the Technical Proposal evaluation.

Additional Warranty and / or Guarantee

- **The Extra Credit for this project shall be a Maximum of 5 Points.**

A twelve-month guarantee, as outlined in the *Twelve-Month Guarantee* Project Special Provision found elsewhere in this RFP, is required for this project. However, the Design-Build Team may provide additional warranties and / or guarantees at their discretion. The Design-Build Team may be awarded additional points as “extra credit” to be added to the Technical Score.

The Design-Build Team may provide warranties and / or guarantees for major components of the project. Examples of major components are pavements, bridge components and sign structures. If additional warranties and / or guarantees are offered, the Design-Build Team shall indicate in the Technical Proposal the general terms of the warranties and / or guarantees, a list of the items covered, performance parameters, notification and response parameters for corrective action, and evaluation periods. The Department will be responsible for annual inspections of the components covered by all warranties and / or guarantees offered by the Design-Build Team that extend beyond the required Twelve-Month Guarantee. The warranties and / or guarantees shall also define how disputes will be handled. Prior to the first partial payment, the Design-Build Team shall submit a document that provides additional warranty / guarantee specifics in sufficient detail that allows the document to be made a part of the contract through supplemental agreement.

No direct payment will be made for warranties and / or guarantees. Payment will be considered incidental to the lump sum price for the contract.

SELECTION PROCEDURE

There will be a Technical Review Committee (TRC) composed of five or more senior personnel from involved engineering groups that will evaluate the Technical Proposal on the basis of the criteria provided in the Request for Proposals.

The selection of a Design-Build Team will involve both technical quality and price. The Technical Proposals will be presented to the TRC for evaluation. The TRC shall first determine whether the proposals are responsive to the requirements of the Request for Proposals. The Department reserves the right to ask for clarification on any item in the Technical Proposal. A written response to this request for clarification shall be provided to the Department prior to the opening of the Price Proposals. The contents of the written response may affect the Technical Review Committee's determination of the Technical Proposal's responsiveness and / or the overall evaluation of the Technical Proposal. If any commitments or clarifications provided in the written response conflict with the contents of the Technical Proposal, the contents of the written response will govern and be incorporated into the contract.

Each responsive Technical Proposal shall be evaluated based on the rating criteria provided in the Request for Proposals. The TRC will submit an overall consensus Technical Proposal score for each Design-Build Team to the State Contract Officer.

Quality Credit Evaluation Factors for Technical Proposals

Management	8
Responsiveness to Request for Proposal	35
Long Term Maintenance	5
Schedule and Milestones	30
Innovation	10
Maintenance of Traffic and Safety Plan	7
Oral Interview	5
Maximum Score	100

The State Contract Officer will use a table based on the maximum quality credit percentage to assign a Quality Credit Percentage to each proposal based on the proposal's overall Technical Score. The maximum quality credit percentage for this project will be **30%**. The Technical Review Committee may elect to assign point values to the nearest one-half of a point (e.g. 90.5). In this event, the Quality Credit Percentage will be determined by linearly interpolating within the table entitled "Quality Credit Percentage for Technical Proposals".

Quality Credit Percentage for Technical Proposals

Technical Score	Quality Credit (%)	Technical Score	Quality Credit (%)
100	30.00	84	14.00
99	29.00	83	13.00
98	28.00	82	12.00
97	27.00	81	11.00
96	26.00	80	10.00
95	25.00	79	9.00
94	24.00	78	8.00
93	23.00	77	7.00
92	22.00	76	6.00
91	21.00	75	5.00
90	20.00	74	4.00
89	19.00	73	3.00
88	18.00	72	2.00
87	17.00	71	1.00
86	16.00	70	0.00
85	15.00		

The maximum Technical Score, including any extra credit given for warranties or guarantees, shall not exceed 100 points in determining the Quality Credit percentage.

If any of the Technical Proposals are considered non-responsive, the State Contract Officer will notify those Design-Build Teams of that fact. The State Contract Officer shall publicly open the sealed Price Proposals and multiply each Design-Build Team's Price Proposal by the Quality Credit Percentage earned by the Design-Build Team's Technical Proposal to obtain the Quality Value of each Design-Build Team's Technical Proposal. The Quality Value will then be subtracted from each Design-Build Team's Price Proposal to obtain an Adjusted Price based

upon Price and Quality combined. Unless all Proposals are rejected or the Department elects to proceed with the Best and Final Offer process, the Department will recommend to the State Transportation Board that the Design-Build Team having the lowest adjusted price be awarded the contract. The cost of the Design-Build contract will be the amount received as the Price Proposal.

The following table shows an example of the calculations involved in this process.

An Example of Calculating Quality Adjusted Price Ranking

Proposal	Technical Score	Quality Credit (%)	Price Proposal (\$)	Quality Value (\$)	Adjusted Price (\$)
A	95	25.00	3,000,000	750,000	2,250,000
B	90	20.00	2,900,000	580,000	2,320,000
C *	90	20.00	2,800,000	560,000	2,240,000
D	80	10.00	2,700,000	270,000	2,430,000
E	70	0.00	2,600,000	0	2,600,000
* Successful Design-Build Team – Contract Cost \$2,800,000					

Opening of Price Proposals

Prior to opening the Price Proposals, the State Contract Officer will provide to each Design-Build Team their Technical Score in a sealed envelope. The sealed envelope will contain that Team's score only.

At the time and date specified, the State Contract Officer will open the Price Proposals and calculate the percentage difference between the Price Proposals submitted and the Engineer's Estimate.

Should all of the Price Proposals be within an acceptable range or below the Engineer's Estimate the State Contract Officer will proceed to calculate the quality credit and publicly read the Price Proposal, Technical Score and Adjusted Price as outlined in the selection procedure above.

Should any one or more of the Price Proposals be within an acceptable range or below the Engineer's Estimate and the remaining Price Proposals exceed an acceptable range of the Engineer's Estimate the State Contract Officer will go to a separate location to calculate the quality credit and determine if the Design-Build Team with the lowest Adjusted Price is within an acceptable range of the Engineer's Estimate. Should the Price Proposal of the Design-Build Team with the lowest Adjusted Price be within an acceptable range of the Engineer's Estimate or below the Engineer's Estimate the State Contract Officer will proceed to publicly read the Price Proposals, Technical Scores and Adjusted Prices. Should the Price Proposal of the Design-Build Team with the lowest Adjusted Price exceed an acceptable range of the Engineer's Estimate the State Contract Officer will publicly read the Price Proposals only and the Department will then determine whether to proceed to request a Best and Final Offer (BAFO) as outlined below.

Should all Price Proposals submitted exceed an acceptable range of the Engineer's Estimate the State Contract Officer will publicly read the Price Proposals only. The Department will then determine whether to proceed to request a Best and Final Offer (BAFO) as outlined below.

In the event that the Department elects to not proceed with a Best and Final Offer (BAFO), then the State Contract Officer will schedule a date and time to publicly reiterate all Price Proposals, and read all Technical Scores and Adjusted Prices.

Provided the Department elects to proceed to request a Best and Final Offer (BAFO), at the date and time specified, the State Contract Officer will open the Best and Final Offer Price Proposals and proceed to publicly read all Price Proposals, Technical Scores and Adjusted Prices.

Best and Final Offer

In the event initial Price Proposals exceed an acceptable range of the Engineer's Estimate or if the Department feels it is necessary for any reason the Department may choose to make amendments to the details of the RFP and request a Best and Final Offer from all of the previously short-listed teams. Alternately, the Department may choose to redistribute to the short-listed Design-Build Teams another RFP for the project with no amendments to the RFP scope.

After receipt of the redistributed RFP, the Design-Build Team has the option of changing their Technical Proposal details. If the Design-Build Team changes any component of the Technical Proposal, the TRC will review those amended components of the Technical Proposal and reevaluate the scores accordingly. The Design-Build Team shall highlight the changes to bring them to the Department's attention. A revised total score will be calculated, if appropriate, based on these amendments to the Technical Proposal.

Additional oral interviews will not be held. The Design-Build Teams shall submit both a revised Price Proposal and a revised Technical Proposal (if applicable) at the time, place and date specified in the redistributed RFP. A revised Quality Credit Percentage (if required) and Adjusted Price will be determined. This will constitute the Design-Build Team's Best and Final Offer. Award of the project may be made to the Design-Build Team with the lowest Adjusted Price on this Best and Final Offer.

Stipend

A stipulated fee of **\$125,000** will be awarded to each short-listed Design-Build Team that provides a responsive, but unsuccessful, Design-Build Proposal. If a contract award is not made, all short-listed Design-Build Teams that provide a responsive Design-Build Proposal shall receive the stipulated fee. Once award is made, or a decision is made not to award, unsuccessful Design-Build Teams can apply for the stipulated fee by notifying the State Contract Officer in writing and providing an original invoice within 60 days of Award. If the Design-Build Team accepts the stipulated fee, the Department reserves the right to use any ideas or information contained in the Design-Build Proposal and / or Alternative Technical Concepts, whether incorporated into the Design-Build Proposal or not, in connection with any contract awarded for the project, or in connection with any subsequent procurement, with no obligation to pay additional compensation to the unsuccessful Design-Build Team. The stipulated fee shall be paid to eligible Design-Build Teams within ninety days after the award of the contract or the decision not to award. Unsuccessful Design-Build Teams may elect to refuse payment of the stipulated

fee and retain any rights to its Design-Build Proposal and the ideas and information contained therein.

In the event that the Department suspends or discontinues the procurement process prior to the Design-Build Proposal submittal date current at the time of the suspension, no stipulated fee will be paid.

ROADWAY SCOPE OF WORK (7-19-16)

It should be noted that TIP Project, U-2827B, as referenced throughout this Request for Proposals (RFP), represents TIP Projects U-2827B and C-5620A. All references to TIP Projects U-2827B and C-5620A in material provided by the Department shall apply to this project.

It should be noted that Fourth Street as referenced throughout this RFP, represents Fourth Street and West Fourth Street.

Throughout this RFP, references to the U-2827B Preliminary Plans shall denote 1) the U-2827B Preliminary Roadway Design (U-2827BA, U-2827B, Brookstown Avenue Lane Shift dated July 19, 2016, Academy Street Improvements, and N. Martin Luther King Jr. Dr. Improvements), and 2) the Multi-Use Path (MUP) (C-5620A) Preliminary Plans (Roll 1 of 1) dated May 6, 2016.

Project Details

- The Design-Build Team shall design and construct a four-lane divided freeway with a minimum 11-foot median throughout the pavement reconstruction limits from the eastern terminus of the concrete median barrier located west of Fourth Street to the western approach slab of the US 421 / I-40 Business bridge over Salem Avenue. Unless noted otherwise elsewhere in this RFP, the Design-Build Team shall design and construct the -L- Line (mainline) providing the same or better access, widening, improvements and traffic measures of effectiveness, in the Department's sole discretion, included in the U-2827B Preliminary Plans provided by the Department. The limits of -L- Line construction shall be of sufficient length to tie to existing based upon the current NCDOT guidelines and standards. The mainline (-L- Line) shall be designed and constructed to meet a 50-mph design speed for a rolling urban freeway. The Design-Build Team shall provide all other design criteria in the Technical Proposal.
- Along the -L- Line, the Design-Build Team shall design and construct minimum 12-foot outside shoulders (ten-foot useable shoulder width plus two feet), ten-foot of which shall be full depth paved shoulders, including all acceleration, deceleration and auxiliary lanes, and ramps / loops to the back of the gore (12-foot width). Along the -L- Line, the Design-Build Team shall design and construct a minimum 11-foot full depth paved median with Type "T" double-faced concrete median barrier.
- The Design-Build Team shall coordinate with 1) Project U-2925, anticipated completion January 2017, and 2) the NCDOT Contract No. C203854 - Milling, Resurfacing and Shoulder Reconstruction of US 421 / I-40 Business west of Crafton Street, anticipated completion May 2017, design and construction to ensure accurate hydrology, capacity, and horizontal and vertical ties that adhere to the design criteria. Excluding the design revisions required herein, the Design-Build Team shall not make any design or construction revisions that impact the design or construction of project U-2925 or C203854 without prior written approval from the Design-Build Unit. The aforementioned prior written approval shall occur

1) through the ATC Process Prior to Award or 2) through coordination and / or submittals to the Design-Build Unit after Award. (Reference the *Cooperation Between Contractors* Project Special Provision found elsewhere in this RFP)

- Unless noted otherwise elsewhere in this RFP, the Design-Build Team shall design and construct -Y- Lines, ramps and loops providing the same or better sidewalks, access, widening, improvements and traffic measures of effectiveness, in the Department's sole discretion, included in the U-2827B Preliminary Plans and Appendix D of the U-2827B Finding of No Significant Impact (FONSI) provided by the Department. On the west side of Peters Creek Parkway, from the north side of the culvert under Peters Creek Parkway (approximately Sta. 34+50 -Y1-, RT) to Fourth Street, the Design-Build Team will be allowed to provide a five-foot sidewalk in lieu of the eight-foot sidewalk indicated in the FONSI - Appendix D. In the event of conflicting design parameters in the requirements noted above, excluding the aforementioned sidewalk width, the proposed design shall adhere to the most conservative values. The limits of -Y- Line construction shall be of sufficient length to tie to existing based upon the current NCDOT guidelines and standards or to the construction limits shown on the U-2827B Preliminary Plans, whichever is greater.
- Excluding modifications included in the U-2827B Preliminary Plans provided by the Department, the Design-Build Team shall coordinate with, and obtain written approval from, the Engineer and the City of Winston-Salem for all horizontal alignment revisions to City Streets. The Department will not honor any requests for additional contract time or compensation for any efforts required to obtain the aforementioned approval, including but not limited to public involvement, additional design effort, additional construction effort, and / or additional environmental agency coordination and approval.
- The Design-Build Team shall design and construct minimum 12-foot lanes on Brookstown Avenue.
- The Design-Build Team shall design and construct all -Y- Lines such that the through movement is not required to change lanes throughout the project limits.
- The minimum width of all grass covered islands / medians shall be eight feet, measured face to face from the surrounding mountable concrete curb and gutter or from edge of pavement to edge of pavement, as appropriate. All grass covered islands shall be constructed with topsoil and appropriate cross slope and median drain with pipe to prevent groundwater and surface water infiltration into the subgrade and / or pavement structure. Prior to construction of the grass covered islands and / or the median drain with pipe, the Design-Build Team shall submit to the Design-Build Unit, for review and acceptance, the proposed number of drains, drain locations within the typical section, topsoil specifications and construction details. Within all proposed grass covered island limits, the Design-Build Team shall completely remove and dispose of the existing pavement structure.

- The Design-Build Team shall design and construct all diverging diamond interchanges (DDI), in accordance with the requirements noted below:
 - Between and through the DDI crossovers, the Design-Build Team shall design and construct lane widths that accommodate a WB-67; however, the minimum lane width between and through the DDI crossovers shall be 15 feet. All approach / departure lanes to / from the crossovers shall be tapered to the crossover lane-width prior to entering / after exiting the curve approaching / departing the crossover.
 - The Design-Build Team shall design and construct lane widths for all spurs (right and left turn movements from / to the ramps) that accommodate a WB-67; however, the minimum spur lane width shall be 15 feet. All approach / departure ramp lanes to / from the spurs shall be tapered to the spur lane width prior to entering / after exiting the spur. Regardless of the spur lane width, all spur alignments shall be located 15 feet from the outside edge of travel lane.
 - The four ramp channelization islands shall be raised grass islands bordered with 2'-6" curb and gutter.
 - Between the DDI crossovers, the Design-Build Team shall provide a minimum ten-foot wide pedestrian accommodation within the -Y- Line median. Along both sides of the aforementioned ten-foot pedestrian accommodation, the Design-Build Team shall provide barrier (2'-6" concrete dual flat-faced barrier with metal handrail and no glare screen) that extends a minimum of 42" above the walking surface. The barrier shall meet AASHTO TL-2 crash test requirements and terminate with a ten-foot taper that reduces the barrier height to 2'-3". Excluding within the aforementioned ten-foot taper, the handrail shall be installed in accordance with the 10-30-2013 Proposed Pedestrian Safety Rail Detail provided by the Department.
 - The curves approaching / departing the crossovers shall slope from the median to the outside at a 0.02 cross slope.
- The Department prefers that the design and construction for the replacement of the Fourth Street bridge to require minimal roadway approach work on Fourth Street. Thus, justification, in the Department's sole discretion, shall be provided for any change in the existing horizontal and vertical alignment of Fourth Street.
- The Design-Build Team shall design and construct one-lane ramps that 1) adhere to Table 3-29, *Design Widths of Pavements for Turning Roadways*, shown in AASHTO's *A Policy on Geometric Design of Highways and Streets* (2011) - Case II / Condition C for one-lane operation, or 2) provide a minimum 16-foot lane width, whichever is greater.
- The Design-Build Team shall design and construct two lane ramps that 1) adhere to Table 3-29, *Design Widths of Pavements for Turning Roadways*, shown in AASHTO's *A Policy on Geometric Design of Highways and Streets* (2011) - Case II / Condition C for

one-lane operation; Case III / Condition C for two-lane operation, or 2) provide minimum 12-foot lanes, whichever is greater.

- Unless noted otherwise elsewhere in this RFP, all ramps shall have 12-foot outside shoulders, four-foot of which shall be full depth paved shoulders and 10-foot inside shoulders, four-foot of which shall be full depth paved shoulders. If the Design-Build Team utilizes a curb and gutter along the edge of pavement on ramps, the four-foot full depth paved shoulder shall be provided between the edge of travel and the curb and gutter.

**** NOTE **** Deleted bullet requiring 2'-6" curb and gutter on ramps.

- The Design-Build Team shall design and construct loops that adhere to Table 3-29, *Design Widths of Pavements for Turning Roadways*, shown in AASHTO's *A Policy on Geometric Design of Highways and Streets* (2011) - Case II / Condition C for one-lane loops; Case III / Condition C for two-lane loops. All loops shall have 12-foot outside shoulders, four-foot of which shall be full depth paved shoulders. All loops shall have 2'-6" curb and gutter along the inside edge of pavement, with a 14-foot berm. Excluding Loop A at Peters Creek Parkway, the minimum loop design shall be 25-mph with a minimum 150-foot radius.
- In areas along the mainline, ramps, and loops where concrete barrier is required to protect features within the vehicle recovery area, the Design-Build Team shall not install expressway gutter or curb and gutter between the travel lane and the concrete barrier.
- Excluding areas required to tie to existing, areas that would require additional right of way beyond that shown on the U-2827B Preliminary Plans provided by the Department, and along the inside edge of pavement for loops, the Design-Build Team shall not install expressway gutter along the mainline or 2'-6" curb and gutter along the ramps and loops.
- The Design-Build Team will not be required to design or construct ramps or bridges to accommodate future loops.
- Excluding transitions required to tie to existing, the -L- Line normal crown cross slope shall be 0.02. The crown and grade point shall be located at the centerline of the -L- Line.
- The Design-Build Team shall design and construct at-grade intersections with the lane configurations noted in the May 2015 *Business 40 Reconstruction Study - Traffic Operations Report, Appendix J – 2040 Alternative 1A Intersections* provided by the Department, unless allowed otherwise elsewhere in this RFP. At all intersections impacted by the Design-Build Team's design and / or construction, excluding resurfacing, the Design-Build Team shall design and construct turn lanes that adhere to the greater of the following:
 - All turn lane lengths shall adhere to the NCDOT minimum turn lane lengths as defined in the NCDOT Roadway Design Manual (Reference Section 9-1, Figure 4).
 - All lengths for the turn lanes required by the May 2015 *Business 40 Reconstruction Study - Traffic Operations Report, Appendix J – 2040 Alternative 1A Intersections* provided by

the Department shall adhere to the NCDOT Recommended Treatment for Turn Lanes. These lengths shall be determined by adding the storage length defined in the aforementioned Memorandum; the minimum deceleration length, as defined in the NCDOT Roadway Design Manual (Reference Section 9-1, Figure F-4A); and the approach / departure taper.

- Right turn lanes / tapers shall be provided in accordance with the NCDOT Right Turn Lane Warrants, as defined in the NCDOT Roadway Design Manual (Reference Section 9-1, Figure F-4C).
- The Design-Build Team will not be required to widen the Peters Creek Parkway bridge over US 421 / I-40 Business solely for the exclusive northbound right turn lane onto Loop A to adhere to the length requirements noted above.
- For all intersection / interchange design modifications, the Design-Build Team shall provide a traffic analysis that adheres to the July 1, 2015 NCDOT *Congestion Management Capacity Analysis Guidelines* for the Department's review and acceptance.
- At all intersections with restricted movements impacted by the Design-Build Team's design and / or construction methods, excluding resurfacing, the Design-Build Team shall provide 5- inch keyed-in concrete monolithic channelization islands.
- US 421 / I-40 Business is a full control of access facility. The Design-Build Team shall bring to the Design-Build Unit's attention any deviations from the proposed control of access shown on the U-2827B Preliminary Plans provided by the Department. The proposed right of way and / or control of access limits may deviate in proximity to cultural, historic, or otherwise protected landmarks, including cemeteries, to eliminate / minimize impacts. Additional right of way impacts, including Temporary Construction Easements, solely for retaining wall tie backs shall not be allowed. Prior to negotiating right of way, easement and / or control of access with property owners, the Design-Build Team shall delineate the proposed acquisitions on the Right of Way Plans developed by the Design-Build Team for the Department's review and acceptance.
- Prior to installation, the Design-Build Team shall be responsible for coordinating with, and obtaining approval from, the NCDOT for the control of access fence placement. The Design-Build Team shall be responsible for installation of the control of access fence as noted below:
 - In accordance with the Aesthetics Scope of Work found elsewhere in this RFP, the Design-Build Team shall install decorative control of access fence. The Design-Build Team shall replace all decorative control of access fence damaged during construction.
 - Outside the decorative control of access fence limits, the Design-Build Team shall replace, in kind, all control of access fence damaged during construction.
 - Outside the decorative control of access fence limits, the Design-Build Team shall install all missing control of access fence, matching the adjacent fence type.

- The Design-Build Team shall not be required to replace the existing fencing adjacent to BB&T Ballpark unless damaged by the Design-Build Team during construction associated with the project or required by the Design-Build Team's design and / or construction.
- Except as required elsewhere in this RFP and / or to eliminate a design exception, the Design-Build Team shall not further impact any cultural, historical or otherwise protected landmark or topographic feature beyond that shown on the U-2827B Preliminary Plans provided by the Department. Unless approved otherwise by the Department, the Design-Build Team shall not acquire right of way or easements from the aforementioned features unless shown on the U-2827B Preliminary Plans provided by the Department.
- Excluding areas that would impact cultural, historic, or otherwise protected landmarks, the Department prefers that all berm widths behind curb and gutter be a minimum of ten-foot wide. Thus, justification, in the Department's sole discretion, shall be provided for all berm widths that are less than 10-foot outside the aforementioned areas.
- Sidewalk transitions, from proposed sidewalk width to existing sidewalk width, shall be a minimum of 50-feet.
- Excluding the improvements noted below, the Design-Build Team shall, at a minimum, design and construct the temporary offsite intersection improvements, as referenced in the August 2015 *Business 40 Reconstruction Study - Detour Conditions Traffic Operations Report* for the 2021 Detour Conditions Scenario 1 and Scenario 2.
 - Martin Luther King, Jr. Drive at US 52 Southbound Ramps / Linden Street intersection improvements
 - Martin Luther King, Jr. Drive at US 52 Northbound Ramps intersection improvements
 - Martin Luther King, Jr. Drive at First Street intersection improvements
 - Martin Luther King, Jr. Drive at Business 40 Eastbound Ramps / Lowery Street intersection improvements
 - First Street westbound triple left turn lanes onto southbound NC 150 (Peters Creek Parkway)

The aforementioned temporary offsite intersection improvements shall be constructed within the existing curb and gutter limits. At the time recommended by the Design-Build Team and approved by the Department, the Design-Build Team shall remove the temporary offsite intersection improvements and restore the intersections to their original configurations. (Reference the Pavement Management Scope of Work found elsewhere in this RFP)

In addition to the aforementioned temporary offsite intersection improvements, the Design-Build Team shall design and construct the Peters Creek Parkway Loop A and Loop D as a temporary two-lane entrance loop and a temporary two-lane exit loop, respectively.

All the aforementioned temporary improvements shall be completed prior to the full closure of US 421 / I-40 Business.

- The Design-Build Team shall provide milled rumble strips along the mainline outside and median paved shoulders, including ramp and loop terminals, and acceleration, deceleration and auxiliary lanes, in accordance with the January 2012 NCDOT *Roadway Standard Drawings*.
- For all bridges over roadways, greenways and / or multi-use paths, including but not limited to the multi-use path under the Broad Street bridge and the Cherry Street bridge noted elsewhere in this RFP, the Design-Build Team shall submit vertical and horizontal clearance design calculations at all critical points. The Design-Build Team shall submit post construction survey points for the aforementioned critical points that verify construction adhered to the vertical and horizontal clearances accepted by NCDOT. The Design-Build Team shall be responsible for all costs associated with correcting vertical and horizontal clearances resulting from any construction variation from the design accepted by NCDOT.
- Excluding 1) haul roads, 2) US 421 / I-40 Business, 3) the offsite temporary intersection improvements, and 4) areas where the grade allows existing curb and gutter and / or expressway gutter to be retrained on -Y- Lines that the Pavement Management Scope of Work allows a mill and fill operation, the Design-Build Team shall design and construct resurfacing grades for all roadways impacted by construction. All resurfacing grades shall adhere to the design criteria and standards, provide all required pavement wedging (Reference the Pavement Management Scope of Work found elsewhere in this RFP) and adhere to the minimum requirements noted below:
 - The Design-Build Team shall resurface all lanes and shoulders of an undivided facility throughout the limits of proposed widening and construction.
 - The Design-Build Team shall resurface each one-way roadway of a divided facility throughout the limits of the one-way roadway widening and construction, allowing varying resurfacing limits for the opposing directions of travel.
 - Unless noted otherwise elsewhere in this RFP, for both divided and undivided facilities, the Design-Build Team shall resurface all lanes and shoulders within the outermost construction limits of all proposed widening and construction, including any gaps along the facility where construction activities are not required. The Design-Build Team will not be required to resurface roadways between the limits of construction shown on the U-2827B Design Public Hearing Maps (Rolls 1, and 3 of 3) and any offsite improvements solely to adhere to the requirement to resurface gaps along a facility where construction activities are not required. Outside the Roadway Construction Signing Limits, the Design-Build Team will not be required to resurface roadways between the

limits of signing construction activities solely to adhere to the requirement to resurface gaps along a facility where construction activities are required. (Reference the Signing Scope of Work found elsewhere in this RFP)

- The Design-Build Team shall resurface all existing facilities to the limits of pavement marking obliterations / revisions.
- The Design-Build Team shall provide turn-arounds on all roads that are dead-ended.
- The Design-Build Team shall inform the Design-Build Unit, in writing, of all proposed design revisions, including but not limited to the following:
 - Excluding the changes required herein, the Design-Build Team shall note in the Technical Proposal any proposed deviations to the preliminary design shown on the U-2827B Preliminary Plans provided by the Department. The Design-Build Team shall be responsible for all activities, as deemed necessary by the Department or the FHWA, resulting from changes to the NCDOT preliminary design, including but not limited to, public involvement, NEPA re-evaluation and / or coordination with other stakeholders. The Department shall not honor any requests for additional contract time or compensation for completion of the required activities resulting from changes to the NCDOT preliminary design.
 - After the contract has been Awarded, the Design-Build Team shall inform the Design-Build Unit, in writing, of all proposed changes to the design shown in the Technical Proposal.
 - After the Department has reviewed and accepted the Design-Build Team's design submittals, the Design-Build Team shall inform the Design-Build Unit, in writing, of any changes to previously reviewed submittals.
- Excluding the following design features, design exceptions will not be allowed for the -L- Line, including all ramps and loops.
 - Locations where bridge piers, concrete barrier or overhead sign assemblies reduce the median shoulder width to less than four feet.
 - The maximum grade for Loop -Y1LPA- and all ramps except -Y1RPD-, -Y10RA- and -Y10RDA4-.
 - Sag vertical curve K-value within the gore area of Ramps -Y8BRA- and -Y8BRD-.
 - Sag vertical curve K-value for Ramp -Y1RPA-.
 - The superelevation and horizontal stopping sight distance along the median barrier for the -L- Line horizontal curves located at Station 12+47 -L-, Station 58+94 -L- and Station 71+94 -L-.

➤ The design speed of -Y1LPA-.

The Design-Build Team shall not increase the severity of the aforementioned design exceptions above and beyond that shown on the U-2827B Preliminary Plans provided by the Department. The Design-Build Team shall clearly note all design exceptions for the -L- Line, including all ramps and loops in the Technical Proposal.

- NCDOT prefers not to have design exceptions for the -Y- Lines. If the Design-Build Team anticipates any design exceptions, they shall be clearly noted in the Technical Proposal. Prior to requesting / incorporating a design exception into the Final Plans, the Design-Build Team must obtain prior conceptual approval from the Design-Build Unit and the FHWA. If conceptual approval is obtained, the Design-Build Team shall be responsible for the development and approval of all design exceptions.
- Due to the right of way constraints, the Design-Build Team will be allowed to 1) design and construct minimum ditch widths for the facility functional classification and 2) utilize Exception “a” shown in AASHTO’s *A Policy on Geometric Design of Highways and Streets* (2011), Table 8-1 *Maximum Grades for Rural and Urban Freeways* and the “Lower range” of Table 10-1, *Guide Values for Ramp Design Speed as Related to Highway Design Speed*.
- Except for sound barrier walls NW3, NW7_Alt1C, NW7_Alt2C, NW7_Alt3, NW8A_Alt1C, NW8A_Alt2C, NW8A_Alt3, NW8A_Alt4, NW8B_Alt1C and NW8B_Alt2C the Design-Build Team shall design and construct the sound barrier walls listed in the U-2827B Design Noise Report and Design Noise Report Addendum dated May 15, 2015, and perform any additional geotechnical investigations necessary to design the foundations. The Design-Build Team shall be responsible for the wall envelope details. If the Design-Build Team revises the horizontal and / or vertical alignments such that greater noise impacts are possible on surrounding receptors, the Design-Build Team shall re-analyze and complete a revised noise report, if necessary, for NCDOT and FHWA review and approval. The U-2827B Design Noise Report and Design Noise Report Addendum dated May 15, 2015, have been provided to the Design-Build Team to assist in their determination of anticipated additional noise impact on current receptors due to design changes. If adjustments to, or addition of, sound barrier walls are required as a result of design deviations, the Design-Build Team shall be responsible for all costs associated with the adjustments and / or additions.
- For all parcels, the Design-Build Team shall locate and install concrete right of way markers that delineate all proposed right of way within the project limits. The Design-Build Team shall replace all existing right of way markers / monuments damaged and / or relocated during construction.
- For all parcels, the Design-Build Team shall locate and install iron pins and caps with fiberglass markers that delineate all proposed permanent easements within the project limits. The Design-Build Team shall replace all existing permanent easement markers / monuments damaged and / or relocated during construction. In accordance with NCDOT Policy, the Department will furnish the metal caps with fiberglass markers.

- The Design-Build Team shall design and construct the relocation of the Strollway as shown on the U-2827B Preliminary Plans and Appendix D of the U-2827B FONSI. The Strollway typical section shall consist of a minimum ten-foot paved facility with two-foot turf shoulders. The Design-Build Team shall design and construct the Strollway in accordance with the 2012 AASHTO *Guide for the Development of Bicycle Facilities*, except those sections of the Strollway that are steeper than five percent shall be designed and constructed in accordance with the FHWA *Designing Sidewalks and Trails for Access*. (Reference the Pavement Management Scope of Work found elsewhere in this RFP)
- Excluding the rest areas and pocket parks, the Design-Build Team shall design and construct 1) Phase 1A of the proposed MUP and 2) the section of the MUP directly beneath the Broad Street and Cherry Street bridges over US 421 / I-40 Business, including but not limited to all required retaining walls and appropriate positive protection, as shown in the U-2827B Preliminary Plans. The Design-Build Team shall grade to drain the areas adjacent to the MUP constructed beneath the aforementioned bridges. The Design-Build Team shall design and construct the MUP in accordance with the 2012 AASHTO *Guide for the Development of Bicycle Facilities*, except those sections of the MUP that are steeper than five percent shall be designed and constructed in accordance with the FHWA *Designing Sidewalks and Trails for Access*. The MUP Phase 1A typical section shall consist of a minimum ten-foot paved facility with two-foot turf shoulders. To accommodate construction of the future MUP phases, the Design-Build Team shall design and construct the retaining walls shown on the July 18, 2016 *Required Additional MUP Walls* detail provided by the Department, unless the Design-Build Team can demonstrate, in the Department's sole discretion, that the aforementioned walls will not be required for the future MUP phases. (Reference the Structures, Geotechnical, Aesthetics and Pavement Management Scopes of Work found elsewhere in this RFP)
- In accordance with the requirements found elsewhere in this RFP, the Design-Build Team shall design and construct all permanent structures, including but not limited to all bridges, abutment walls and retaining wall, such that they will not require modifications to construct the future MUP phases, including but not limited to the MUP bridge over the Cherry Street Ramp D. To ensure that all permanent structures will accommodate the future MUP construction, the Design-Build Team shall provide functional horizontal and vertical alignments for all MUP phases shown in the U-2827B Preliminary Plans, and indicate how the MUP future phases can be constructed without modifying the proposed permanent structures in the Technical Proposal. Post Award, for the Department's review and acceptance, the Design-Build Team shall provide preliminary designs of the aforementioned MUP future phases that verify that the permanent structures will not require modifications. (Reference the Geotechnical and Structures Scopes of Work found elsewhere in this RFP)
- The Design-Build Team shall design and construct a pedestrian connection from the northern terminus of the Green Street Pedestrian Bridge to the to the Green Street / Ball Park Way intersection. The width of the pedestrian connection shall be as noted in Appendix D of the U-2827B FONSI.

- The Design-Build Team shall carefully remove and deliver all existing granite curb impacted by the Design-Build Team's design and / or construction to the City of Winston Salem Lowery Street Facility located at 2000 Lowery Street, Winston-Salem, NC 27101-4717. The Design-Build Team shall contact either Bobby Branch, Street Supervisor at 336-414-7536, Marlene Davis, Street Supervisor at 336-462-0099 or Joe Duncan, Senior Crew Coordinator at 336-462-0156 prior to delivery.

General

- The design shall be in accordance with the 2011 AASHTO *A Policy on Geometric Design of Highways and Streets* and 2013 *Errata*, 2002 NCDOT *Roadway Design Manual*, including all revisions effective on the Technical Proposal submittal date, January 2012 NCDOT *Roadway Standard Drawings*, or as superseded by detail sheets located at <https://connect.ncdot.gov/resources/Specifications/Pages/2012-Roadway-Drawings.aspx>, *Roadway Design Policy and Procedure Manual*, *Roadway Design Guidelines for Design-Build Projects*, January 2012 NCDOT *Standard Specifications for Roads and Structures* and the 2011 AASHTO *Roadside Design Guide*, 4th Edition and 2015 *Errata*.
- If the NCDOT *Roadway Design Manual*, the 2011 AASHTO *A Policy on Geometric Design of Highways and Streets*, the January 2012 NCDOT *Roadway Standard Drawings* and / or any other guidelines, standards or policies have desirable and / or minimum values, the Design-Build Team shall use the desirable values unless noted otherwise elsewhere in this RFP. Similarly, in case of conflicting design parameters, and / or ranges, in the various resources, the proposed design shall adhere to the most conservative values, unless noted otherwise elsewhere in this RFP.
- At all intersections, the Design-Build Team shall not exceed a 0.05 roll-over between the outside edge of travel lane of the primary roadway and the beginning of the proposed grade for the secondary roadway.
- Unless noted otherwise elsewhere in this RFP, the Design-Build Team shall design and construct bridge rail offsets as indicated in the NCDOT *Roadway Design Manual* or that are equal to the approach roadway paved shoulders, whichever is greater. Narrower bridge rail offsets based on bridge length will not be allowed. The Design-Build Team will not be required to widen existing bridges solely to provide the aforementioned minimum bridge rail offsets.
- Unless noted otherwise elsewhere in this RFP, the maximum allowable cut and fill slope shall be 2:1. (Reference the Geotechnical Scope of Work found elsewhere in this RFP) The slopes in the interchange area shall follow the requirements set forth in the *Roadway Design Guidelines for Design-Build Projects* located on the Design-Build web site.
- Outside the project limits, the Design-Build Team will not be allowed to use the NCDOT right of way and / or property for borrow or waste sites. Within the project limits, the Design-Build Team shall adhere to the following:

- Only clean waste material may be wasted within the NCDOT right of way or property.
- Excluding crushed concrete, debris shall not be buried within the NCDOT right of way or property.
- Normal grading operations shall occur, including but not limited to, removal of the existing embankments supporting all removed roadway sections.
- Unless noted otherwise elsewhere in this RFP, all guardrail / guiderail placement shall be in accordance with the January 2012 NCDOT *Roadway Standard Drawings* and / or approved details in lieu of standards. Along all 3:1 fill slopes, constructed at fill heights that are equal to or greater than 12 feet, the Design-Build Team shall install guardrail. Along all fill slopes steeper than 3:1, constructed at fill heights that are equal to or greater than six feet, the Design-Build Team shall install guardrail. The guardrail / guiderail design shall be submitted for review with the Preliminary Plans submittal.
- The total outside shoulder width for all facilities with defined usable shoulders shall equal the usable shoulder plus two feet.
- The Design-Build Team shall be responsible for the evaluation of the algebraic difference in rates of cross slope (roll-over) between existing shoulders and roadways and the associated suitability for carrying traffic during construction, if necessary. In the event that the roll-over is found to be unacceptable for the proposed temporary traffic patterns, the Design-Build Team shall be responsible for providing cross slopes that meet design standards and eliminate roll-over concerns.
- The Design-Build Team shall submit Structure Recommendations and Design Criteria for NCDOT review and acceptance prior to the Preliminary Roadway Plans submittal. The Design-Build Team shall develop Structure Recommendations that adhere to the format noted in the March 25, 2003 and September 1, 2004 memos from Mr. Jay Bennett, PE, former State Roadway Design Engineer.
- Unless noted otherwise elsewhere in this RFP, the design speed for all roadways shall be the greater of the minimum design speed for the facility type, as specified in the 2011 AASHTO *A Policy on Geometric Design of Highways and Streets*, or the anticipated / actual posted speed plus five mph. If a speed limit is not physically posted on an existing facility outside the Winston-Salem City limits, General Statutes mandate the speed limit as 55 mph, resulting in a 60 mph design speed. If a speed limit is not physically posted on an existing facility within the Winston-Salem City limits, the design speed shall be 40 mph or the design speed indicated in the July 20, 2016 *Roadway Design and Posted Speed Table* provided by the Department.
- The Design-Build Team shall design and construct single face concrete barrier in front of the traffic face of all sound barrier walls, retaining walls and all elements acting as a retaining wall that are located within the vehicle recovery area. The aforementioned concrete barrier

shall be located beyond the typical section shoulder point, requiring the Design-Build Team to widen the outside shoulder beyond the typical section width.

**** NOTE**** Deleted bullet requiring -Y- Line / -Y- Line intersection minimum lane width at the radius points.

- At all intersections impacted by the Design-Build Team's design and / or construction methods, excluding resurfacing and temporary offsite improvements, the following design vehicles shall be required for all turning movements:
 - WB-67 at all ramp / loop intersections with NC 150 (Peters Creek Parkway) (For side-by-side turning maneuvers, WB-67 for the outside movement only and SU-30 for inside movement).
 - BUS-14 at all other ramp / loop intersections with -Y- Lines and all City street intersections.
- Unless noted otherwise elsewhere in this RFP, all roundabouts shall adhere to the design and operation parameters as detailed in *Roundabouts: An Informational Guide*, Second Edition (NCHRP Report 672). Prior to incorporation, the Design-Build Team shall provide a traffic analysis of the proposed roundabout(s), utilizing the appropriate projected traffic volumes and SIDRA Intersection 5.1 or SIDRA Intersection 6.0 analysis software, for NCDOT review and acceptance. All roundabouts shall be designed and constructed to accommodate a WB-67. The Department prefers that all roadway grades approaching a roundabout are 4.0% or less. Thus, justification, in the Department's sole discretion, shall be provided for all roadway approach grades that are steeper than 4.0%.
- Unless noted otherwise elsewhere in this RFP, the Design-Build Team shall design and construct all lane drops from the outside travel way.
- A sag vertical curve low point will not be allowed on any proposed bridge or approach slab.
- Excluding grades required to tie to existing, the minimum longitudinal grade shall be 0.30%.
- The Department has followed a modified Merger Process used by the Environmental Agencies and the Department to obtain environmental permits. Any variations in the Department's proposed design and / or construction methods that nullify any Concurrence Points obtained or decisions reached between the Department and the Environmental Agencies; and / or require additional coordination with the Environmental Agencies shall be the sole responsibility of the Design-Build Team. The Department will not allow any contract time extensions or additional compensation associated with any coordination or approval process resulting from design and / or construction modifications.
- Excluding parcels restricted by Control of Access, the Design-Build Team shall design and construct a minimum of one driveway per parcel. The Design-Build Team shall design and construct all driveways that adhere to the NCDOT *Policy on Street and Driveway Access to*

North Carolina Highways and the minimum requirements noted below. Excluding the maximum grade requirement, if the NCDOT *Policy on Street and Driveway Access to North Carolina Highways* and the requirements noted below have conflicting design parameters, the proposed design shall adhere to the aforementioned Policy:

- The Design-Build Team shall provide horizontal and vertical alignments for all driveways that require 100 feet or longer to tie to existing.
- Excluding grades required to tie to existing, the maximum driveway grade shall be 10%.
- For shoulder sections, the minimum driveway turnout for residential and commercial properties shall be 16'-0" and 24'-0", respectively, or the existing width, whichever is greater.
- For curb and gutter sections, the minimum driveway turnout for residential and commercial properties shall be 20'-0" and 28'-0", respectively, or the existing width, whichever is greater.
- The Design-Build Team shall contact Mr. Gary W. Thompson, North Carolina Geodetic Survey Director, prior to disturbing any geodetic monument.
- The project shall follow the NCDOT-FHWA Oversight Agreement. This agreement will be provided. Any changes that affect previous approvals shall be re-submitted by the Design-Build Team for FHWA acceptance.
- The Design-Build Team shall identify the need for any special roadway design details (i.e. any special drainage structures, rock embankment, rock plating, special guardrail, retaining walls, concrete barrier designs, etc.) and shall provide special design drawings. The Contract Standards and Development Unit may have special details available that can be provided to the Design-Build Team upon request.
- A 4:1 back slope shall extend from the back of the expressway gutter to the clear zone limit. Beyond that, a maximum 2:1 cut slope will be acceptable.
- The expressway gutter centerline shall be located at the hinge / shoulder point.
- Shoulder berm gutter shall not be installed in cut sections.
- At all locations with paved shoulders that extend beyond the typical width (i.e. to the face of single face barrier and guardrail, edge of expressway / shoulder berm gutter, etc.), the Design-Build Team shall taper the wider paved shoulder width to the typical paved shoulder width using an 8:1 taper. (Reference the Pavement Management Scope of Work found elsewhere in this RFP)
- Cut and fill slope transitions shall not exceed one increment (i.e. 3:1 to 4:1) per 50 feet.

- The Design-Build Team shall design and construct horizontal and vertical curves at all Points of Intersections (PIs) on the horizontal and vertical alignments, respectively.
- All paved shoulders shall be tapered at 8:1 to the existing pavement at tie-in points.

NCDOT Information Supplied

- The NCDOT will provide copies of the U-2827B Environmental Assessment (EA), the U-2827B Finding of No Significant Impact (FONSI), the U-2827B Right-of-Way / Construction Consultation, the C-5620A Categorical Exclusion (CE), and the latest list of environmental commitments, municipal agreements and all pertinent approvals and correspondence. Unless noted otherwise elsewhere in this RFP, the Design-Build Team shall adhere to all commitments stated in the environmental documents.
- The NCDOT will provide electronic surveys to the Design-Build Team. Any supplemental surveys, including but not limited to additional topography, existing and proposed roadway, structure sites, underground and overhead utilities, existing and proposed drainage, wetland delineation, right of way, parcel names, and deed research and descriptions shall be the responsibility of the Design-Build Team to acquire and process. The Design-Build Team shall modify / incorporate boundary information used for the determination and valuation of property solely under the direct supervision of a Professional Land Surveyor registered in North Carolina. Known existing utilities have been located and will be included with the survey data. The Design-Build Team shall be responsible for confirming the location of the utilities and the type / size of facilities. All supplemental Subsurface Utility Engineering (SUE) work shall be the responsibility of the Design-Build Team.
- The NCDOT will provide the U-2827B Public Meeting Maps and MUP (C-5620A) Preliminary Plans developed by the Department. The Design-Build Team is cautioned that the preliminary designs are provided solely to assist the Design-Build Team in the development of the project design. The Design-Build Team shall be fully and totally responsible for the accuracy and completeness of the project design, including, but not limited to, the use of the NCDOT's design, the use of portions of the NCDOT's design or modifications to the NCDOT's design.
- The NCDOT will provide the U-2827B electronic design files.
- The NCDOT will provide final pavement designs for U-2827B. The Design-Build Team shall be responsible for all temporary pavement designs. (Reference the Pavement Management Scope of Work found elsewhere in this RFP)
- The NCDOT will provide a Geotechnical Subsurface Investigation for U-2827B. The Design-Build Team shall be responsible for any additional geotechnical information, all geotechnical recommendations, as well as supplemental structural and roadway investigations. (Reference the Geotechnical Engineering Scope of Work found elsewhere in this RFP)

PAVEMENT MANAGEMENT SCOPE OF WORK (6-17-16)**US 421 / I-40 BUSINESS MAINLINE AND US 421 / I-40 BUSINESS RAMP / LOOP
PAVEMENT DESIGNS WITHIN THE PAVEMENT RECONSTRUCTION LIMITS**

Throughout the pavement reconstruction limits, the pavement design for the mainline, ramp and loop travel lanes, and the corresponding shoulders shall consist of one of the following alternatives. Excluding the section of US 421 / I-40 Business near Peters Creek Parkway that is not part of the long-term closure, the pavement alternate chosen shall be used throughout the entire pavement reconstruction limits. The Design-Build Team may use the Asphalt Pavement Alternate or the Concrete Pavement Alternate for the section of US 421 / I-40 Business near Peters Creek Parkway that is not part of the long-term closure regardless of the pavement alternative chosen for the remainder of the mainline. The Design-Build Team shall specify in the Technical Proposal the pavement alternate(s) chosen.

Alternate 1 - Concrete Pavement**US 421 / I-40 Business Mainline Pavement Design**

Throughout the pavement reconstruction limits, the Design-Build Team shall remove and dispose of / recycle the existing pavement structure for the mainline travel lanes, mainline median shoulder and mainline outside shoulder to the top of the soil subgrade.

The pavement design for the mainline travel lanes shall consist of the following:

11.0" doweled jointed concrete
Nonwoven Geotextile Drainage Interlayer *
1.25" SF9.5A
Subgrade Stabilization

* The Nonwoven Geotextile Drainage Layer shall be in accordance with the *Nonwoven Geotextile Interlayer* Project Special Provision found elsewhere in this RFP.

The joints shall be uniformly spaced 15 feet apart.

US 421 / I-40 Business Median and Outside Shoulder Design

Throughout the pavement reconstruction limits, the pavement design for the mainline median and outside shoulders shall consist of the following:

9.0" jointed concrete, without dowels
8.0" Aggregate Base Course

Shoulder joints shall match the adjacent travel lane joint spacing and location; and be anchored to the mainline travel lane pavement with tie bars.

US 421 / I-40 Business Ramp / Loop Design

The pavement design for all US 421 / I-40 Business ramp and loop travel lanes, and the corresponding shoulders shall consist of the following:

9.0" doweled jointed concrete
3.0" B25.0B
Subgrade Stabilization

Alternate 2 - Asphalt Pavement**US 421 / I-40 Business Mainline / Shoulder Pavement Design**

Throughout the pavement reconstruction limits, the Design-Build Team shall remove and dispose of / recycle the existing pavement structure for the mainline travel lanes, mainline median shoulder and mainline outside shoulder to the top of the soil subgrade.

The pavement design for the mainline travel lanes and shoulders shall consist of the following:

3.0" S9.5C
4.0" I19.0C
7.0" B25.0C
Subgrade Stabilization

US 421 / I-40 Business Ramp / Loop Design

The pavement design for all US 421 / I-40 Business ramp and loop travel lanes, and the corresponding shoulders shall consist of the following:

3.0" S9.5C
4.0" I19.0C
4.0" B25.0C
Subgrade Stabilization

**US 421 / I-40 BUSINESS MAINLINE PAVEMENT DESIGNS OUTSIDE THE
PAVEMENT RECONSTRUCTION LIMITS**

Within the limits noted below, the Design-Build Team shall mill 3.0" of the existing mainline pavement and overlay with 3.0" S9.5C:

- From the western limit of the pavement marking obliterations / revisions to the western limit of the mainline pavement reconstruction.
- From the eastern limit of the mainline pavement reconstruction to the eastern limit of the pavement marking obliterations / revisions.

OTHER REQUIREMENTS

Unless noted otherwise elsewhere in this RFP, all longitudinal joints shall be located on a lane line or lane midpoint. Solely to shift a longitudinal joint to one of the aforementioned locations, a maximum 600-foot transition, that locates the longitudinal joint elsewhere, will be allowed. The Design-Build Team shall indicate in the Technical Proposal how longitudinal joints will be located on a lane line or lane midpoint.

In accordance with the requirements noted below, the mainline subgrade stabilization shall consist of chemical stabilization or Class IV stabilization. The Design-Build Team shall specify the proposed mainline subgrade stabilization, or combination, with approximate limits of each type clearly noted in the Technical Proposal. However, only one subgrade stabilization alternate shall be used across the full typical section width, in a given direction, and shall be used for a minimum 1000-foot length.

- Chemical stabilization shall be to a minimum depth of 8 inches for lime and 7 inches for cement. The type of subgrade stabilization and the amount of stabilizing agent shall be determined in accordance with the *Cement and Lime Stabilization of Sub-grade Soils* Project Special Provision found elsewhere in this RFP.
- Class IV stabilization shall be in accordance with the *Class IV Subgrade Stabilization in Lieu of Chemical Stabilization* Standard Special Provision found elsewhere in this RFP.

Other pavement designs for this project shall be as listed in the table below:

LINE	Surface	Intermediate	Base	Stab
West Fourth Street, Broad Street, Brookstone Avenue, High Street, Cherry Street, Main Street and Church Street	3.0" S9.5B	4.0" I19.0B	4.0" B25.0B	No
* Marshall Street	3.0" S9.5B	4.0" I19.0B	4.0" B25.0B	No
Peters Creek Parkway	3.0" S9.5B	4.0" I19.0B	4.0" B25.0B	No
Liberty Street	3.0" S9.5B	4.0" I19.0B	4.0" B25.0B	No
Spruce Street and Green Branch Turnarounds	3.0" S9.5B	4.0 I19.0B	4.0" B25.0B	No
Gregory Street / Apple Street Connection	3.0" S9.5B	4.0 I19.0B	4.0" B25.0B	No
Peters Creek Parkway / Academy Street Intersection Improvements	3.0" S9.5B	4.0 I19.0B	4.0" B25.0B	No
Eighth Street between Cherry Street and Trade Street, and Martin Luther King, Jr. Drive between Trade Street and Liberty Street	3.0" S9.5B	4.0 I19.0B	4.0" B25.0B	No

* The pavement design for the Marshall Street southbound left turn lane, and adjacent shoulder, that accesses Eighth Street, and Eighth Street travel lanes and shoulders between Marshall Street and Cherry Street shall consist of the following:

9.0" doweled, jointed concrete
4.0" B25.0B

The pavement design for the Multi-Use Path and Strollway shall consist of the following:

5.0" concrete without welded wire mesh
4.0" ABC

For the Liberty Street pavement design noted in the table above, the Design-Build Team may substitute an ABC layer for the asphalt base course layer. If such an alternative is proposed, the thickness of the ABC layer, used as a substitute for the asphalt base course layer, shall be equal to twice the proposed asphalt base course thickness specified for the roadway. The Design-Build Team shall maintain the same pavement design throughout the Liberty Street construction limits. In the Technical Proposal, the Design-Build Team shall specify the base option chosen (ABC or asphalt) for Liberty Street.

Throughout the retained pavement sections of West Fourth Street, Broad Street, Brookstown Avenue, High Street, Marshall Street, Cherry Street, Main Street and Church Street within the

construction limits, the Design-Build Team shall 1) resurface the existing pavement with a minimum 3.0" S9.5B in those sections that require a resurfacing grade and / or 2) mill 3.0" of pavement and overlay with 3.0" S9.5B in those sections that do not require a resurfacing grade. (Reference the Roadway Scope of Work found elsewhere in this RFP)

Throughout the retained pavement sections of Peters Creek Parkway, Academy Street, Eighth Street, and Martin Luther King, Jr. Drive within the construction limits, the Design-Build Team shall 1) resurface the existing pavement with a minimum 1.5" S9.5B in those sections that require a resurfacing grade and / or 2) mill 1.5" of pavement and overlay with 1.5" S9.5B in those sections that do not require a resurfacing grade. (Reference the Roadway Scope of Work found elsewhere in this RFP)

For all other -Y- Lines, the Design-Build Team shall resurface the existing pavement with a minimum depth that equals the full thickness of surface course as provided in the table above. (Reference the Roadway Scope of Work found elsewhere in this RFP)

Throughout the limits of the temporary offsite intersection improvements, including but not limited to the limits of pavement marking obliterations / revisions, the Design-Build Team shall mill 1.5" of pavement and overlay with 1.5" S9.5B.

Throughout the limits of the water main installation on First Street, the Design-Build Team shall make pavement repairs in accordance with City of Winston Salem Standard Drawing for Asphalt Pavement Repair (For Non-State Maintained Roads) as revised by NCDOT (07-15-16) utilizing 5.5" of B25.0B and 3" of S9.5B. The pavement repair area shall be monitored for settlement and repaired for a minimum period of one year from completion of the initial repair. The Design Build Team shall mill 1.5" of pavement and overlay with 1.5" S9.5B for the full width of First Street throughout the limits of the pavement repair.

On all ramps and loops, the adjacent through lane pavement design shall extend to the back of the gore (12-foot width).

Longitudinal joints of all surface course layers shall not be located in the final traffic pattern wheel path. If applicable, the Design-Build Team shall indicate in the Technical Proposal where all underlying longitudinal joints will be located and demonstrate how the underlying longitudinal joint location will minimize reflective cracking.

Unless noted otherwise elsewhere in this RFP, the minimum widened width shall be six feet. The minimum widened width may be reduced to four feet only if the Design-Build Team demonstrates that their equipment properly compacts narrow widening and obtains prior Department approval. Tapers that tie proposed pavement to existing pavement are excluded from the narrow widening requirements noted above.

In areas where the existing -Y- Line or ramp paved shoulders are proposed to be incorporated into a permanent travel lane, the Design-Build Team shall be responsible for evaluating the existing paved shoulder regarding its suitability for carrying the projected traffic volumes. In the event that the existing paved shoulder is found to be inadequate, the Design-Build Team shall be

responsible for upgrading the existing paved shoulder to an acceptable level or replacing the existing paved shoulder. The Design-Build Team shall submit their evaluation and proposed use of existing paved shoulders to the Design-Build Unit for review and acceptance or rejection.

The Design-Build Team shall be responsible for the design of all temporary pavements and for the evaluation of existing shoulders and roadways regarding their suitability for carrying traffic during construction, if necessary. In the event that the existing shoulders and / or roadways are found to be inadequate for the proposed temporary traffic volumes and durations, the Design-Build Team shall be responsible for upgrading the pavement to an acceptable level. Temporary pavements shall be designed in accordance with the most recent version of the North Carolina DOT *Pavement Design Procedure*. Temporary pavement designs and associated calculations shall be submitted for review and acceptance using the Design-Build submittal process prior to incorporation. The expected duration for traffic on temporary pavement must be included as part of the submittal.

When a resurfacing grade ties to an existing curb, bridge and / or pavement, the Design-Build Team shall perform incidental milling such that the new pavement ties flush with the existing feature(s). When tying to the aforementioned feature(s), the Design-Build Team shall not reduce the minimum required surface layer pavement thickness noted above. At existing pavement ties, the Design-Build Team shall perform incidental milling for a minimum distance of 25 feet at bridges and six feet at curb sections. The Design-Build Team shall not perform incidental milling more than 72 hours prior to placement of the asphalt surface layer.

All driveways, up to the radius point, shall be constructed with the full-depth pavement design of the intersecting roadway. The entire impacted length of all non-concrete driveways with a 10% grade shall be constructed with 1.5" S9.5B (or S9.5C or SF9.5A) and 8" ABC with prime coat. Unless otherwise noted above, the Design-Build Team shall adhere to the following for all driveway construction:

- For existing gravel and soil driveways, use 8" ABC
- For existing asphalt driveways, use 1.5" S9.5B (or S9.5C or SF9.5A) and 8" ABC with prime coat
- For existing concrete driveways, use 6" jointed concrete reinforced with woven wire mesh

The rate of application and the maximum and minimum thickness per application and layer shall be in accordance with the NCDOT Roadway Design Manual.

Excluding the high side of superelevated sections, the Design-Build Team shall design and construct continuous median and outside shoulder drains and outlets for the mainline concrete and asphalt pavement alternates.

Where installed on the outside shoulder, outlets shall be provided approximately every 300 feet. Where installed on the median shoulder, outlet locations shall not exceed 500 feet, and all outlets shall be located at drainage structures. Shoulder drains shall be placed to drain the entire

pavement structure. The shoulder drain design and outlet locations shall be submitted to the Design-Build Unit for review and acceptance.

Unless noted otherwise elsewhere in this RFP, the Design-Build Team shall pave from 1) the edge of all paved shoulders to the face of all single face barrier / guardrail 2) from the edge of all paved shoulders to the edge of all expressway / shoulder berm gutter and 3) from the edge of all paved shoulders to the face of proposed retaining walls and sound barrier walls located on the outside shoulder with 6" of ABC (or 4" B25.0B or B25.0C), a split seal and at least two lifts of surface course. If a split seal is not used, the ABC pavement design shall require prime coat at the normal application rate. In these areas, the Design-Build Team's installation of ABC or black base shall be consistent with the pavement type for the specific roadway. As an alternative to the above pavement design for paving the shoulders to the face of the aforementioned features, the Design-Build Team may use the adjacent travel lane pavement design. The Design-Build Team will not be required to pave to the face of guardrail providing positive protection for overhead sign assemblies installed outside the roadway construction signing limits. (Reference the Signing Scope of Work found elsewhere in this RFP)

ALTERNATIVE TECHNICAL CONCEPTS

The Department will not accept Alternative Technical Concepts (ATCs) proposing to overlay the mainline pavement. Alternative Technical Concepts that provide an alternate **mainline** pavement design will be considered subject to the following restrictions:

- ATCs on pavement design will only be permitted on the mainline and shall not be submitted until after issuance of the Second Industry Draft Request for Proposals.
- Unless noted otherwise elsewhere in this RFP, the pavement design in the ATC shall be determined using one of the methods noted below:
 1. The NCDOT Interim Pavement Design Procedure dated April 1, 2000, as modified by Modifications to the April 2000 Interim Pavement Design Procedure dated November 2007 using a minimum 30-year design life.
 2. The AASHTOWare Pavement ME Design Software, Version 2.0, Build 2.0.19. Unless clear and convincing supporting documentation is provided, the pavement design in the ATC shall incorporate the design parameters noted below:

Parameter	Interstates and Other Freeways
Design Life	30 years
Reliability	90%
Asphalt Pavement	
Total Rutting	0.75 inch
AC Rutting	0.5 inch
Top Down Cracking	1000 feet/ mile
Bottom Up Cracking	10%
IRI (30 year design)	185 in/ mile
Concrete Pavement	
Faulting	0.15 inch
Slab Cracking	10%
IRI (30 year design life)	185 inch / mile

- Regardless of the design method, the mainline pavement design in the ATC shall adhere to the requirements noted below:

Asphalt Pavement

- In accordance with the requirements noted below, all asphalt pavement designs shall include subgrade stabilization that consists of chemical stabilization or Class IV stabilization:
 - Chemical stabilization shall be to a minimum depth of 8 inches for lime and 7 inches for cement. The type of subgrade stabilization and amount of stabilizing agent shall be determined in accordance with the *Cement and Lime Stabilization of Sub-grade Soils* Project Special Provision found elsewhere in this RFP.
 - Class IV stabilization shall be in accordance with the *Class IV Stabilization in Lieu of Chemical Stabilization* Standard Special Provision found elsewhere in this RFP.
 - Only one subgrade stabilization alternate shall be used across the full typical section width, in a given direction, and shall be used for a minimum 1000-foot length.
- Full Depth Asphalt
 - Minimum 14" thickness

➤ Asphalt on ABC

- Minimum 13” asphalt thickness
- Minimum 8” ABC thickness

➤ Asphalt on CTBC

- Minimum 12.5” asphalt thickness
- 8” CTBC thickness – Cement treated base course shall be in accordance with the *Cement Treated Base Course* Project Special Provision that the Department will provide upon request.

Concrete Pavement

➤ Concrete on stabilized subgrade

- Minimum 11” concrete thickness
 - In accordance with the requirements noted below, subgrade stabilization shall consist of chemical stabilization or Class IV stabilization:
 - Chemical stabilization shall be to a minimum depth of 8 inches for lime and 7 inches for cement. The type of subgrade stabilization and amount of stabilizing agent shall be determined in accordance with the *Cement and Lime Stabilization of Sub-grade Soils* Project Special Provision found elsewhere in this RFP.
 - Class IV stabilization shall be in accordance with the *Class IV Stabilization in Lieu of Chemical Stabilization* Standard Special Provision found elsewhere in this RFP.
 - Only one subgrade stabilization alternate shall be used across the full typical section width, in a given direction, and shall be used for a minimum 1000-foot length.
 - Uniform 15-foot joint spacing
 - Base shall be non-erodible and shall include a permeable drainage layer and a separator layer below the drainage layer (must drain the pavement structure while protecting the subgrade from moisture)
- The pavement design in the ATC must be sealed by a professional engineer who has experience in pavement design. The ATC submittal shall include a brief resume or description of the designer’s pavement design experience.
 - For all incorporated ATC pavement designs, the Design-Build Team shall include in the Technical Proposal a minimum three-year extension of the 12-month guarantee. (Reference the *Twelve Month Guarantee* Project Special Provision found elsewhere in this RFP)

ATCs complying with the above restrictions will be evaluated by a technical review panel in accordance with the usual ATC process with the exception that the NCDOT reserves the right to engage a recognized pavement design expert to assist with the ATC evaluations. (Reference the *Alternative Technical Concepts and Confidential Questions* Project Special Provision found elsewhere in this RFP)

STRUCTURES SCOPE OF WORK (6-13-16)**Project Details**

The Design-Build Team shall be responsible for all structures necessary to complete the project, including, but not limited to, the following:

- Bridge on Fourth Street over US 421 / I-40 Business
- Bridge on NC 150 (Peters Creek Parkway) over US 421 / I-40 Business
- Pedestrian culvert beneath NC 150 (Peters Creek Parkway)
- Pedestrian Bridge over US 421 / I-40 Business at existing Green Street roadway bridge (Green Street Pedestrian Bridge)
- Bridge on Broad Street over US 421 / I-40 Business
- Bridge on US 421 / I-40 Business over Brookstown Avenue
- Bridge on Marshall Street over US 421 / I-40 Business
- Bridge on Cherry Street over US 421 / I-40 Business
- Bridge on Liberty Street over US 421 / I-40 Business
- Pedestrian Bridge on Strollway over US 421 / I-40 Business (Strollway Pedestrian Bridge)
- Bridge on Main Street over US 421 / I-40 Business
- Bridge on Church Street over US 421 / I-40 Business
- All retaining walls required by the Design-Build Team's design
- All sound barrier walls required by the Design-Build Team's design (Reference the Roadway Scope of Work found elsewhere in this RFP)

All bridges shall meet approved roadway typical sections and grades. Bridge geometry (width, length, skew, span arrangement, etc.) shall be in accordance with the accepted Structure Recommendations prepared by the Design-Build Team. The minimum roadway vertical clearance for all new bridges and aesthetic elements shall adhere to the preferred alternative values specified in the Finding of No Significant Impact (FONSI) - Table 11b.

The Design-Build Team shall design and construct all bridges and abutment walls such that they do not require modifications to accommodate construction of the future MUP phases.

The Department prefers to limit the use of median bents for the roadway bridges over US 421 / I-40 Business. The Design-Build Team shall identify the bridges that will be designed and constructed with a median bent in the Technical Proposal.

The Design-Build Team shall lengthen or replace all existing reinforced concrete / masonry box culverts as required by the Design-Build Team's design. Reinforced concrete box culvert designs shall be in accordance with the latest edition of the AASHTO LRFD Bridge Design Specifications and the Hydraulic Culvert Survey Reports prepared by the Design-Build Team and accepted by the Department. (Reference the Hydraulics Scope of Work found elsewhere in this RFP)

The bridges on Broad Street and Cherry Street over US 421 / I-40 Business shall be of sufficient length and height to accommodate the ten-foot wide Multi-Use Path with two-foot shoulders, the

aesthetic column, and appropriate positive protection. The minimum clear horizontal width and minimum vertical clearance for the Multi-Use Path shall be 14 feet and ten feet, respectively. (Reference the Roadway Scope of Work found elsewhere in this RFP)

The Design-Build Team shall design and construct the pedestrian culvert beneath NC 150 (Peters Creek Parkway) with a minimum inside ten-foot height and a minimum inside ten-foot width.

The Design-Build Team shall design and construct the Fourth Street bridge over US 421 / I-40 Business in accordance with the requirements below:

- The bridge shall have 15-foot approach slabs.
 - The bridge shall have eight-foot sidewalks unless otherwise allowed below.
 - The minimum vertical clearance shall be 17'-0".
- ** Note ** Deleted retaining wall bullet
- If cored slabs or box beams are used, the Design-Build Team may:
 - Utilize a maximum five percent longitudinal grade in lieu of the NCDOT standard four percent maximum longitudinal grade
 - Design and construct seven-foot sidewalks in lieu of the eight-foot sidewalks noted above

All proposed bridge barrier rails on US 421 / I-40 Business shall be per Standard Drawing CBR1. All proposed bridge barrier rails on roadways over US 421 / I-40 Business shall be per Standard Drawing BMR34 and shall provide outriggers for future lighting as shown on the U-2827B Preliminary Lighting Plans. (Reference the Lighting Scope of Work found elsewhere in this RFP)

Unless noted otherwise elsewhere in this RFP, all roadway bridges over US 421 / I-40 Business shall have sidewalks with widths as specified in the U-2827B FONSI – Appendix D.

The Design-Build Team shall design and construct a positive separation between vehicular traffic on the Peters Creek Parkway bridge and pedestrian traffic for the Multi-Use Path on the west side of the bridge and the sidewalk on the east side of the bridge. The aforementioned positive separation shall consist of a concrete parapet, 2'-6" in height and a minimum 1'-2" width, with a minimum one-foot tall pedestrian metal rail. The Multi-Use Path and the sidewalk may be raised or level with the finished grade of the bridge deck.

A live load rating chart for proposed girders shall be included with the roadway bridge plans and shall state design assumptions and methodology used in the load rating calculations. The load rating shall be in accordance with the NCDOT *Structures Management Unit Manual* (including Policy Memos) and AASHTO's *Manual for Bridge Evaluation*.

A live load rating chart for reinforced concrete box culverts and reinforced concrete box culvert extensions shall be included in the culvert plans. A live load rating chart will not be required for the existing section of reinforced concrete box culverts that are extended.

The following will not be allowed on the project:

- Empirical method for deck design
- Monotube or cantilever DMS support structures
- Attachment of sign structures to bridges
- Precast bridge barrier rails
- Excluding the Strollway Pedestrian Bridge and the Green Street Pedestrian Bridge, Fracture critical, deck slab or deck girder bridges
- Interior pile bents
- Bridge piers adjacent to a roadway shoulder
- Bridge piers within the US 421 / I-40 Business median for the Green Street Pedestrian Bridge.
- Excluding the bridge on Fourth Street over US 421 / I-40 Business, cored slab or box beam bridges
- Unless allowed otherwise elsewhere in this RFP, bridge attachments (e.g. ITS conduit, water lines) in the overhang of grade separations
- Excluding conduit for proposed and / or future lighting accommodations, casting of conduit in the bridge deck or barrier rail (Reference the Lighting Scope of Work found elsewhere in this RFP)

The Design-Build Teams will be allowed to attach NCDOT fiber optic communication cable to the bridges noted in the July 5, 2016 *US 421 Structures over Features* document provided by the Department. The location and hardware needed to attach the required conduit to the existing bridges noted in the aforementioned document shall be reviewed and approved by the Engineer in writing prior to installation. (Reference the ITS Scope of work found elsewhere in this RFP) For the proposed bridge on US 421 / I-40 Business over Brookstown Avenue, the Design-Build Team shall design and construct the attachment in accordance with Structure Standard Drawings ECS1 and the attachment shall be located within an outside girder bay.

Regardless of wall height, sound barrier walls shall be designed in accordance with the latest edition of the *AASHTO LRFD Bridge Design Specifications* with a minimum base wind pressure of 40 psf.

All ground-mounted sound barrier walls shall be detailed in accordance with Structure Standard Drawings SBW1 and SBW2, and concrete piles shall be used. (Reference the *Sound Barrier*

Wall and Architectural Concrete Surface Treatment Project Special Provisions and the Roadway Scope of Work found elsewhere in this RFP)

All sound barrier walls attached to bridge structures shall be a maximum of sixteen feet in height, as measured from the top of the bridge deck. All bridge mounting hardware to the barrier rail and panels shall be attached to the back of the concrete barrier rail. (Reference the *Sound Barrier Wall - Bridge Mounted Project Special Provision* found elsewhere in this RFP)

The sound barrier walls attached to the bridge on US 421 / I-40 Business over Crafton Street shall be non-transparent. (Reference the *Sound Barrier Wall – Bridge Mounted Project Special Provision* found elsewhere in this RFP) Prior to installing the sound barrier wall on the aforementioned US 421 / I-40 Business bridge, the Design-Build Team shall perform a structural analysis of the bridge's ability to accommodate the sound barrier wall loading. Excluding the aforementioned structural analysis, all design effort and structural modifications required solely for the bridge to support the additional sound barrier wall loadings will be paid for as extra work in accordance with Subarticle 104-8(A) of the 2012 *Standard Specifications for Roads and Structures*.

The sound barrier wall attached to the bridge on NC 150 (Peters Creek Parkway) over US 421 / I-40 Business shall be transparent. (Reference the *Sound Barrier Wall -Bridge Mounted Project Special Provision* found elsewhere in this RFP)

The number of expansion joints for each structure shall be kept to a minimum. Structures shall be integral if the criteria listed in the NCDOT *Structures Management Unit Manual* is met. When required by the criteria in Section 6.2.3.2 of the NCDOT *Structures Management Unit Manual*, the Design-Build Team shall use expansion joints, except Bullets 3 and 4 in the aforementioned Section shall apply to all roadways.

Use of Florida Department of Transportation Prestressed Florida I-Beams (FIB), the Prestressed Concrete Committee for Economic Fabrication (PCEF) prestressed concrete girders, and Modified Bulb Tee girders will be allowed. However, the structural details associated with the aforementioned items, including but not limited to mild reinforcing and reinforcing cover, shall be subject to Department review and acceptance post-award.

The Design-Build Team shall apply anti-graffiti coating on all **exposed surfaces of** retaining walls, sound barrier walls, vertical abutment walls, concrete arch facades, bridge barrier rails, **aesthetic columns, exterior girders, the interior bent of the Strollway Pedestrian Bridge,** and the pedestrian culvert. (Reference the *Application of Base and Anti-Graffiti Coating Project Special Provision* found elsewhere in this RFP)

Aesthetic Design

In accordance with the Aesthetics Scope of Work found elsewhere in this RFP, all bridges (roadway and pedestrian) and retaining walls shall have aesthetic treatments.

The concrete arch facades may be braced to the deck or exterior girders. The concrete arch facades shall be non-load bearing.

At the Broad Street and Cherry Street bridges over US 421 / I-40 Business the aesthetic columns located between US 421 / I-40 Business and the proposed MUP shall be non-load bearing and shall be positively anchored at the base. (Reference the Aesthetics Scope of Work found elsewhere in this RFP)

Pedestrian Bridges

The Design-Build Team shall design and construct pedestrian bridges in accordance with the AASHTO *LRFD Guide Specifications for the Design of Pedestrian Bridges*. The Design-Build Team shall provide a conceptual design and rendering for both pedestrian bridges in the Technical Proposal.

Unless noted otherwise elsewhere in this RFP, on all pedestrian bridges, the Design-Build Team shall design and construct protective vinyl coated fencing with anodized posts and supports that adhere to the 2012 NCDOT *Standard Specifications for Roads and Structures*.

To accommodate the decorative lighting designed and constructed by the Design-Build Team, the Design-Build Team shall design and construct two 1.5" conduits in all pedestrian bridge decks. (Reference the Lighting Scope of Work found elsewhere in this RFP)

The Design-Build Team shall design and construct the Green Street Pedestrian Bridge in accordance with the requirements noted below:

- The bridge shall be a double tied arch structure with a minimum 12-foot clear width.
- The double tied arch structure shall maintain the proportions of the bridge as shown in the Business 40 Aesthetics Guidelines provided by the Department.
- All structural steel shall be painted in accordance with the 2012 NCDOT *Standard Specifications for Roads and Structures*.

The Design-Build Team shall design and construct the Strollway Pedestrian Bridge in accordance with the requirements noted below:

- The bridge shall be a land bridge with a minimum 24-foot out-to-out dimension at the base of the superstructure.
- The bridge shall provide a minimum 12-foot wide pedestrian walkway with planter troughs on each side of the walkway. The aforementioned walkway shall be skewed to the center line of the bridge. (Reference the Business 40 Aesthetics Guidelines provided by the Department)
- The exterior walls of the planter troughs shall be angled at a slope equal to four-foot of vertical rise for every one-foot of horizontal distance instead of the angle shown in the Business 40 Aesthetics Guidelines provided by the Department.
- The median bent shall be a continuous concrete rectangular wall with a smooth surface.
- The bridge shall be designed and constructed to accommodate four-foot thick lightweight growing material, with a minimum soil density of 100 pcf and a 20% increase for plantings, in each of the aforementioned planter troughs.
- An irrigation and drainage system shall be designed and constructed in each of the aforementioned planter troughs. Water from the planter troughs shall be drained to both sides of the bridge and continue away from the structure and the bridge approach fill. The drainage system shall be designed and constructed such that it can be easily maintained and cleaned out. For irrigation system requirements, reference the Utilities and Aesthetics Scopes of Work found elsewhere in this RFP.
- The Design-Build Team shall design and construct retaining walls in front of the end bents. On the west side of the bridge the retaining wall shall turn-back parallel to the Strollway. The Design-Build Team shall design and construct gabion elements adjacent to, and in front of, the aforementioned turned-back section of retaining wall that provide a variable slope transition from the retaining wall to the Strollway 2:1 fill slope. (Reference the Geotechnical and Aesthetics Scopes of Work found elsewhere in this RFP)

Structure Removal

The Design Build Team shall remove and dispose of the following existing structures:

- Bridge No. 269 on Fourth Street over US 421 / I-40 Business
- Bridge No. 278 on NC 150 (Peters Creek Parkway) over US 421 / I-40 Business
- Bridge No. 286 on Green Street over US 421 / I-40 Business
- Bridge No. 178 on Broad Street over US 421 / I-40 Business
- Bridge No. 288 on US 421 / I-40 Business over Brookstown Avenue
- Bridge No. 291 on Spruce Street over US 421 / I-40 Business
- Bridge No. 293 on Marshall Street over US 421 / I-40 Business
- Bridge No. 305 on Cherry Street over US 421 / I-40 Business
- Bridge No. 312 on US 421 / I-40 Business over Liberty Street
- Bridge No. 313 on Main Street over US 421 / I-40 Business
- Bridge No. 336 on Church Street over US 421 / I-40 Business

In accordance with the *Asbestos Assessment for Bridge Demolition and Renovation Activities* Project Special Provision located on the Structures Management Unit's website, the Design-

Build Team is cautioned that all the aforementioned bridges require an asbestos survey / inspection prior to demolition.

The Design-Build Team is cautioned that all the aforementioned bridges may be coated with red lead paint. In accordance with the 2012 *Standard Specifications for Roads and Structures*, the Design-Build Team shall handle, remove, ship, and dispose of all red lead painted elements.

Except as noted below, the aforementioned structures shall be removed and disposed of in accordance with the 2012 *Standard Specifications for Roads and Structures*:

- The Design-Build Team shall salvage all two-bar metal rail and posts on all bridges but Bridge Nos. 312 and 288.
- The Design-Build Team shall salvage all single-bar metal rail and posts on Bridge No. 288.
- The Design-Build Team shall carefully remove all material to be salvaged in a manner that prevents damages.
- Prior to delivery to the Department, the Design-Build Team shall stockpile all salvaged material to prevent damage.
- The Design-Build Team shall return all salvaged material to the Department. A minimum of one week prior to delivery, the Design-Build Team shall contact Chuck White, Division 9 Bridge Superintendent during normal business hours (704-630-3260) to coordinate a specific day and time for the Design-Build Team to deliver the salvaged material to the Department.

General

The Design-Build Team's primary design firm shall be on the Department's list of firms qualified for Structure Design and maintain an office in North Carolina.

Designs shall be in accordance with the latest edition of AASHTO LRFD Bridge Design Specifications (with exceptions noted in the NCDOT *Structures Management Unit Manual*), NCDOT LRFD Driven Pile Foundation Design Policy, NCDOT *Structures Management Unit Manual* (including Policy Memos) and NCDOT *Bridge Policy Manual*, except as noted otherwise elsewhere in this RFP.

Unless noted otherwise elsewhere in this RFP, all construction and materials shall be in accordance with the 2012 NCDOT *Standard Specifications for Roads and Structures*, NCDOT Structures Management Unit Project Special Provisions and NCDOT Structures Management Unit Standard Drawings.

Alternate designs, details, or construction practices (such as those employed by other states, but not standard practice in NC) are subject to Department review and approval, and will be evaluated on a case by case basis.

HYDRAULICS SCOPE OF WORK (6-23-16)**Project Details**

- The Design-Build Team shall employ a private engineering firm to perform hydraulic design for all work required under this contract. The private engineering firm must be prequalified for Tier II hydraulic design work under the Department's normal prequalification procedures prior to the Technical Proposal submittal date.
- The Design-Build Team shall hold a pre-design meeting with the Design-Build Unit and Hydraulic Review Engineer upon acceptance of the Preliminary Roadway Plans developed by the Design-Build Team.
- The Design-Build Team shall design all storm drainage systems using Geopak Drainage, including but not limited to incorporating discharges from allowable routing programs.
- If appropriate for the drainage area, the Design-Build Team shall use the USGS Scientific Investigations Report 2014-5030 (*Methods for Estimating the Magnitude and Frequency of Floods for Urban and Small, Rural Streams in Georgia, South Carolina and North Carolina, 2011*) for determining storm discharges, in lieu of the USGS Water-Resources Investigations Report 96-4084 (*Estimation of Flood-Frequency Characteristics of Small Urban Streams in North Carolina*).
- The Design-Build Team shall not include the effects of storage when computing discharges for hydraulic design and analysis for areas less than 50% impervious and / or areas without storm drainage systems. For drainage areas where impervious surfaces are greater than 50% and / or areas with storm drainage systems, routing will be allowed. EPA SWMM, USACE HMS, Win TR-20 or equivalent are commonly used and accepted programs for routing. A storm duration of 24 hours shall be used in developing the hydrograph.
- Excluding US 421 / I-40 Business and all ramps / loops, the hydraulic spread shall not encroach into operational lanes beyond the limits noted below:
 - For shoulder facilities, including those with expressway gutter and shoulder berm gutter, 1) the hydraulic spread shall not encroach into an operational permanent through lane; and 2) the hydraulic spread shall not encroach more than two feet into an operational temporary through lane.
 - For curb and gutter facilities, the hydraulic spread shall not encroach more than three feet into an operational permanent through lane or six feet into an operational temporary through lane.
 - The hydraulic spread shall not encroach into an operational permanent or temporary through lane on a bridge.

- The hydraulic spread shall not encroach more than a distance that equals half the lane width into an operational permanent or temporary exclusive turn lane.
- The hydraulic spread shall not encroach into an operational permanent or temporary lane of US 421 / I-40 Business, including all ramps / loops.
- In accordance with the Hydraulic Guidelines noted below, the Design-Build Team shall provide Culvert Survey Reports for hydraulic structures for the Department's review and acceptance.
- The Design-Build Team shall analyze spread for all bridges identified in the Structures Scope of Work found elsewhere in this RFP and, as necessary, provide mitigation that adheres to the hydraulic spread requirements noted above. If required, the Design-Build Team shall adhere to the bridge drainage system requirements noted below:
 - The Design-Build Team shall design bridge drainage without the use of Bridge Scuppers (open-grated inlets). If deck drains are used on a bridge, they shall be vertical pipes at the flow line through the deck with no elbow and shall be consistent with that shown in the current NCDOT Stormwater Best Management Practices Toolbox. If a closed drainage system is used on a bridge, the closed drainage system shall use vertical pipes at the flow line through the deck with no elbow and shall be consistent with that shown on the current NCDOT Stormwater Best Management Practices Toolbox.
 - The Design-Build Team shall use 4" deck drains adjacent to pedestrian facilities.
 - The Design-Build Team shall provide bridge drainage features that prevent direct discharge into waterways or onto any existing / future greenway.
- In accordance with the NCDOT Stormwater Best Management Practices Toolbox and the NCDOT Post-Construction Stormwater Program, effective on the Technical Proposal submittal date, the Design-Build Team shall develop a Stormwater Management Plan that, at a minimum, demonstrates the following:
 - To the maximum extent practicable, stormwater runoff shall be diverted away from surface waters.
 - To the maximum extent practicable, on-site stormwater control measures shall be employed to minimize water quality impacts.
 - Underground detention will not be allowed. No additional right of way will be acquired solely for stormwater management.
- In accordance with the Hydraulic Guidelines noted below, the Design-Build Team shall prepare Outfall Analyses for increases in discharge and take appropriate action to ensure that any increases are appropriately mitigated.

- Unless noted otherwise elsewhere in this RFP, the Design-Build Team shall remove or fill with flowable fill all pipes not retained for drainage purposes.
- Throughout the project limits, the Design-Build Team shall remove the entire length of all existing metal pipes and vitrified clay pipes under pavement to the limits of the nearest outfall or drainage structure and replace them with the appropriately sized pipe that adheres to the *Drainage Pipe* Project Special Provision found elsewhere in this RFP. The Design-Build Team shall not steepen slopes, reduce easements, or reduce right of way solely to avoid replacing the aforementioned pipes. Throughout the project limits, the Design-Build Team shall analyze all other existing box culverts and pipes within the existing / proposed right of way for hydraulic and structural deficiencies. Based on these analyses, the following shall be adhered to:
 - Excluding the box culverts under Peters Creek Parkway and West Academy Street, the Design-Build Team shall provide the appropriate hydraulic mitigation for 1) all hydraulically deficient box culverts and / or pipes and 2) all hydraulically and structurally deficient box culverts and / or pipes; including but not limited to replacement. For major hydraulic crossings (crossings with a conveyance greater than the capacity of a single 72" diameter pipe), the Design-Build Team shall remove and replace all hydraulically, or **hydraulically and** structurally, deficient box culverts and / or pipes. Inlet improvement outside of the right of way shall not be allowed to mitigate for hydraulically deficient box culverts and / or pipes. The Design-Build Team shall identify all hydraulically deficient box culverts and / or pipes and their proposed mitigation or replacement in the Technical Proposal.
 - Any system improvements shall be contained within the right of way. The Design-Build Team shall provide an outflow of a closed system within the right of way limits during overcapacity periods where downstream systems are found to be hydraulically deficient.
 - To ensure that all pipes that cross under pavement, and are retained for drainage purposes are structurally sound, the Design-Build Team shall provide appropriate documentation obtained from video inspections for the Department's review and approval prior to any hydraulic design submittal. Prior to performing any storm drain clean-out required for the aforementioned video inspections, the Design-Build Team shall obtain approval from the Engineer. In accordance with Subarticle 104-8(A) of the 2012 *Standard Specifications for Roads and Structures*, required storm drain clean-out will be paid for as extra work.
 - As directed by the Engineer, the Design-Build Team shall provide the appropriate structural mitigation for all structurally deficient box culverts and / or pipes. Structural mitigation, for structural deficiencies in box culverts and / or pipes, including but not limited to all repairs, will be paid for as extra work in accordance with Subarticle 104-8(A) of the 2012 *Standard Specifications for Roads and Structures*.

- For all major hydraulic crossings with a conveyance greater than the capacity of a single 72” diameter pipe on new location, the Design-Build Team shall adhere to the requirements noted below:
 - The Design-Build Team shall design and construct an appropriately sized reinforced concrete box culvert or bridge.
 - The Design-Build Team shall design and construct a hydraulic system that does not increase the water surface elevation by more than one foot above natural conditions during the 100-year storm.
- For all major hydraulic crossings with a conveyance greater than the capacity of a single 72” diameter pipe, the Design-Build Team shall indicate the rise in the floodplain water elevation in the Technical Proposal.
- The Design-Build Team shall conduct an interagency hydraulic design review meeting and an interagency permit impacts meeting prior to submittal of the environmental permit applications. These meetings shall adhere to the Concurrence Point 4B and Concurrence Point 4C requirements, respectively, of the Merger Process used by the environmental agencies and the Department to obtain environmental permits. (Reference the Environmental Permits Scope of Work found elsewhere in this RFP.) All work resulting from the hydraulic design and permit review meetings shall be the Design-Build Team’s responsibility. The Design-Build Team shall provide hydraulic plans and permit impact sheets to the Design-Build Unit a minimum of five weeks prior to the appropriate interagency meeting. The Design-Build Team shall take minutes of the interagency meetings and provide them to the Department within three business days of the aforementioned meetings.
- The Design-Build Team shall use a minimum ditch grade of 0.3% and avoid constructing ditches in wetlands.
- The Design-Build Team shall provide permit drawings, calculations and impact sheets, for the USACE 404 Permit and the NCDWR Section 401 Certification.
- For all FEMA regulated streams impacted by the Design-Build Team’s design and / or construction, the Design-Build Team shall adhere to the Hydraulic Guidelines noted below and the following requirements:
 - The Design-Build Team shall prepare a CLOMR or MOA package for the Department’s submittal to the North Carolina Floodplain Mapping Program (NCFMP). The Design-Build Team shall obtain NCFMP approval prior to performing any construction activity in a FEMA regulated floodplain.
 - The Design-Build Team shall notify the Design-Build Unit, in writing, of all structures that may require purchase due to an increase in the 100-year water surface elevation. The Department will be responsible for all surveys to ascertain insurable structures within the impacted area of the floodplain(s). The Design-Build Team shall discuss the extent and

limits of the rise in water elevation in the floodplain(s), identify potentially impacted insurable structures, specify areas anticipated to require additional surveys and estimate the anticipated additional right of way impacts outside the project construction limits in the Technical Proposal. (Reference the Right of Way Scope of Work found elsewhere in this RFP)

- The Department will be responsible for all fees associated with the CLOMR(s) and / or MOA(s).
- The Design-Build Team shall ensure that construction and / or removal of all structures in FEMA regulated floodplains adheres to the approved CLOMR(s) and / or MOA(s). Within three months of completion of work in a FEMA regulated floodplain, the Design-Build Team shall provide As-Built Plans of the site, and a completed As-Built Certification Review Form that verifies all construction adheres to the approved CLOMR(s) and / or MOA(s). The Design-Build Team shall prepare a new FEMA model and / or package and be responsible for all associated costs resulting from any construction variation from the approved CLOMR(s) and / or MOA(s).
- The Department will allow no direct contact between the Design-Build Team and the NCFMP representatives. No contact between the Design-Build Team, the NCFMP and / or personnel under contract with NCFMP shall be allowed by phone, e-mail, or in person, without Department representatives present. A representative from the Design-Build Unit shall be included on all correspondence.
- Raised median island cuts will not be allowed.
- At a minimum, the Design-Build Team shall install traffic bearing grated drop inlets with steel frames and flat steel grates at the following locations:
 - Within a temporary travel lane
 - Within four feet of a temporary and / or permanent travel lane

General

- The Design-Build Team's design shall be in accordance with criteria provided in the North Carolina Division of Highways "Guidelines for Drainage Studies and Hydraulics Design - 1999", the addendum "Handbook of Design for Highway Drainage Studies - 1973", North Carolina Department of Transportation *Best Management Practices for Construction and Maintenance Activities* – 2003, NCDOT Stormwater Best Management Practices Toolbox, NCDOT Post-Construction Stormwater Program and the North Carolina Division of Highways Hydraulics Unit website noted below:

<https://connect.ncdot.gov/resources/hydro/pages/default.aspx>

GEOTECHNICAL ENGINEERING SCOPE OF WORK (7-17-16)**I. GENERAL**

All geotechnical data, tests, computations and supporting subsurface investigations and documentation submitted by the Design-Build Team shall be provided in English Units.

Obtain the services of a firm prequalified for geotechnical work by the NCDOT Geotechnical Engineering Unit at:

<https://partner.ncdot.gov/VendorDirectory/default.html>

The prequalified geotechnical firm shall prepare foundation design recommendation reports for use in designing structure foundations, roadway foundations, retaining walls, sound barrier foundations, overhead sign structure and luminary foundations, and temporary structures.

The Engineer of Record who prepares the foundation design recommendation reports shall be a Professional Engineer registered in the State of North Carolina who has completed a minimum of three geotechnical design projects of scope and complexity similar to that anticipated for this project using the load and resistance factor design (LRFD) method and in accordance with the latest edition of the AASHTO *LRFD Bridge Design Specification*.

The prequalified geotechnical firm shall also determine if additional subsurface information, other than that required and noted elsewhere in this RFP, is required based upon the subsurface information provided by the NCDOT and the final roadway and structure designs. If a determination is made that additional subsurface information is required; the Design-Build Team shall use a prequalified geotechnical firm to perform all additional subsurface investigation and laboratory testing in accordance with the current NCDOT Geotechnical Engineering Unit *Guidelines and Procedures Manual for Subsurface Investigations*. Submit additional information collected by the Design-Build Team to the Geotechnical Engineering Unit, via the Design-Build Unit, for review and acceptance. The Design-Build Team shall provide the final Subsurface Investigation report in electronic and hardcopy format to the NCDOT for its records.

A minimum of 2 standard penetration test (SPT) / rock core borings shall be required per bent for all bent lengths of 50 feet or less. Additional SPT / rock core borings shall be required across the roadway typical section for each bent more than 50 feet long and the borings shall be spaced no greater than 50 feet apart. All borings for pile-supported bents shall be located within 25 feet of the centerline of each bent location to be counted for these minimum requirements. All borings for bents with spread footing or drilled pier foundations shall be performed at opposite ends of each bent, or no greater than 50-foot spacing along the bent line as required by bent length noted above, to be counted for these minimum requirements. For structure sites with multiple bridges, borings may be performed between bridges along the bent projection provided the distance between any two borings does not exceed 50 feet. The Design-Build Team shall extend all borings to

a depth of 15 feet or four foundation element diameters, whichever is greater, below the foundation element to show a complete subsurface profile. The Design-Build Team shall be responsible for obtaining the borings noted above for all bents where subsurface information is not sufficient or is warranted by variability in the geology unless the prequalified geotechnical firm submits documented justification that the subsurface investigation provided by the NCDOT is adequate for design purposes and the justification is acceptable to the Department. Any deviations to the requirements noted above shall require acceptance from the NCDOT Geotechnical Engineering Unit prior to the foundation design submittal.

The maximum spacing between borings for retaining walls and sound barrier walls shall be 100 feet, with a minimum of two borings; one at each end of the wall. Drill borings for retaining walls a minimum depth below the bottom of the wall equal to twice the maximum height of the wall. Boring depths for sound barrier walls shall be to a minimum depth below the bottom of the wall equal to the maximum height of the wall or to SPT refusal.

The Design-Build Team is permitted to design bridges on this project using software that accounts for the structural effects of soil / pier interaction.

II. DESCRIPTION OF WORK

Unless otherwise noted herein, the Design-Build Team shall design foundations (except for sign foundations), embankments, slopes, retaining walls, and sound barrier walls in accordance with the current edition of the *AASHTO LRFD Bridge Design Specifications*, *NCDOT LRFD Driven Pile Foundation Design Policy*, all applicable NCDOT Geotechnical Engineering Unit Standard Provisions, *NCDOT Structures Management Unit Manual* and *NCDOT Roadway Design Manual*. The *NCDOT LRFD Driven Pile Foundation Design Policy* is located on the NCDOT Geotechnical Engineering Unit's website at:

<https://connect.ncdot.gov/resources/Geological/Pages/default.aspx>

For *Geotechnical Guidelines For Design-Build Projects*, the Design-Build Team shall adhere to the guidelines located at the following website:

<https://connect.ncdot.gov/letting/Pages/Design-Build-Resources.aspx>

A. Structure Foundations

Key in spread footings of structures crossing streams a minimum of full depth below the 100-year design scour elevation and provide scour protection in accordance with scour protection detail in the *NCDOT Structures Management Unit Manual*.

Permanent steel casings shall be required for drilled piers that are constructed in six inches or more of water. Permanent steel casings shall be required for drilled piers constructed on sloped stream banks subject to degradation from flooding.

When the weathered rock or rock elevation is below the 100-year hydraulic scour elevation, the 100-year and 500-year design scour elevations are equal to the 100-year and 500-year hydraulic scour elevations from the structure survey report developed by the Design-Build Team and accepted by the NCDOT Hydraulics Unit. When the weathered rock or rock elevation is above the 100-year hydraulic scour elevation, the 100-year design scour elevation may be considered equal to the top of the weathered rock or rock elevation, whichever is higher, and the 500-year design scour elevation may be set two feet below the 100-year design scour elevation.

End bent fill slopes up to 35 feet in height (defined as the difference between grade point elevation and finished grade at toe of slope) shall be 1.5:1 (H:V) or flatter. End bent fill slopes with heights greater than 35 feet shall be 2:1 or flatter. All end bent cut slopes shall be 2:1 or flatter. For 1.5:1 fill slopes, extend end bent slope protection from the toe of slope to berm and to 1.75:1 (H:V) slope or to the limits of the superstructure. For end bent cut slopes and for 2:1 or flatter end bent fill slopes, extend end bent slope protection from the toe of slope to berm and to the limits of the superstructure.

Analyze drilled pier and pile bent foundations using either LPile or FB-Pier. Design drilled piers and vertical piles with a sufficient embedment in soil and / or rock to achieve “fixity”.

For box culverts, the Design Build Team shall submit details for undercut of unsuitable material or recommendations for use of more than one foot of conditioning material to the NCDOT Geotechnical Engineering Unit, via the Design-Build Unit, for review and acceptance.

Retaining walls or taller headwalls / endwalls shall not be used to reduce the length of proposed culverts and / or the length of culvert extensions.

Add steel pile points to all piles with an estimated embedded length of 20' or less.

B. Roadway Foundations

Unless noted otherwise herein, all unreinforced proposed fill slopes, except bridge end bent slopes (Reference Section A – Structure Foundations), shall be 2:1 (H:V) or flatter. Unless the slopes are designed with adequate reinforcement to provide the required stability, all proposed soil cut slopes shall be 2:1 (H:V) or flatter. Except as allowed below, rock cuts shall be 1:1 (H:V) or flatter. Rock cuts steeper than 1:1 (H:V) and reinforced soil slopes shall only be used if detailed design calculations and a slope stability analysis are submitted to the NCDOT Geotechnical Engineering Unit, via the Design-Build Unit, for review and acceptance prior to construction.

Design and construct bridge approach embankments such that no more than ½-inch of settlement shall occur after the waiting period or monitoring ends or

embankment fill is constructed to subgrade elevation. Soil improvement techniques to mitigate long term settlement problems or to transfer the embankment load to a deeper bearing stratum are allowed. Soil improvement techniques shall follow the current industry standard practices and the guidelines of *Ground Improvement Methods FHWA publication NHI-04-001* or *Geosynthetic Design and Construction Guidelines FHWA-HI-95-038*.

Embankment settlement monitoring shall be required when a waiting period of more than one month is recommended in the foundation design recommendation reports developed by the Design-Build Team. When embankment monitoring is required, construct the embankment and approach fill to the proposed roadway grade prior to monitoring. In the absence of embankment settlement monitoring, monitor approach fill settlement after the construction of the approach fill and prior to construction of the approach slab when the approach fill height exceeds 25% of total fill height. Approach fill height shall be defined as the difference between proposed grade and bottom of cap elevations. Use an appropriate method to monitor settlement across the length of the embankment (from toe to toe) such as settlement gauges, surveyed stakes on finished subgrade or other methods but submit documentation describing the method and procedures to the NCDOT Geotechnical Engineering Unit, via the Design-Build Unit, for review and acceptance prior to construction of the embankment.

The Design-Build Team shall determine the effect of settlement on existing adjacent roadways, buildings and / or other property resulting from the construction of roadway embankments, retaining walls, and / or temporary shoring. If deemed detrimental, in the Department's sole discretion, the Design-Build Team shall mitigate the effects of the settlement. The Design-Build Team shall be responsible for obtaining access, including but not limited to any required agreements, for performing mitigation work.

Mitigate all unsuitable soils to the extent that is required to improve the stability of the proposed embankment or subgrade. Use any suitable material to backfill undercut areas except when employing shallow undercut in accordance with Section 505 of the January 2012 NCDOT *Standard Specifications for Roads and Structures* which requires the use of Select Material, Class IV. For undercut backfilling in water, use Select Material, Class III.

If the top half of a new embankment that is at least ten feet high and 200 feet long is constructed with material that has more than 50%, by weight, passing the No. 200 sieve, the Design-Build Team shall add a high strength geotextile to the pavement structure design in accordance with the *Geotextile for Pavement Stabilization* Project Special Provision found elsewhere in this RFP. The aforementioned "top half" and ten-foot height shall be measured below the pavement structure and vertically from the toe of the embankment to the top of the outer edge of pavement, respectively.

C. Permanent Retaining Wall Structures

Retaining walls or abutment walls will not be allowed at any location where more than five feet of scour is calculated at the base of the wall.

For design and construction of mechanically stabilized earth (MSE) retaining walls, refer to the NCDOT *Policy for Mechanically Stabilized Earth Retaining Walls* which can be found at the NCDOT Geotechnical Engineering Unit's website at:

<https://connect.ncdot.gov/resources/Geological/Pages/Products.aspx>

For the design and construction of gabion walls, reference the *Gabions* Project Special Provision found elsewhere in this RFP.

With the exception of gravity walls, design and construct permanent retaining walls in accordance with the applicable NCDOT Geotechnical Engineering Unit Project Special Provisions, which can be provided upon request by the Design-Build Team. Geotechnical Provisions and Notes can be found at the NCDOT Geotechnical Engineering Unit's website at:

https://connect.ncdot.gov/resources/Geological/Pages/Geotech_Provisions_Notes.aspx

The Design-Build Team shall design and construct all retaining walls such that they do not require modifications to accommodate construction of the future MUP phases, including but not limited to the future MUP bridge over the Cherry Street Ramp D.

With the exception of gravity walls, submit a wall layout and design for each retaining wall. At a minimum, the wall layout submittal shall include the following:

- Wall envelope with top of wall, bottom of wall, existing ground, finished grade elevations, and MUP elevations, if applicable, at incremental stations
- Wall alignment with stations and offsets
- Typical sections showing top and bottom of wall, drainage, embedment, slopes, barriers, fences, etc.
- Calculations for bearing capacity, global stability and settlement
- Details of conflicts with utilities and drainage structures
- Roadway plan sheets showing the wall (half size)
- Roadway cross sections showing the wall (half size)
- Traffic Control Plans showing the wall (half size)

Gravity walls shall be designed and constructed in accordance with the NCDOT Structure Standard Drawings and the January 2012 NCDOT *Standard*

Specifications for Roads and Structures. Gravity walls shall be identified in the roadway foundation design recommendation report developed by the Design-Build Team. Cast-in-place cantilever walls shall be designed and constructed in accordance with the January 2012 NCDOT *Standard Specifications for Roads and Structures*. Conceptual wall layouts and wall designs shall be submitted to NCDOT for review and acceptance.

Locate retaining walls at toes of slopes unless restricted by right of way limits. The Design-Build Team shall submit global stability calculations for slopes at retaining walls and obtain acceptance from the NCDOT prior to construction. Any slopes behind walls shall be 2:1 (H:V) or flatter.

Drainage over the top of retaining walls shall not be allowed. Sags in the top of walls will be permissible. Direct runoff above and below walls away from walls, if possible, or collect runoff at the walls and transmit it away. Appropriate drainage, in the Department's sole discretion, shall be provided at all retaining walls, including but not limited to areas of sags in the top of walls. (Reference the Hydraulics Scope of Work found elsewhere in this RFP) Curb and gutter or cast-in-place single faced barrier with paving up to the wall shall be required when runoff can not be directed away from the back or front of the wall. A paved concrete ditch with a minimum depth of twelve inches shall be required at the top of walls when slopes steeper than 6:1 (H:V) intersect the back of walls.

Precast or cast-in-place coping shall be required for all walls with the exception of when a barrier is integrated into the top of the wall. Extend coping to the height required by the Aesthetics Scope of Work found elsewhere in this RFP above where the finished or existing grade intersects the back of the wall. A fence shall be required on top of the coping or barrier or immediately behind the wall, if there is no slope behind the wall. (Reference the Aesthetics Scope of Work found elsewhere in this RFP for the precast or cast-in-place coping dimensions)

Deep foundations shall be used for end bents when abutment retaining walls are employed. When using abutment retaining walls, design and construct the end bent and the wall independent of each other. When using abutment retaining walls, the end bent foundation shall be designed and constructed with one of the following deep foundations: (1) a single row of plumb piles with brace piles battered toward the wall, (2) a single row of plumb piles with MSE reinforcement connected to the back of the cap, (3) integral abutment with a single row of plumb piles and no reinforcement connected to the back of the cap in accordance with FHWA GEC 11 pages 6-8 through 6-10, or (4) drilled piers. Regardless of foundation type, the abutment wall shall be designed to satisfactorily resist the additional pressure resulting from lateral foundation displacement. Wing walls independent of abutment retaining walls shall be required unless accepted otherwise by the NCDOT. All foundations for end bents with abutment retaining walls shall extend a minimum of 10 feet below the retaining wall foundation or leveling pad. For drilled-in piles behind such retaining walls, the penetration can be reduced to 5 feet below the bottom of the wall provided the Design-Build

Team analyzes and determines that the vertical piles are “fixed” in natural ground such that the decrease in pile embedment shall not significantly increase the top deflection under lateral loading. The calculations and supporting documentation for this analysis shall be submitted to the NCDOT for review and acceptance prior to construction.

D. Temporary Structures

Design temporary retaining structures, which include earth retaining structures and cofferdams, in accordance with current allowable stress design AASHTO *Guide Design Specifications for Bridge Temporary Works*, the *Temporary Shoring* Standard Special Provision found elsewhere in this RFP and the applicable NCDOT Project Special Provisions available upon request by the Design-Build Team. The only submittal required to use the standard sheeting design is the “Standard Shoring Selection Form”.

Traffic control barrier on top of walls shall be in accordance with the NCDOT Work Zone Traffic Control Unit details available upon request by the Design-Build Team. If anchored barrier is required, then anchor the barrier in accordance with January 2012 NCDOT Roadway Standard Drawing No. 1170.01.

III. CONSTRUCTION REQUIREMENTS

All construction and materials shall be in accordance with the January 2012 NCDOT *Standard Specifications for Roads and Structures* and current NCDOT Project Special Provisions, unless stated otherwise elsewhere in this Scope of Work. The Design-Build Team shall investigate, propose and incorporate remedial measures for any construction problems related to the following:

- Foundations
- Retaining Walls
- Sound Barrier Walls
- Subgrades
- Settlement
- Slopes
- Construction Vibrations

The NCDOT Geotechnical Engineering Unit shall review and accept these proposals prior to incorporation.

The Design-Build Team shall be responsible for any damage and / or claim caused by construction, including but not limited to damage caused by vibration (see Article 107-14 of the January 2012 NCDOT *Standard Specifications for Roads and Structures*). The Design-Build Team shall perform pre- and post-construction condition inventories and construction vibration monitoring of all subsurface utilities and residential and commercial structures located at a Scaled Distance of less than or equal to 55 feet-pounds^{-0.5} for blasting operations. The Design-Build Team shall perform pre- and

post-construction condition inventories and construction vibration monitoring of all subsurface utilities and residential and commercial structures within 200 feet of pile driving activities and other non-blasting construction activities that have the potential to induce peak particle velocities (PPV) exceeding 0.4 inch per second. The Design-Build Team shall be responsible for deciding what additional, if any, pre- and post-construction monitoring and inventories need to be conducted to satisfy their other liability concerns. The PPV at any utility or structure shall not exceed the "Alternative Blasting Level Criteria" from Appendix B of the *U.S. Bureau of Mines Report of Investigations 8507*. The maximum air-overpressure at any structure resulting from blasting shall not exceed 133 dB (linear). The vibration monitoring for subsurface utilities may be performed on the ground surface. Any monitoring and inventory work shall be performed by a prequalified private engineering firm experienced in the effects of construction on existing structures. Upon project award, the Design-Build Team shall provide a list of their Vibration Monitoring Consultant(s) and Rock Blasting Subcontractor(s) for review. The Design-Build team shall provide pre-construction inventories to the NCDOT Geotechnical Engineering Unit for review and acceptance at least five (5) business days prior to beginning construction within proximity of the subject structures or utilities. The Design-Build team shall provide vibration monitoring records to the Resident Engineer within 24 hours when the PPV exceeds 0.5 inch per second. Otherwise, provide vibration monitoring records to the Resident Engineer weekly.

The prequalified geotechnical firm that prepared the foundation designs shall review the settlement monitoring data a minimum of once a month and issue a letter prior to releasing the embankment or approach fill from monitoring. Monitoring shall not be ended until less than 0.10 inch of settlement is measured over a period of four weeks. Submit the settlement monitoring data to the Design-Build Unit prior to issuing the release letter.

The prequalified geotechnical firm that prepared the foundation designs shall review and approve all pile driving hammers and drilled pier construction sequences. After the prequalified geotechnical firm has approved these submittals, the Design-Build Team shall submit to the NCDOT for review and acceptance prior to beginning construction.

The prequalified geotechnical firm that prepared the original foundation designs shall perform any changes to the foundation designs. All changes shall be based upon additional information, subsurface investigation and / or testing. Send copies of revised designs, including additional subsurface information, calculations and any other supporting documentation, sealed by a professional engineer registered in the State of North Carolina, to the NCDOT for review and acceptance.

Prior to Pile Driving Analyzer (PDA) testing, perform hammer approvals with GRLWEAP Version 2002 or later and in accordance with the NCDOT LRFD Driven Pile Foundation Design Policy.

Install piles in accordance with Section 450 of the January 2012 NCDOT *Standard Specifications for Roads and Structures* and the *Piles Project Special Provision* located on the NCDOT Geotechnical Engineering Unit's website. Prequalification of contractors

is not required for pile excavation or drilled-in pile holes that are 30 inches in diameter or less. Class A concrete or grout shall be required to backfill holes for drilled-in piles.

Perform PDA testing, provide PDA reports, and develop pile driving inspection charts or tables in accordance with Section 450 of the January 2012 NCDOT *Standard Specifications for Roads and Structures* and the *Piles Project Special*, except that pile driving inspection charts or tables may be provided by the PDA consultant or the foundation design engineering firm. For each permanent bridge that includes driven pile bents or driven pile footings, perform a minimum of one (1) PDA test (dual bridges are counted as one structure) for each pile size, pile type (material or shape) and pile driving hammer combination. Additional PDA tests may be required based upon the AASHTO *LFRD Bridge Design Specifications*. If the bridge length with driven pile foundations is longer than 400 feet, perform an additional PDA test at every 400-foot interval. Provide additional PDA testing for any revisions to pile type, size or hammer previously approved. The locations of specific piles to be tested must be accepted by the NCDOT prior to any PDA test.

For drilled piers, the following additional requirements shall apply:

1. Use current NCDOT inspection forms for drilled piers available on the NCDOT Geotechnical Engineering Unit's webpage. Construct and inspect drilled piers in accordance with Section 411 of the January 2012 NCDOT *Standard Specifications for Roads and Structures* and the *Drilled Piers Project Special Provision* located on the NCDOT Geotechnical Engineering Unit's website.
2. The Department will inspect drilled piers using the Shaft Inspection Device (SID) for any pours using the wet method of concrete placement and for any drilled pier excavations that cannot be visually inspected or have remained open longer than 24 hours that cannot be dewatered due to unstable soil or rock.
3. The Design-Build Team shall notify Sam Lawhorn by e-mail (sclawhorn@ncdot.gov) a minimum of five days prior to required SID testing, followed by a confirmation two days prior to required SID testing. The Design-Build Team shall notify Sam Lawhorn of all SID testing cancellations as soon as possible at the e-mail address noted above and at (919) 329-4200.
4. Install Crosshole Sonic Logging (CSL) tubes in all drilled piers. CSL test a minimum of 25% of drilled piers at each bridge or one per bent, whichever is greater. If a CSL test identifies any defect in the drilled pier, the Department has the right to request additional CSL testing as needed. The Department will determine which piers will be CSL tested. Submit CSL test information and results to the Geotechnical Engineering Unit, via the Design-Build Unit, for review and acceptance.
5. Drilled pier tip elevations shall not be changed during construction unless the prequalified geotechnical firm that prepared the bridge foundation design redesigns the drilled pier from either an SPT / rock core boring, performed in accordance with ASTM standards at the subject pier location, or observations of the drilled pier excavation. If a drilled pier is designed based on a boring, do not

drill a boring inside an open drilled pier excavation. Locate the boring within three pier diameters of the center of the subject pier and drill to a depth of two pier diameters below the revised tip elevation. If a drilled pier is redesigned based upon observations of the drilled pier excavation, the geotechnical engineer of record shall be present during the excavation to determine the actual subsurface conditions.

Conduct proofrolling in accordance with Section 260 of the January 2012 NCDOT *Standard Specifications for Roads and Structures*.

Send copies of any inspection forms related to foundations, settlement or retaining walls to the NCDOT for review.

GEOENVIRONMENTAL SCOPE OF WORK (11-16-15)**I. DEFINITION**

For the purpose of this scope of work, contamination / contaminants are defined as any substance that when discharged in any quantity may present an imminent and substantial danger to the public health or welfare. Petroleum is defined as any petroleum-derived product of any kind and in any form, including but not limited to, crude oil, diesel fuel, fuel oil, gasoline, lubrication oil, oil refuse, oil mixed with other waste, oil sludge, petroleum related products or by-products, and all other liquid hydrocarbons, regardless of specific gravity, whether occurring singly or in combination with other substances.

II. DESCRIPTION OF WORK

Sites of concern were identified in the November 26, 2014 *Revised Hazardous Materials Report*. After submittal of the Right of Way / 60% Roadway Plans developed by the Design-Build Team, the Design-Build Team shall hold a right of way consultation with the Department's GeoEnvironmental staff, Design-Build Unit, and key Design-Build Team members.

Sites of concern within the proposed right of way that are noted in the aforementioned *Hazardous Materials Report*, and any other sites identified during the right of way consultation with the Design-Build Team, will be investigated by the Department. The Department shall require 90 days from the date of the aforementioned consultation to investigate and provide Right of Way Recommendations. The Right of Way Recommendations shall be completed prior to the Design-Build Team making offers to purchase the right of way on these sites of concern.

The Design-Build Team shall notify the Design-Build Unit in writing of any underground storage tanks (USTs) containing fuel, chemicals, or heating oil tanks discovered during property appraisals. The Department will require 90 days from the date of written notification to investigate and provide Right of Way Recommendations. The Right of Way Recommendations shall be completed prior to the Design-Build Team making offers to purchase the right of way on sites containing USTs.

The Design-Build Team shall adhere to all Right of Way Unit procedures regarding the acquisition of contaminated property and all Right of Way Recommendations provided by the Department. (Reference the Right of Way Scope of Work found elsewhere in this RFP) After the parcels with identified contamination and / or underground storage tanks (USTs) are acquired and cleared of all above ground structures, the Department will 1) remove from the right of way USTs identified in the aforementioned *Hazardous Materials Report* and discovered during the property appraisals and 2) remove all associated contaminated soil anticipated to require excavation to complete the project. The Department will remove the aforementioned USTs and contaminated soil within 60 days of written notification that the above-ground structures have been removed. All contaminated soil not required for removal to complete the project shall be left in place and undisturbed.

III. INFORMATION PROVIDED BY NCDOT:

- November 26, 2014 *Revised Hazardous Materials Report*
- GeoEnvironmental MicroStation Reference File *U-2827B_Geo_env.dgn*

IV. UNKNOWN CONTAMINATED SITES:

The Design-Build Team shall immediately notify the Department if the Design-Build Team's operations encounter or expose any abnormal condition that may indicate the presence of a hazardous, contaminated, and / or toxic material not previously identified. If the Engineer elects to have the Design-Build Team remove and dispose of contaminated material, the removal and disposal of this material shall be performed as extra work in accordance with Article 107-25 of the January 2012 NCDOT *Standard Specifications for Roads and Structures*.

TRANSPORTATION MANAGEMENT SCOPE OF WORK (7-18-16)**I. Laws, Standards and Specifications**

The Design-Build Team shall design the Transportation Management Plans (TMP) in accordance with the requirements of this RFP and the version of the standards listed below that are current at the time of the Technical Proposal submittal.

- January 2012 NCDOT Standard Specifications for Roads and Structures
- January 2012 NCDOT Roadway Standard Drawings
- NC Supplement to the MUTCD
- Manual on Uniform Traffic Control Devices (MUTCD)
- Roadway Design Manual
- Americans with Disabilities Act of 1990 (ADA)
- A Policy on Geometric Design of Highways and Streets
- Roadside Design Guide
- Standard Highway Signs
- Guidelines for Preparation of Traffic Control and Pavement Marking Plans for Design-Build Projects
- Design-Build Submittal Guidelines
- Rule on Work Zone Safety and Mobility 23 CFR 630 Subpart J

References

The Design-Build Team shall use the references provided on the site below, as supplementary guidelines and requirements for the design and implementation of the Transportation Management Plans (TMP).

<https://connect.ncdot.gov/projects/WZTC/>

Transportation Management Plans

The Design-Build Team shall prepare Transportation Management Plans (TMP) that include Temporary Traffic Control Plans (TTCP) and Traffic Operations Plans (TOP). The Traffic Operations Plans shall include demand management strategies, corridor network management strategies, work zone safety management strategies and traffic incident management and enforcement strategies. In accordance with the Public Information Scope of Work found elsewhere in this RFP, the Design-Build Team shall assist the Department in updating the US 421 / Business 40 Improvement Project Strategic Marketing and Communications Plan.

The Design-Build Team shall produce TMP for each phase of work that impacts road users. The TMP shall include details of all planned detours, traffic control devices, striping, and signage applicable to each phase of work. The information on the TMP shall be of sufficient detail to allow verification of design criteria and safety requirements, including but not limited to typical sections, alignment, striping layout, drop off conditions, and temporary drainage. The Design-Build Team shall develop TMP that include procedures to

communicate TMP information to the public about road and travel conditions within the work zone and affected roadway network.

A Transportation Management Phasing Concept (TMPC) shall be prepared by the Design-Build Team to present the Design-Build Team's approach to all areas covered under the TMP, including but not limited to hauling of materials to, from, and within the project right of way (ROW). The Design-Build Team shall include the TMPC in the Technical Proposal. The Design-Build Team shall submit the TMPC for Department review and acceptance and shall address NCDOT comments on the TMPC prior to commencing production of the TMP for each phase of work or any construction. Any changes to the TMPC after acceptance by NCDOT shall require a submittal for review prior to any future phasing submittals.

The Design-Build Team shall select a Private Engineering Firm (PEF) that has experience developing TMP on comparable projects for the North Carolina Department of Transportation (NCDOT) and shall list these comparable projects in the Technical Proposal.

In the event any self-imposed liquidated damages are included in the Technical Proposal, an Intermediate Contract Time(s) shall be established and shall become part of the contract.

General Requirements

When lane and / or shoulder closures are not in effect, maintain the existing number of travel lanes on all roads. For existing travel lanes that are 11-foot wide or wider, maintain a minimum of 11-foot travel lanes at all times. For existing travel lanes that are narrower than 11 feet, maintain the existing travel lane widths at all times. Maintain four-foot wide inside and outside paved shoulders in each direction of US 421 / I-40 Business, unless temporary barrier is placed on the paved shoulder. Under structures only, maintain a minimum two-foot wide paved shoulder adjacent to US 421 / I-40 Business through lanes and a minimum one-foot wide paved shoulder adjacent to ramps. Unless permitted otherwise elsewhere in this RFP, maintain existing shoulder widths (paved and unpaved).

The Design-Build Team shall maintain positive median cross-over protection for the entire US 421 / I-40 Business project limits. The Design-Build Team shall indicate in the Technical Proposal the type of positive protection proposed and replacement / resetting requirements.

All traffic control devices, including bridge barrier rails, shall be placed / located a minimum two-foot offset (shy distance) from the edge of an open travel lane.

Placement of temporary barrier systems shall be shown on the Transportation Management Phasing Concept. Temporary barrier systems shall be designed in accordance with the following requirements:

- Determine the need for temporary barrier in accordance with the FHWA *Rule on Temporary Traffic Control Devices (23 CFR 630 Subpart K)*. Reference the NCDOT Work Zone Traffic Control website noted below for examples and Guidelines on the Use of Positive Protection in Work Zones.

<https://connect.ncdot.gov/projects/WZTC/Pages/Design-Resources.aspx>

- The Design-Build Team shall adhere to the AASHTO *Roadside Design Guide* in determining the length of need, flare rate, and clear zone. The Design-Build Team shall adhere to the possible deflection of the proposed temporary barrier system in accordance with NCHRP-350 deflections from crash testing. Providing less than the minimum deflection distance shall require the use of anchored temporary barrier systems in accordance with the January 2012 NCDOT *Standard Specifications for Roads and Structures*.
- The Design-Build Team shall not place temporary barrier systems utilized for traffic control on unpaved surfaces.

The design speed for temporary alignments of Interstate, US, and NC routes shall not be lower than the current posted speed limit. The minimum allowable design speed for temporary alignments on secondary roads shall be the higher of 10 mph below the posted speed limit or 35 mph.

The January 2012 NCDOT *Roadway Standard Drawing* No. 1101.11 shall be used to calculate the length of temporary merges for lane closures and temporary traffic shifts. For temporary traffic patterns that will remain in place for a period longer than three days, including but not limited to traffic shifts, merges, and temporary alignments, breaks in the superelevation and / or breaks in a normal crown section will not be allowed within the shifting taper. Excluding the aforementioned temporary traffic patterns, breaks in the superelevation and / or breaks in a normal crown section shall only occur on a lane line or lane midpoint, and shall not exceed 0.04.

Temporary traffic shifts requiring vertical grades shall be considered a temporary alignment. All temporary alignments shall adhere to the NCDOT *Roadway Design Manual*, 2011 AASHTO, *A Policy on Geometric Design of Highways and Streets* and the most current *Highway Capacity Manual*.

Maintain access to all residences, schools, bus stops, mass transit facilities (park and ride lots), emergency services and businesses at all times. Prior to incorporation, obtain written approval from the Engineer on method to maintain access.

At all times, maintain sidewalk access or provide temporary sidewalk (constructed of concrete, asphalt or other suitable material, as approved by the Engineer) at all locations where the open pedestrian travelway has been closed and / or removed by the Design-Build Team's design or construction operations.

Through traffic traveling in the same direction shall not be split. (i.e. separation by any type of barrier, bridge piers, existing or proposed median, etc.).

Prior to incorporation, obtain written approval from the Engineer for all road closures.

Prior to incorporation, all offsite detour routes shall receive Department written approval and shall adhere to the following requirements:

- The Design-Build Team shall not concurrently close -Y- Lines unless the Design-Build Team can prove, in the Department's sole discretion, that the traffic on the approved detour route(s) will operate at an acceptable Level of Service (LOS).

**** NOTE **** Deleted bullet regarding overlapping detours.

- The Design-Build Team shall not concurrently close the following sets of one-way road pairs:
 - a) Marshall Street and Cherry Street
 - b) Liberty Street and Main Street
- Except as allowed in ICT #5, NC 150 (Peters Creek Parkway) shall not be closed.
- Except as allowed in ICT #1 and ICT #5 US 421 / I-40 Business shall not be closed.
- The Design-Build Team shall not construct proposed NC 150 (Peters Creek Parkway) Ramp D and Loop D through Gregory Street and / or Apple Street until the proposed connection of Gregory Street and Apple Street is complete and open to traffic.
- Excluding the NC 150 (Peters Creek Parkway) ramps and loops, the US 421 / I-40 Business ramps and loops shall only be closed during the US 421 / I-40 Business two-year full closure, and as allowed in ICT #5, ICT #15, and ICT #17 – ICT #20.
- The NC 150 (Peters Creek Parkway) Ramp A and Ramp D shall only be closed during the US 421 / I-40 Business two-year full closure, and as allowed in ICT #5, ICT #9 and ICT #12.
- The Design-Build Team shall not close the NC 150 (Peters Creek Parkway) Loop A or Loop D during the US 421 / I-40 Business two-year full closure. The Design-Build Team shall not close the NC 150 (Peters Creek Parkway) Loop A or Loop D except as allowed in ICT #5, ICT #10 and ICT #13.
- The Design-Build Team shall adhere to the permanent ramp closure requirements noted below:
 - The Design-Build Team shall not close the existing NC 150 (Peters Creek Parkway) Ramp C until 1) the proposed NC 150 (Peters Creek Parkway) Loop D is open to traffic and 2) the signal at the NC 150 (Peters Creek Parkway) Loop D terminal is operational.
 - The Design-Build Team shall not close the existing ramps / loops at Broad Street, High Street, Spruce Street, Marshall Street, Cherry Street, Liberty

Street, or Main Street until the two-year full closure of US 421 / I-40 Business is in effect.

- The Design-Build Team shall be responsible for investigating all detour routes including but not limited to, analyzing traffic capacity, investigating impacts to emergency services and schools, analyzing design characteristics to ensure the design supports the traffic volumes (existing traffic volumes plus detoured traffic volumes), and investigating pavement structural adequacy including any bridge postings on the detour route. The Design-Build Team shall determine and recommend improvements required to accommodate detoured traffic. As directed by the Engineer, the Design-Build Team shall design and construct the required improvements prior to utilizing detour routes. Excluding the temporary improvements required in the Roadway Scope of Work found elsewhere in this RFP, the design and construction of improvements required to accommodate detoured traffic will be paid for as extra work in accordance with Subarticle 104-8(A) of the January 2012 Standard Specifications for Roads and Structures.
- Between Broad Street and Marshall Street, the Design-Build Team shall not use First Street or Second Street as part of any detour route.

**** Note **** Relocated bullet regarding improvements required to accommodate detoured traffic.

- Offsite detours that have non-signalized at-grade railroad crossings shall not be allowed.
- Submit detour routes and all associated sign designs for review and acceptance prior to incorporation.
- All proposed road closures, detour routes, durations and justifications shall be incorporated into the Technical Proposal. (All proposed road closures, detour routes, durations and justifications incorporated into the Technical Proposal shall require Department approval.)
- Unless approved otherwise by the controlling government entity, in writing, use only state maintained roads for offsite detour routes.

Except as allowed otherwise elsewhere in this RFP, the Design-Build Team shall provide safe access for wide-loads and oversized permitted vehicles through the work zone on all roadways within the project limits. Safe access shall entail, but is not limited to, a sufficient pavement structure (Reference the Pavement Management Scope of Work found elsewhere in this RFP), maintaining the existing vertical clearance of overhead structures, providing the required vertical clearance on proposed overhead structures and providing the minimum horizontal clear widths as follows:

Roadway	Minimum Clear Width
US 421 / I-40 Business, NC 150 (Peters Creek Parkway), and ramps and loops	20 feet
All other roadways	18 feet

The Design-Build Team shall coordinate with the Division Operations Engineer and Division Traffic Engineer to manage traffic operations within the work zone and other roadways within the network that may be affected by the work zone activities. Coordination shall include, but not be limited to, providing notification of planned lane or road closures, traffic detours, public information, traffic management, access management, incidents, etc.

The Design-Build Team shall utilize Changeable Message Signs (CMS) as follows:

- For traffic control purposes during construction, the Design-Build Team shall provide and operate a minimum of one CMS per direction on US 421 / I-40 Business that provides general information about the construction activities within the project limits. This CMS shall be in addition to any other CMSs required by the January 2012 NCDOT Roadway Standard Drawings.
- In addition to the requirement above, and expressly for the purpose of managing incidents on US 421 / I-40 Business during construction, the Design-Build Team shall provide and operate a minimum of two additional (2) CMSs per direction to display alternate route information ahead of the detour points on US 421 / I-40 Business. The positioning of these incident management CMSs shall be as directed by the Engineer. These CMSs shall be in addition to any other devices provided by the Department and operated by the NCDOT Statewide Operations Center (STOC) and / or NCDOT Triad Regional Transportation Management Center (TRTMC). The Design-Build Team shall coordinate with the STOC and the TRTMC when alternate route information needs to be displayed.
 - These CMSs shall have the ability to 1) be controlled remotely by the STOC and the TRTMC and 2) be operated in the field by the Design-Build Team.
 - Alternate routes, CMS locations and CMS messages shall be reviewed and approved by the Department prior to incorporation.
- The Design-Build Team shall show approximate CMS locations, along with the respective messages that have been coordinated with the STOC and the TRTMC, in the Transportation Management Plans.

On all roads, the Design-Build Team shall make all modifications to existing pavement markings, markers and / or signing located outside the project limits that are necessitated by the Transportation Management Plans. Additionally, the Design-Build Team shall readjust the markings, markers, and / or signing located outside the project limits to the existing / proposed pattern when the temporary changes are no longer needed.

The Design-Build Team shall not place traffic on lanes containing rumble strips.

The Design-Build Team shall take steps to minimize disruptions to existing roadway facilities during construction and shall demonstrate how the traffic control phasing, minimizes inconvenience to motorists on all roads.

Lane Closure Notice (LCN)

The Design-Build Team shall issue a Lane Closure Notice (LCN) to NCDOT and affected government entities a minimum of twenty-one (21) calendar days prior to the publication of any notices or placement of any traffic control devices associated with lane closures, detour routing or other change in traffic control requiring lane closures. The Design-Build Team will be allowed to issue a single LCN for multiple / consecutive lane closures that occur in the same location.

For a LCN utilizing a non-NCDOT controlled facility, the Design-Build Team shall secure concurrence, in writing, from the controlling government entity. A LCN shall contain the estimated date, time, duration and location of the proposed work. The Design-Build Team shall keep NCDOT informed of any and all changes or cancellations of proposed lane closures prior to the date of their implementation.

If an emergency condition should occur, a LCN shall be provided to NCDOT within two (2) days after the event. For non-NCDOT controlled facilities, the Design-Build Team shall immediately notify the controlling government entity.

Road Closure Notice (RCN)

Proposed road closures on any road shall be approved by the Engineer prior to incorporation in the Transportation Management Plans.

The Design-Build Team shall issue a Road Closure Notice (RCN) to NCDOT and affected government entities a minimum of twenty one (21) calendar days prior to the publication of any notices or placement of any traffic control devices associated with road closures, detour routing or other change in traffic control requiring road closures.

For a RCN utilizing a non-NCDOT controlled facility, Design-Build Team shall secure concurrence in writing from the controlling government entity. A RCN shall contain the estimated date, time, duration, and location of the proposed work. The Design-Build Team shall keep NCDOT and any other affected government entity informed of any and all changes or cancellations of proposed Road Closures prior to the date of their implementation.

If an emergency condition should occur, a RCN shall be provided to NCDOT within two (2) days after the event. For non-NCDOT controlled facilities, the Design-Build Team shall immediately notify the controlling government entity.

II. Project Operations Requirements

The following are Time Restrictions and notes that shall be included with the Transportation Management Plan General Notes, unless noted otherwise elsewhere in this RFP:

A. Time Restrictions

1. Intermediate Contract Times #2, #3, and #4 for Lane Narrowing, Lane Closure, Holiday and Special Event Restrictions.

Except as allowed otherwise, elsewhere in this RFP, the Design-Build Team shall maintain the existing traffic pattern and shall not close or narrow a lane of traffic during the times below.

Road Name	Day	Time Restrictions
I-40, US 52, and US 421 / I-40 Business and ramps and loops	Monday through Sunday	6:00 a.m. to 9:00 p.m.
NC 150 (Peters Creek Parkway) and Silas Creek Parkway	Monday through Sunday	6:00 a.m. to 9:00 p.m.
Academy Street, Broad Street, 6th Street, First Street, Northwest Boulevard,	Monday through Friday	6:00 a.m. to 9:00 a.m. and 4:00 p.m. to 7:00 p.m.
All other roads	Monday through Friday	6:00 a.m. to 9:00 a.m. and 4:00 p.m. to 7:00 p.m.

**** NOTE **** Deleted Broad Street time restrictions.

The Design-Build Team shall not install, reset and / or remove any traffic control device during the times listed above.

In addition, the Design-Build Team shall not close or narrow a lane of traffic on the aforementioned facilities, detain, and / or alter the traffic flow on or during holidays, holiday weekends, special events, or any other time when traffic is unusually heavy. At a minimum, these requirements / restrictions shall apply to the following schedules:

- (a) For New Year's between the hours of 6:00 a.m. December 31st and 9:00 p.m. January 2nd. If New Year's Day is on a Friday, Saturday, Sunday or Monday then from 9:00 p.m. the following Tuesday.
- (b) For Easter, between the hours of 6:00 a.m. Thursday and 9:00 p.m. Monday.
- (c) For Memorial Day, between the hours of 6:00 a.m. Friday and 9:00 p.m. Tuesday.
- (d) For Independence Day, between the hours of 6:00 a.m. July 3rd and 9:00 p.m. July 5th. If Independence Day is on a Friday, Saturday, Sunday or Monday, then between the hours of 6:00 a.m. the Thursday before Independence Day and 9:00 p.m. the Tuesday after Independence Day.
- (e) For Labor Day, between the hours of 6:00 a.m. Friday and 9:00 p.m. Tuesday.

- (f) For Thanksgiving Day, between the hours of 6:00 a.m. Tuesday and 9:00 p.m. Monday.
- (g) For Christmas, between the hours of 6:00 a.m. the Friday before the week of Christmas Day and 9:00 p.m. the following Tuesday after the week of Christmas Day.
- (h) For Wake Forest University football games occurring at Groves Stadium, between four (4) hours before the start and four (4) hours after the end of the games.
- (i) For the NCAA Tournament, occurring at Greensboro Coliseum Complex, between the hours of 6:00 a.m. the day before the start of the Tournament and 9:00 p.m. the day after the end of the Tournament.
- (j) For the Dixie Classic Fair in Winston-Salem between the hours of 6:00 a.m. the day before the start of the Fair and 9:00 p.m. the day after the end of the Fair.
- (k) For the ACC Tournament occurring at Greensboro Coliseum Complex, between the hours of 6:00 a.m. the day before the start of the Tournament and 9:00 p.m. the day after the end of the Tournament.
- (l) For The Furniture Markets, between the hours of 6:00 a.m. the Friday before the start of The Furniture Markets and 9:00 p.m. the Friday after the end of The Furniture Markets.
- (m) For car races, occurring at Bowman Gray Stadium, between four (4) hours before the start and four (4) hours after the end of the races.
- (n) For football games and other special events at Winston-Salem State University, between four (4) hours before the start and four (4) hours after the end of the event.
- (o) For the Air Show in Winston-Salem, between the hours of 6:00 a.m. the Friday before the start of the show and 9:00 p.m. the Monday after the end of the show.
- (p) For Dash Baseball games in Winston-Salem, between four (4) hours before the start of the game and four (4) hours after the end of a game.

Liquidated Damages for Intermediate Contract Time #2 for the above lane narrowing, lane closure, holiday and special event time restrictions for I-40, US 52, and US 421 / I-40 Business and ramps and loops are \$2,500.00 per 15-minute period or any portion thereof.

Liquidated Damages for Intermediate Contract Time #3 for the above lane narrowing, lane closure, holiday and special event time restrictions for NC 150 (Peters Creek Parkway), Academy Street, Broad Street, 6th Street, First Street, Northwest Boulevard, and Silas Creek Parkway are \$1,000.00 per hour or any portion thereof.

Liquidated Damages for Intermediate Contract Time #4 for the above lane narrowing, lane closure, holiday and special event time restrictions for all other roads are \$500.00 per hour or any portion thereof.

2. Intermediate Contract Time #5 for Road Closure Restrictions for Construction Operations

Unless allowed otherwise elsewhere in this RFP, at a minimum, the Design-Build Team shall maintain the existing traffic pattern and follow the road closure restrictions for all roadways listed below. When a road closure is used, the Design-Build Team shall reopen the travel lanes by the end of the road closure duration to allow the traffic queue to deplete before re-closing the roadway.

Unless allowed otherwise elsewhere in this RFP, the Design-Build Team shall 1) not close any direction of travel on the following roads or any ramps / loops during the times noted below; and 2) only close the following roads or any ramps / loops for the operations listed in this intermediate contract time restriction. Using a median crossover, exclusively for the operations listed below, shall be defined as a closure of a direction of travel.

A crossover providing one lane in each direction on US 421 / I-40 Business will be allowed for the purpose of bridge demolition, and girder, overhang, and falsework installation and / or removal during the times set forth below. The Design-Build Team shall monitor the traffic queue during operation of the crossover. Should the traffic queue extend to the advance warning signs, traffic shall be returned to the existing number of lanes in each direction until the traffic queue is depleted.

Road Name	Day	Time Restrictions
US 421 / I-40 Business, including all ramps and loops, and NC 150 (Peters Creek Parkway)	Monday through Sunday	6:00 a.m. until 12:00 a.m. (midnight)

For the operations noted below, the maximum road closure duration shall not exceed **thirty (30) minutes** without an approved offsite detour. The Contractor shall reopen the travel lanes to traffic until any resulting traffic queue is depleted. With an approved offsite detour, the roadways listed may be closed from 12:00 a.m. (Midnight) to 6:00 a.m. for the operations listed below.

- Bridge demolition
- Girder, overhang, and falsework installation and / or removal
- Installation of overhead sign assemblies and / or work on existing overhead sign assemblies over travel lanes

Proposed road closures for any road within the project limits shall be approved by the Engineer, in writing, prior to incorporation in the Transportation Management Plans.

Liquidated Damages for Intermediate Contract Time #5 for the above road closure time restrictions for US 421 / I-40 Business including all ramps and loops and NC 150 (Peters Creek Parkway) are \$5,000.00 per 15-minute period or any portion thereof.

**** NOTE **** Relocated ICT information on two-year full closure of US 421 / I-40 Business to *Intermediate Contract Time Number 1 and Liquidated Damages Project Special Provision* found elsewhere in this RFP.

3. Intermediate Contract Time #6 for Lane Narrowing, Lane Closure Restrictions during the Two-Year Full Closure of US 421 / I-40 Business (ICT #1).

US 421 / I-40 Business, from the western sound barrier wall construction limits to the NC 150 (Peters Creek Parkway) Loop A gore located at approximately Station 24+00 -L-, may be reduced to one lane of traffic eastbound and one lane of traffic westbound during ICT #1 to complete the mainline pavement removal / replacement operations, and any other required construction activities, within the aforementioned limits. The Design Build Team may utilize an approved offsite detour for wide loads and oversized permitted vehicles on US 421 / I-40 Business during ICT #6. The Design-Build Team shall adhere to the following time restrictions listed below.

Road Name	Day	Time Restrictions
US 421 / I-40 Business	Monday through Sunday	90 consecutive days

The date of availability shall be the date the Design-Build Team elects to begin work after closing US 421 / I-40 Business. The Design-Build Team shall provide the Engineer a minimum of 30 days written notice prior to the date of availability. The date of completion shall be the number of calendar days proposed by the Design-Build Team in the Technical Proposal, and such number of calendar days proposed shall not be greater than 90 days.

Proposed offsite detours for wide loads and oversized permitted vehicles shall be approved by the Engineer, in writing, prior to incorporation in the Transportation Management Plans.

Liquidated Damages for Intermediate Contract Time #6 for the above lane narrowing, lane closure restrictions of US 421 / I-40 Business, from the western sound barrier wall construction limits to the NC 150 (Peters Creek Parkway) Loop A gore located at approximately Station 24+00 -L- during the two-year full closure of US 421 / I-40 Business (ICT #1) are \$1,500.00 per calendar day or any portion thereof.

4. Intermediate Contract Times #7 and #8 for Lane Narrowing, Lane Closure Restrictions for median bent construction prior to the Two-Year Full Closure of US 421 / I-40 Business (ICT #1).

From the western sound barrier wall construction limits to the NC 150 (Peters Creek Parkway) Loop A gore, located at approximately Station 24+00 -L-, US 421 / I-40 Business, may be reduced to one lane of traffic eastbound and one lane of traffic westbound prior to the two-year full closure of US 421 / I-40 Business (ICT #1) to complete construction activities within the aforementioned limits. During ICT #7 and #8, the Design Build Team may utilize an approved offsite detour for wide loads and oversized permitted vehicles within the aforementioned limits. The Design-Build Team shall adhere to the following time restrictions listed below.

Intermediate Contract Time #	Road Name	Day	Time Restrictions
#7	US 421 / I-40 Business	Monday through Sunday	45 consecutive days
#8	US 421 / I-40 Business	Monday through Sunday	60 consecutive days

The time of availability for Intermediate Contract Time # 7 and #8 shall be 9:00 p.m. on the date the Design-Build Team elects to begin work on the operations noted in the table above. The Design-Build Team shall provide the Engineer a minimum of 30 days written notice prior to each time of availability. The time of completion for Intermediate Contract Time # 7 and #8 shall be 6:00 a.m. on the date that corresponds to the number of calendar days proposed by the Design-Build Team in the Technical Proposal for each ICT, and such number of calendar days proposed shall not be greater than the days noted above.

Proposed offsite detours for wide loads and oversized permitted vehicles within the aforementioned limits shall be approved by the Engineer, in writing, prior to incorporation in the Transportation Management Plans.

Liquidated Damages for Intermediate Contract Times #7 and #8 for the above lane narrowing, lane closure restrictions of US 421 / I-40 Business, from the western sound barrier wall construction limits to the NC 150 (Peters Creek Parkway) Loop A gore, located at approximately Station 24+00 -L-, prior to the two-year full closure of US 421 / I-40 Business (ICT #1) are \$15,000.00 per calendar day or any portion thereof.

5. Intermediate Contract Times #9 - #13 for Ramp Reconstruction

A maximum of three road closures for each ramp / loop, with an approved offsite detour, will be permitted for the phased construction, reconstruction, or removal of each ramp / loop for the maximum durations listed below. The Design-Build Team shall not close Loop A or Loop D during the two-year full closure of US 421 / I-40 Business or concurrently close more than one ramp / loop.

Intermediate Contract Time #	Road Name	Day	Duration (Per ramp or loop)	Liquidated Damages (per hour or any portion thereof)
#9	NC 150 (Peters Creek Parkway) Ramp A	From Friday at 9:00 p.m. until 6:00 a.m. on Monday	57 consecutive hours	\$1,000.00
#10	NC 150 (Peters Creek Parkway) Loop A	From Friday at 9:00 p.m. until 6:00 a.m. on Monday	57 consecutive hours	\$1,000.00
#11	NC 150 (Peters Creek Parkway) Ramp C	From Friday at 9:00 p.m. until 6:00 a.m. on Monday	57 consecutive hours	\$1,000.00
#12	NC 150 (Peters Creek Parkway) Ramp D	From Friday at 9:00 p.m. until 6:00 a.m. on Monday	57 consecutive hours	\$1,000.00
#13	NC 150 (Peters Creek Parkway) Loop D	From Friday at 9:00 p.m. until 6:00 a.m. on Monday	57 consecutive hours	\$1,000.00

Liquidated Damages for Intermediate Contract Times #9 through #13 for the above road closure time restrictions for NC 150 (Peters Creek Parkway) Ramp A, Loop A, Ramp C, Ramp D and Loop D are \$1,000.00 per hour or any portion thereof.

6. Intermediate Contract Times #14 - #21 for Bridge Reconstruction

One road closure, with an approved offsite detour, will be permitted for the removal and reconstruction of each bridge and adjacent roadway improvements for the maximum durations listed below.

Intermediate Contract Time #	Facility	Duration (Per bridge)
#14	Fourth Street	365 consecutive days
#15	Broad Street and Broad Street ramps	365 consecutive days
#16	Brookstown Avenue	365 consecutive days
#17	Marshall Street and Marshall Street ramps	365consecutive days
#18	Cherry Street and Cherry Street ramps	365 consecutive days
#19	Liberty Street and Liberty Street ramps	548 consecutive days
#20	Main Street and Main Street ramps	365 consecutive days
#21	Church Street	365consecutive days

The date of availability shall be the date the Design-Build Team elects to close the road. The Design-Build Team shall provide the Engineer a minimum of 30 days written notice prior to the date of availability. The date of completion shall be the number of calendar days proposed by the Design-Build Team in the Technical Proposal, and such number of calendar days proposed shall not be greater than the days noted above.

Liquidated Damages for Intermediate Contract Times #14 through #21 for the above road closure time restrictions for Fourth Street; Broad Street, including all ramps; Brookstown Avenue; Marshall Street, including Marshall Street ramps; Cherry Street, including Cherry Street ramps; Liberty Street, including Liberty Street ramps; Main Street, including Main Street ramps; and Church Street are \$1,000.00 per calendar day or any portion thereof.

B. Hauling Restrictions

The Design-Build Team shall adhere to the hauling restrictions noted in the January 2012 NCDOT *Standard Specifications for Roads and Structures*.

The Design-Build Team shall conduct all hauling operations as follows:

- The Design-Build Team shall not conduct any hauling operations against the flow of traffic of an open travelway unless an approved temporary traffic barrier or guardrail separates the traffic from the hauling operation.
- The Design-Build Team shall not haul during the holiday and special events time restrictions listed in ICT #2, ICT #3, and ICT #4 unless the hauling operation

occurs completely behind temporary traffic barrier or guardrail and does not impact traffic operations.

- All entrances and exits for hauling to and from the work zone shall conform to the January 2012 NCDOT Roadway Standard Drawings.
- Haul vehicles shall not enter and / or exit an open travel lane at speeds more than 10 mph below the posted speed limit.
- All hauling entrances, exits and crossings shall be shown on the Transportation Management Plans.
- Hauling operations that perpendicularly cross a roadway shall require Transportation Management Plans and shall be subject to the time restrictions, and holiday and special event time restrictions listed in ICT #2, ICT #3, and ICT #4.

Excluding hauling operations that are conducted entirely behind a temporary traffic barrier or guardrail, single vehicle hauling shall not be allowed ingress and egress from any open travel lane during the following time restrictions:

Road Name	Day	Time Restrictions
US 421 / I-40 Business including all ramps and loops	Monday through Friday	7:00 a.m. to 9:00 a.m. and 4:00 p.m. to 6:00 p.m.

Excluding hauling operations that are conducted entirely behind a temporary traffic barrier or guardrail, multi-vehicle hauling shall not be allowed ingress and egress from any open travel lane during the following time restrictions:

Road Name	Day and Time	Restrictions
US 421 / I-40 Business, including all ramps and loops	Monday through Friday	7:00 a.m. to 9:00 a.m. and 4:00 p.m. to 6:00 p.m.
NC 150 (Peters Creek Parkway) and Academy Street	Monday through Friday	7:00 a.m. to 9:00 a.m. and 3:00 p.m. to 6:00 p.m.

The Design-Build Team shall address, in the Technical Proposal, how hauling will be conducted, including but not limited to, hauling of any materials to and from the site and hauling material within the NCDOT right of way.

C. Lane and Shoulder Closure Requirements

On two-lane, two-way facilities, the Design-Build Team shall not install more than one (1) mile of lane closure in any one direction on any roadway within the project limits or in conjunction with this project, measured from the beginning of the merge taper to the end of the lane closure.

On multi-lane facilities, the Design-Build Team shall not install more than two (2) miles of lane closure in any one direction, measured from the beginning of the merge taper to the end of the lane closure. The Design-Build Team shall not install more than one lane closure in any one direction.

The Design-Build Team shall remove lane closure devices from the lane when work is not being performed behind the lane closure or when a lane closure is no longer needed.

When barrier is placed on the roadway shoulder, the Design-Build Team shall install shoulder closure signs and devices in advance of the barrier using January 2012 NCDOT Roadway Standard Drawings.

When personnel and / or equipment are working within 15 feet of an open travel lane, the Design-Build Team shall close the nearest open shoulder using January 2012 NCDOT Roadway Standard Drawings, unless the work area is protected by an approved temporary traffic barrier or guardrail.

When personnel and / or equipment are working on the shoulder adjacent to an undivided facility and within five feet of an open travel lane, the Design-Build Team shall, at a minimum, close the nearest open travel lane using January 2012 NCDOT Roadway Standard Drawings, unless the work area is protected by an approved temporary traffic barrier or guardrail.

When personnel and / or equipment are working on the shoulder adjacent to a divided facility and within ten feet of an open travel lane, the Design-Build Team shall, at a minimum, close the nearest open travel lane using January 2012 NCDOT Roadway Standard Drawings, unless the work area is protected by an approved temporary traffic barrier or guardrail.

When personnel and / or equipment are working within a lane of travel of an undivided or divided facility, the Design-Build Team shall, at minimum, close the lane using the January 2012 NCDOT Roadway Standard Drawings. The Design-Build Team shall conduct the work so that all personnel and / or equipment remain within the closed travel lane.

The Design-Build Team shall not perform work involving heavy equipment within 15 feet of the edge of travel way when work is being performed behind a lane closure on the opposite side of the travel way.

D. Pavement Edge Drop off Requirements

The Design-Build Team shall backfill at a 6:1 slope up to the edge and elevation of the existing pavement in areas adjacent to an open travel lane that has an edge of pavement drop-off as follows:

- Elevation differences that exceed two inches on roadways with posted speed limits of 45 mph or greater and a paved shoulder four-foot wide or less.

- Elevation differences greater than three inches on roadways with posted speed limits less than 45 mph and with a paved shoulder four-foot wide or less.
- Refer to the current AASHTO *Roadside Design Guide* for proper treatment of all other conditions.

Do not exceed a difference of two inches in elevation between open lanes of traffic for nominal lifts of 1.5 inches. Install advance warning “UNEVEN LANES” signs (W8-11) 1,000 feet in advance and a minimum of every half mile throughout the uneven area.

E. Traffic Pattern Alterations

The Design-Build Team shall notify the Engineer, in writing, at least twenty-one (21) calendar days prior to any traffic pattern alteration. (Reference the Public Information Scope of Work found elsewhere in this RFP for public information requirements)

F. Signing

The Design-Build Team shall install advance work zone warning signs when work is within 40 feet from the edge of travel lane and no more than three days prior to the beginning of construction.

When no work is being conducted for a period longer than one week, the Design-Build Team shall remove or cover all advance work zone warning signs, as directed by the Engineer. Stationary work zone warning signs shall be covered with an opaque material that prevents reading of the sign at night by a driver traveling in either direction.

When portable work zone signs are not in use for periods longer than 30 minutes, the Design-Build Team shall lay the portable work zone sign flat on the ground and collapse the sign stand and lay it flat on the ground.

The Design-Build Team shall install and maintain all detour signing and devices required for road closures. The Design-Build Team shall cover or remove all detour signs within and off the project limits when a detour is not in operation.

The Design-Build Team shall ensure proper signing (including but not limited to guide signs) is in place at all times during construction, as required by the *MUTCD*. All temporary signing shall be shown on the Traffic Control Plans or Temporary Signing Plans to be reviewed and approved by the Work Zone Traffic Control Section and / or the Signing and Delineation Unit prior to incorporation.

G. Traffic Barrier

The Design-Build Team shall use only an NCDOT approved temporary traffic barrier system and adhere to the following requirements:

- Install temporary traffic barrier system a maximum of two (2) weeks prior to beginning work in any location. Once the temporary traffic barrier system is

installed at any location, proceed in a continuous manner to complete the proposed work in that location.

- Place all temporary barrier used for traffic control directly on an asphalt or concrete surface.
- Temporary barrier used for traffic control shall not act as a retaining wall.
- Once the temporary traffic barrier system is installed and no work has been or will be performed behind the temporary traffic barrier system for a period longer than two (2) months, remove / reset the temporary traffic barrier system unless the barrier is protecting traffic from a hazard.
- Protect the approach end of temporary traffic barrier system at all times during the installation and removal of the barrier by either a truck mounted impact attenuator (maximum 72 hours) or a temporary crash cushion.
- Protect the approach end of temporary traffic barrier system from oncoming traffic at all times by a temporary crash cushion unless the approach end of temporary traffic barrier system is offset from oncoming traffic as follows:

Posted speed limit (MPH)	Minimum offset (feet)
40 or less	15
45 – 50	20
55	25
60 mph or higher	30

- Install temporary traffic barrier system with the traffic flow, beginning with the upstream side of traffic. Remove the temporary traffic barrier system against the traffic flow, beginning with the downstream side of traffic.
- Install drums to close or keep closed tangent sections of the roadway until the temporary traffic barrier system can be placed or after the temporary barrier system has been removed. The distance, in feet, between drums shall be no greater than twice the posted speed limit (mph).
- The Design-Build Team shall minimize the presence of portable concrete barrier along acceleration ramps / loops. Thus, justification, in the Department's sole discretion, shall be provided in the TMP for the placement of portable concrete barrier along acceleration ramps / loops. At acceleration ramps / loops, the Design-Build Team shall install temporary traffic barrier system in a manner that provides a minimum of 200 feet from the end of the pavement marking taper to the beginning of the barrier taper.
- The Design-Build Team shall be responsible for providing proper connection between the existing bridge rail and the temporary barrier system and include this information in the appropriate plans.

H. Traffic Control Devices

The Design-Build Team shall use traffic control devices that conform to all NCDOT requirements and are listed on the NCDOT Approved Products List. The Approved Products List is shown on the following website:

<https://apps.dot.state.nc.us/vendor/approvedproducts/>

The use of any devices that are not shown on the Approved Product List shall require written approval from the Design-Build Unit prior to incorporation.

Channelizing device spacing shall not exceed a distance in feet equal to twice the posted speed limit. Channelization devices shall be spaced ten feet on-center in radii. Channelization devices shall be two feet off the edge of an open travelway, when lane closures are not in effect. Skinny drums shall only be allowed as defined in Section 1180 of the January 2012 NCDOT *Standard Specifications for Roads and Structures*.

Place Type III barricades, with "ROAD CLOSED" signs (R11-2) attached, of sufficient length to close entire roadway. Stagger or overlap barricades to allow for ingress or egress.

Place sets of three drums perpendicular to the edge of the travelway on 500-foot centers when unopened lanes are closed to traffic. These drums shall be in addition to channelizing devices.

Portable changeable message signs should be placed off the shoulder of the roadway and behind a traffic barrier, if practical. Where a traffic barrier is not available to shield the portable changeable message sign, it should be placed off the shoulder and outside of the clear zone. If a portable changeable message sign must be placed on the roadway shoulder or within the clear zone, it should be delineated with retro reflective temporary traffic control (TTC) devices. When portable changeable message signs are not being used to display TTC messages, they should be relocated such that they are outside of the clear zone or shielded behind a traffic barrier and turned away from traffic. If relocation or shielding is not practical, the portable changeable message signs shall be delineated with retro reflective TTC devices.

I. Temporary Pavement Markings, Markers and Delineation

US 421 / I-40 Business, Including All Ramps and Loops

The Design-Build Team shall show temporary pavement markings on the Transportation Management Plans that meet the requirements of the *Work Zone "Performance" Pavement Markings on US 421 / I-40 Business Including All Ramps and Loops* section below, the *Guidelines for Preparation of Traffic Control and Pavement Marking Plans for Design-Build Projects*, and the *Work Zone Traffic "Pattern Masking" Project Special Provision* found elsewhere in this RFP.

The Design-Build Team shall install pavement markings and markers in accordance with the January 2012 NCDOT *Standard Specifications for Roads and Structures*, and in accordance with the manufacturer's procedures and specifications.

In accordance with the requirements below, the Design-Build Team shall install Work Zone "Performance" pavement markings on the interim surface for temporary traffic patterns. The Design-Build Team shall install temporary raised pavement markers on the interim surface for temporary traffic patterns on US 421 / I-40 Business, including all ramps and loops.

The Design-Build Team shall not place temporary markings on the final asphalt pavement surface unless the temporary markings are placed in the exact location of the final pavement markings.

Temporary pavement markings on the final concrete surface shall only be removed by hydroblasting.

Prior to shifting traffic to a new pattern, the Design-Build Team shall mask / conceal all conflicting markings and remove all conflicting markers and snowplowable marker castings.

The Design-Build Team shall tie proposed pavement marking lines to existing pavement marking lines.

By the end of each day's operation, the Design-Build Team shall mask / conceal all conflicting markings, replace all damaged markings, and remove / replace all conflicting / damaged markers.

Work Zone "Performance" Pavement Markings on US 421 / I-40 Business, Including All Ramps and Loops

Description

The Design-Build Team shall furnish and install Work Zone "Performance" pavement markings that delineate the travel way for work zone traffic patterns on US 421 / I-40 Business, including all ramps and loops. The purpose of Work Zone "Performance" pavement marking is to provide a more durable work zone pavement marking that shall last the full duration of a traffic pattern without requiring replacement or reapplication for a period of up to 12 months. The Work Zone "Performance" pavement markings shall also provide a higher performance level, for both initial and residual retroreflectivity, than standard traffic paints to improve nighttime work zone visibility.

Materials

a) General

Use materials in accordance with the Manufacturer's recommendations that shall retain both durability and a minimum retroreflectivity, as described elsewhere in this RFP, for a period of at least 12 months.

The Work Zone "Performance" pavement markings shall be manufactured to bond successfully to both concrete and asphalt pavements. The pavement marking materials shall be applied in a single application. The following are approved materials to be used for Work Zone "Performance" pavement markings:

- Polyurea
- Thermoplastic (Extruded and Sprayed)
- Epoxy
- Polymer (Single System)

b) Material Qualifications / Certifications

The Design-Build Team shall only use Work Zone "Performance" pavement marking materials, as listed above, that are on the NCDOT Approved Products List at the time of installation. In accordance with Article 106-3, and Section 1087-4 of the January 2012 NCDOT *Standard Specifications for Roads and Structures*, the Design-Build Team shall provide a Type 3 Material Certification for all materials, and a Type 3 and Type 4 certification for all reflective media.

Construction Methods

The Design-Build Team shall not use hand applied methods or any other non-truck mounted application equipment / device to install Work Zone "Performance" pavement markings for applications longer than 1000 feet.

All Work Zone "Performance" pavement markings shall be installed in a single application.

a) Testing Procedures.

All Work Zone "Performance" pavement markings shall be tested by the Department through an independent Mobile Retroreflective Contractor. The Work Zone "Performance" pavement markings will be scanned to ensure the retroreflectivity requirements in Section c below are met.

b) Application Equipment

Application equipment shall be in accordance with Section 1205 of the January 2012 NCDOT *Standard Specifications for Roads and Structures*.

c) Material Application

The Work Zone “Performance” pavement marking material shall be applied at the following minimum thicknesses:

- Polyurea = 20 mils wet
- Epoxy = 20 mils wet
- Thermoplastic (Extruded or Sprayed) = 50 mils wet
- Polymer = 20 mils wet

The Work Zone “Performance” pavement marking line widths shall be as follows:

- Edge lines, Solid Lane Lines, Skip and Mini-Skip Lines = 6”
- Gorelines = 12”

“No track” dry times for the liquid systems shall be ten minutes or shorter. Traffic shall not be placed on any material until it is sufficiently dry / cured to eliminate wheel tracking.

The minimum level of retroreflectivity for all Work Zone “Performance” pavement marking system selected shall be as follows:

Reflectometer Requirements for Work Zone “Performance” Pavement Markings

Color	Initial	6 Months	12 Months
White	375 mcd/lux/m ²	275 mcd/lux/m ²	150 mcd/lux/m ²
Yellow	250 mcd/lux/m ²	150 mcd/lux/m ²	100 mcd/lux/m ²

For the durations noted in the chart above, the Work Zone “Performance” pavement markings shall adhere to the corresponding retroreflectivity levels.

The Design-Build Team shall notify the Engineer, in writing, a minimum of 7 - 10 days prior to the installation of Work Zone “Performance” pavement markings. The Department will measure initial retroreflectivity levels with a mobile retroreflectometer within 30 days after placement to ensure compliance with the reflectivity levels in the chart above.

Work Zone “Performance” pavement markings shall maintain the retroreflectivity levels for the durations noted above. If the markings appear to be non-performing, in the Engineer’s sole discretion, the Engineer may request additional retroreflectivity readings. If and when this becomes necessary, the same notification procedure as described above shall be used to have Work Zone “Performance” pavement markings measured by a Mobile Retroreflective Contractor.

If measured and found to be noncompliant, the Design-Build Team shall replace the Work Zone “Performance” pavement markings at no cost to the Department.

All Work Zone “Performance” pavement markings shall be durable enough to withstand a single snow event without showing excessive fatigue in either bonding or retroreflectivity. The Design-Build Team shall replace the Work Zone “Performance” pavement markings if a single snowplow event results in more than 25% of the pavement marking edgelines or skips being physically removed and / or the Work Zone “Performance” pavement markings do not meet the following minimum retroreflectivity values:

Reflectometer Requirements for Work Zone “Performance” Pavement Markings after a Single Snowplowed Event

Color	MINIMUM
White	150 mcd/lux/m2
Yellow	100 mcd/lux/m2

Unless the temporary traffic pattern is to be modified within 30 days, the Design-Build Team shall replace all non-compliant Work Zone “Performance” pavement markings within 30 days of determining they are non-compliant.

If the work zone experiences more than one snow event requiring snowplowing, the retroreflectivity values in the chart above will no longer apply. The Engineer will determine if the pavement markings are performing adequately and / or if replacement is necessary due to excessive damage caused solely by snowplow activities. If the Work Zone “Performance” pavement markings are found to be deficient, solely in the Engineer’s discretion, they shall be replaced. In such case, the Work Zone “Performance” pavement markings will be paid for as extra work in accordance with Subarticle 104-8-(A) of the January 2012 NCDOT *Standard Specifications for Roads and Structures* at the unit price of \$0.40 per linear foot. Unless the temporary traffic pattern is to be modified within 30 days, the Design-Build Team shall replace all Work Zone “Performance” pavement markings damaged due to multiple snowplow events within 30 days.

If the Work Zone “Performance” pavement markings need to remain in place longer than 12 months, the markings shall be scanned by a Mobile Retroreflective Contractor. If the Work Zone “Performance” pavement markings meet or exceed the 12-month retroreflectivity requirements noted above, the markings can remain in place. If the Work Zone “Performance” pavement markings do not meet or exceed the 12-month retroreflectivity requirements noted above, the Design-Build Team shall replace the Work Zone “Performance” pavement markings within 15 days of the 12-month duration date at no cost to the Department. If and when this becomes necessary, the same notification procedure as described above shall be used to have Work Zone “Performance” pavement markings measured by a Mobile Retroreflective Contractor.

d) Surface Preparation

Prior to installation, all pavement surfaces to receive Work Zone “Performance” pavement markings shall be swept clean and prepared in accordance with the Manufacturer’s recommendation.

e) Temperature and Weather Limitations

Work Zone “Performance” pavement markings shall only be applied when the ambient air temperature and the pavement temperature are 50°F or higher for thermoplastic and are 40°F or higher for all other materials. The Design-Build Team shall not install Work Zone “Performance” pavement markings unless the pavement surface is completely dry. The Design-Build Team shall not install Work Zone “Performance” pavement markings within four hours of a heavy rain event, (rainfall intensities equal to or greater than 1 inch /per hour).

In the event a traffic shift must occur when the air and / or pavement temperatures are below the aforementioned minimums and / or a rain event occurs four hours prior to or during a planned traffic shift, the Design-Build Team may install temporary pavement marking paint, at the Engineer’s sole discretion. Temporary pavement marking paint shall be applied in one application and shall produce a four-inch wide line at 15 mils (wet). Beads that provide the following minimum retroreflectivity shall be applied to the temporary pavement marking paint:

White:	225 mcd / lux / m2
Yellow:	200 mcd / lux / m2

The temporary pavement marking paint with beads shall maintain the minimum retroreflectivity noted above until placement of the Work Zone “Performance” pavement markings

The Design-Build Team shall replace / reapply temporary pavement marking paint with beads that does not adhere to the retroreflectivity requirements noted above at no cost to the Department. The Design-Build Team shall apply the Work Zone “Performance” pavement markings within 90 days of installing the temporary pavement marking paint with beads.

Excluding damage due solely to snowplow events, the Design-Build Team shall replace all Work Zone “Performance” pavement material that debonds and /or does not adhere to the retroreflectivity levels for the corresponding durations noted above at no cost to the Department.

ALL OTHER ROADS AND STRUCTURES

The Design-Build Team shall show temporary pavement markings on the Transportation Management Plans that meet the requirements of the RFP, the *Guidelines for Preparation of Traffic Control and Pavement Marking Plans for Design-Build Projects*, and the *Work Zone Traffic “Pattern Masking”* Project Special Provision found elsewhere in this RFP.

The Design-Build Team shall use pavement marking and marker products that conform to all NCDOT requirements and are listed on the NCDOT Approved Products List. The use of any devices that are not shown on the NCDOT Approved Products List shall require written approval from the Design-Build Unit prior to incorporation.

The Design-Build Team shall install pavement markings and markers in accordance with the January 2012 NCDOT *Standard Specifications for Roads and Structures*, and in accordance with the manufacturer's procedures and specifications.

The Design-Build Team shall install temporary pavement markings that are the same width as existing pavement markings. For roadways that do not have existing pavement markings, the Design-Build Team shall install temporary pavement markings that are the same width as required for the final pavement markings in the Pavement Markings Scope of Work found elsewhere in this RFP.

The Design-Build Team shall install temporary pavement markings and temporary pavement markers on the interim surface or temporary pattern as follows:

Road	Marking	Marker
All roads and structures, except US 421 / I-40 Business and US 421 / I-40 Business ramps and loops	Any Marking on the Approved Product List	Raised Temporary

The Design-Build Team may use any type of pavement markings on the NCDOT Approved Products List for temporary patterns. However, the Design-Build Team shall maintain a minimum retroreflectivity for pavement markings (existing and temporary markings) at all times during construction, as follows:

White:	125 mcd / lux / m ²
Yellow:	100 mcd / lux / m ²

When using Cold Applied Plastic Type 4 pavement markings, place temporary raised markers half on and half off edge lines and centerlines to help secure the tape to the roadway. Markers shall be spaced the appropriate distance apart as described by the January 2012 NCDOT Roadway Standard Drawing No. 1250.01, Sheet 1 of 3.

The Design-Build Team shall tie proposed pavement marking lines to existing pavement marking lines.

By the end of each day's operation, the Design-Build Team shall mask / conceal all conflicting markings, replace all damaged markings, and remove / replace all conflicting / damaged markers.

The Design-Build Team shall trace existing and / or proposed monolithic island locations with the proper color pavement marking prior to removal and / or installation. The Design-Build Team shall place drums to delineate existing and / or proposed monolithic islands after removal and / or before installation.

The Design-Build Team shall not place temporary markings on the final asphalt pavement surface unless the temporary markings are placed in the exact location of the final pavement markings.

Temporary pavement markings on the final concrete surface shall only be removed by hydroblasting.

Prior to shifting traffic to a new pattern, the Design-Build Team shall mask / conceal all conflicting markings and remove all conflicting markers and snowplowable marker castings.

J. Temporary Traffic Signals

Use the following General Notes if the Design-Build Team proposes temporary traffic signals for maintenance of traffic:

- Notify the Engineer in writing a minimum of two months before a temporary traffic signal installation is required.
- Shift and revise all signal heads as shown on the accepted Traffic Signal Plans.

K. Traffic Control Supervisor

The Design-Build Team shall furnish a Traffic Control Supervisor for the project who is knowledgeable of Transportation Management Plan design, devices and application, and has full authority to ensure traffic is maintained in accordance with the plans and specifications developed by the Design-Build Team.

The Traffic Control Supervisor shall be on the project site overseeing all road closures and median crossover operations to ensure traffic control devices are properly installed and adjusted as necessary. The Traffic Control Supervisor shall also make necessary changes to the traffic control operations and aide in the monitoring of traffic queuing.

The Design-Build Team shall identify a Traffic Control Supervisor in their Technical Proposal that has the following qualifications:

- (1) A minimum 24 months of On-the-Job Training in supervision and work zone set up and implementation on similar projects.
- (2) Be certified by responsible party (contractor or NCDOT) to have the required experience and training and is qualified to perform the duties of this position. If certified by the Contractor, a notarized certification letter shall be furnished to the Engineer at the preconstruction meeting. The letter shall state the Traffic Control Supervisor is qualified, and state that the Traffic Control Supervisor has the authority to ensure traffic is maintained in accordance with the contract documents.

The Traffic Control Supervisor for the project shall perform the following:

- (1) During construction, be available or on call 24 hours per day, 7 days per week to direct / make any necessary changes in the traffic control operations in a timely and safe manner.
- (2) Coordinate and cooperate with traffic control supervisors of adjacent, and overlapping construction projects, as well as construction projects in proximity to the subject project, to ensure safe and adequate traffic control setup is maintained throughout the project at all times, including periods of construction inactivity.
- (3) Coordinate and cooperate with the NCDOT Statewide Operations Center (STOC) and NCDOT Triad Regional Transportation Management Center (TRTMC) to ensure proper messages are displayed on the CMSs and DMSs.
- (4) Provide traffic control setup that ensures safe traffic operations and workers' safety throughout the construction area.
- (5) Attend all scheduled traffic control coordination meetings, as required by the Engineer.
- (6) Monitor traffic delays and backups within the work zone.

L. Miscellaneous

Provide portable temporary lighting to conduct night work in accordance with the January 2012 NCDOT *Standard Specifications for Roads and Structures*.

Provide proper drainage for all temporary alignments and / or traffic shifts.

Law enforcement officers may be used to maintain traffic through the work area and / or intersections. The Design-Build Team shall be responsible for coordinating with the law enforcement agency for the use of law enforcement officers. The Design-Build Team shall only utilize Officers who are outfitted with law enforcement uniforms and marked vehicles, which are equipped with proper lights mounted on top of the vehicle and agency emblems. The Design-Build Team shall coordinate with the Engineer where and how law enforcement officers will be used during construction. The Design-Build Team shall address where and how law enforcement officers will be used in the Technical Proposal.

If, at the Department's sole discretion, the Design-Build Team can justify that the TMPs cannot be designed to adhere to the existing US 421 / I-40 Business posted speed limit requirements, the Design-Build Team shall submit a formal Work Zone Speed Limit Reduction Ordinance request to the Design-Build Unit for approval. The request shall state the type of ordinance requested, why the ordinance is needed and why the TMPs cannot be designed to avoid the need. The request shall also include an Engineering Study that justifies the need for a Work Zone Speed Limit Reduction Ordinance. (Reference the criteria listed in the NCDOT Work Zone Traffic Control Guidelines). Upon receipt of the formal request, the Design-Build Team shall allow six weeks for the Work Zone Speed Limit Reduction Ordinance to be approved. The Design-Build Team shall provide and install proper signing for all approved Work Zone Speed Limit

Reduction Ordinances. The Design-Build Team shall identify the need for a Work Zone Speed Limit Reduction Ordinance in the Technical Proposal.

The Department may grant a \$250 Speeding Penalty Ordinance for US 421 / I-40 Business provided the project meets or exceeds the required criteria. If the Transportation Management Plans cannot be designed to eliminate the need for a Speeding Penalty Ordinance and meet the criteria listed in the NCDOT Work Zone Traffic Control Guidelines, the Design-Build Team shall prepare an Engineering Study. The Design-Build Team shall submit a formal Speeding Penalty Ordinance request to the Design-Build Unit that states why the ordinance is needed and why the Transportation Management Plans cannot be designed to avoid the need. Upon receipt of the formal request, the Design-Build Team shall allow six weeks for the Speeding Penalty Ordinance to be approved. The Design-Build Team shall identify the need for a Speeding Penalty Ordinance in the Technical Proposal.

The Design-Build Team shall coordinate with all Contractors, the City of Winston-Salem, and NCDOT Resident Engineers in charge of any project in the vicinity of this project for any work that may affect the construction, traffic operations, and placement of temporary traffic control devices (including advance warning signs) on all roads within the project limits and associated with this project.

The Design-Build Team shall be responsible for all required temporary shoring, including but not limited to designing, providing, installing, maintaining and removing. Temporary shoring for the maintenance of traffic is defined as shoring necessary to provide lateral support to the side of an excavation or embankment parallel to an open travelway when a theoretical 2:1 (H:V) slope from the bottom of the excavation or embankment intersects the existing ground line closer than five feet from the edge of pavement of the open travelway. The Design-Build Team shall identify locations where temporary shoring for maintenance of traffic will be required on the Transportation Management Phasing Concept. The Design-Build Team shall install temporary traffic barrier as shown on a detail available from Work Zone Traffic Control that provides design information on the temporary traffic barrier location in relation to the temporary shoring and traffic location. The NCDOT Geotechnical Engineering Unit and Work Zone Traffic Control websites have more information on temporary shoring. (Notes related to Temporary Shoring are not required in the General Notes sheet for the Transportation Management Plans.)

The Design-Build Team shall adhere to the additional shoring requirement located on the Work Zone Traffic Control and Geotechnical Engineering Unit websites:

<https://connect.ncdot.gov/projects/WZTC/Pages/default.aspx>

<https://connect.ncdot.gov/resources/Geological/Pages/default.aspx>

The Design-Build Team shall identify on the appropriate traffic control details where temporary shoring will be used by providing station limits, offsets, cut sections, the type of shoring and where temporary traffic barrier will be located, if needed.

**** NOTE ** Deleted Network Traffic Management Map Section**

SIGNING SCOPE OF WORK (7-7-16)**Project Description**

The Design-Build Team shall prepare Signing Plans for the entire Signing Project Limits, including but not limited to, the roadway construction limits, the US 421 / I-40 Business Corridor, as well as advance and other signing required outside the roadway construction limits and the US 421 / I-40 Business Corridor.

Websites and References

The Design-Build Team shall prepare Signing Plans in accordance with the information on the following websites, the version of the following references effective on the Technical Proposal submittal date, and the contract requirements contained herein:

- The Signing and Delineation Unit website:

<https://connect.ncdot.gov/resources/safety/Pages/Signing-and-Delineation.aspx>

- Traffic Engineering Practices, Policies, and Legal Authority (TEPPL):

<https://connect.ncdot.gov/resources/safety/Teppl/Pages/Teppl-Select-Topics.aspx>

- *Manual on Uniform Traffic Control Devices* (MUTCD):

http://mutcd.fhwa.dot.gov/kno_2009r1r2.htm

- 2009 NC Supplement to the Manual on Uniform Traffic Control Devices:

<https://connect.ncdot.gov/resources/safety/TrafficSafetyResources/2009%20NC%20Supplement%20to%20MUTCD.pdf>

- *Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals* (AASHTO):

https://bookstore.transportation.org/collection_detail.aspx?ID=126

- *Guidelines for Preparation of Signing Plans for Design-Build Projects*

<https://connect.ncdot.gov/letting/Pages/Design-Build-Resources.aspx>

- *Design-Build Submittal Guidelines*

<https://connect.ncdot.gov/letting/Pages/Design-Build-Resources.aspx>

- NCDOT *Standard Specifications for Roads and Structures*

- NCDOT *Roadway Standard Drawings*

Signing Requirements for Technical Proposal

The Design-Build Team shall select a Private Engineering Firm (PEF) that has experience in the preparation, design, and sealing of Signing Plans for NCDOT on comparable projects. The Technical Proposal shall list projects, where the Signing Plans were developed by the PEF, including description and similarity to the subject project.

The Design-Build Team shall include a Preliminary Signing Concept Map in the Technical Proposal. At a minimum, the aforementioned Concept Map shall include all proposed overhead sign structure locations, overhead signs and ground mounted guide signs for the Signing Project Limits defined elsewhere in this Scope of Work.

Signs to be Furnished by Design-Build Team

The Design-Build Team shall furnish signs in accordance with the specifications provided by the NCDOT.

Signing Project Limits

Roadway Construction Signing Limits

Unless noted otherwise elsewhere in this RFP, the Design-Build Team shall design, fabricate and install all Type A, B, D, E and F signs and supports (including overhead sign structures) required through the construction limits of the mainline, as well as all -Y- Lines, ramps, loops, and turn-arounds. Unless noted otherwise elsewhere in this RFP, the Design-Build Team shall design, fabricate and install all signs required beyond the roadway construction limits of the mainline, as well as all -Y- Lines, ramps, loops, and turn-arounds to ensure adequate advance signage and spacing is provided.

US 421 / I-40 Business Corridor Signing Limits

Within the US 421 / I-40 Business Corridor, from I-40 / US 421 Interchange in Forsyth County to I-40 / US 421 Interchange in Guilford County, the mainline shall be re-designated as US 421 and a new roadway name to be determined in the Fall of 2016. The Design-Build Team shall design, fabricate and install all signs within the US 421 / I-40 Business Corridor to reflect US 421, the new roadway name, and mile marker designations. The four finalists for the new roadway name are available at the website noted below. The Department will not honor any requests for additional contract time or compensation for incorporating the selected roadway name into the project design and / or construction.

<http://www.business40nc.com/en-us/Pages/Naming-Process.aspx>

Within the entire US 421 / I-40 Business Corridor, including but not limited to all -Y- Lines and the I-40 interchanges in Forsyth and Guilford Counties, the Design-Build Team shall:

- Remove and dispose of all advance guide signs (ground-mounted and overhead) and Type F-assemblies (route marker assemblies) with the I-40 Business designation.
- Remove and dispose of all exit gore signs, exit panels and mile markers.
- Design, fabricate and install all guide signs (ground mounted and overhead) and Type F-assemblies for the aforementioned re-designation.
- In accordance with the mile numbers provided by the Department, design, fabricate and install all exit gore signs, exit panels and mile markers for the aforementioned re-designations.
- Remove and dispose of all Type D signs with the I-40 Business designation. The Design-Build Team will not be required to include the aforementioned re-designation on new Type D signs.
- The Design-Build Team will not be required to include the *Winston-Salem DOWNTOWN* notation on the overhead signs with the aforementioned re-designation.
- The aforementioned new roadway name and mileage designation shall be included on the overhead sign structures at the interchanges noted below. Unless allowed otherwise elsewhere in this Scope of Work, design, fabricate and install new overhead sign structures for these new roadway and mileage designations. At all new overhead sign structures required for the aforementioned re-designations, the Design-Build Team shall upgrade / widen shoulders to accommodate the required positive protection. (Reference the *Guardrail or other Positive Protection for Overhead Sign Supports* section of this Scope of Work and the Roadway Scope of Work found elsewhere in this RFP)
 - I-40 / US 421 in Forsyth County
 - US 421 / Silas Creek Parkway
 - US 421 / US 52
 - I-40 / US 421 in Guilford County

The City of Winston-Salem and / or the Department will be responsible for the removal and disposal of span wire signing with the I-40 Business designation.

Sign Designs

The Design-Build Team shall include all sign designs in the Signing Plans. Unless noted otherwise elsewhere in this Scope of Work, all sign designs shall be prepared using the latest version of GuideSign software.

The Design-Build Team shall design, fabricate and install all signs required for the Signing Project Limits defined elsewhere in this Scope of Work, including Type A, B overhead signs, Type A, B, and D ground mounted signs, and exit gore signs. The Design-Build Team shall size

and locate all Type E signs (warning and regulatory) and Type F-assemblies (route marker assemblies). Within the US 421 / I-40 Business Corridor Signing Limits, the Design-Build Team shall design, fabricate and install overlay panels on existing supplemental signs for the exit numbers provided by the Department.

Within the US 421 / I-40 Business Corridor, the Design-Build Team shall design, fabricate and install enhanced mile markers at **1-mile** intervals along both sides of the mainline. The Design-Build Team shall install each mile marker on one three-pound U-channel post. Mile markers shall be located at the outside shoulder point or a maximum of 15 feet from the edge of travel lane. The Design-Build Team shall install mile markers such that the bottom of the mile marker shall be four feet above the edge of travel lane (edgeline) elevation. The mile marker designs shall be in accordance with the Intermediate Enhanced Reference Location Signs (D10-5) referenced in the *Standard Highway Signs* (2004 Edition and the 2012 Supplement to the 2004 Edition) and the NCDOT Roadway Standard Drawing No. 904D40.

The Design-Build Team shall design, fabricate and install 30" x 36" Chevron Alignment signs (W1-8) along all interchange loops within the Roadway Construction Signing Limits. Each Chevron Alignment sign shall be:

- installed on two U-channel posts spaced 24" apart with cross bracing
- located and installed so the bottom of the sign is four feet above the edge of the travel lane elevation (left edge of the loop)

The first Chevron Alignment sign shall be installed as close as practical after the exit gore sign (approximately 20' from the exit gore sign), and shall not interfere with or block the exit gore sign. The first five Chevron Alignment signs shall be spaced approximately 40' apart and oriented to optimize the view of approaching motorists. After these first five Chevron Alignment signs, or beyond the midpoint of the curve, Chevron Alignment sign spacing shall adhere to the MUTCD requirements.

Prior to fabrication, the Design-Build Team shall coordinate with the Signing and Delineation Unit on destination cities and / or street names on guide signs.

Logo Signs

The Design-Build Team will not be required to design, locate or install new Logo Signs (blue service signs with specific business panels) within the US 421 / I-40 Business Corridor Signing Limits. The Design-Build Team shall design, fabricate and install overlay panels on existing logo signs within the US 421 / I-40 Business Corridor Signing Limits for the exit numbers provided by the Department.

If damage occurs to the Logo Signs and / or the business panels during construction, the Design-Build Team shall immediately notify the Division Logo Coordinator. The Design-Build Team shall replace all Logo Signs and / or business panels that are damaged during construction. If the Logo Signs are replaced, the Design-Build Team shall remove the business panels and deliver

them to the Division Logo Coordinator. During project construction, the Design-Build Team shall maintain the Logo Signs order of preference in accordance with the MUTCD Section 2J.01.

Wayfinding Signing

As shown in "Phase Two" of the "Greater Downtown Winston Salem Wayfinding Sign Phases" found in the *Business 40 Downtown Wayfinding Existing Signage Design and Installation Details*, provided by the Department, the Design-Build Team shall 1) remove and dispose of all existing wayfinding signing and 2) design, fabricate, and install new wayfinding signing for the City of Winston-Salem. The Design-Build Team shall not install wayfinding signing on U-channel supports. The Design-Build Team shall coordinate with, and obtain the approval from the City of Winston-Salem and the Engineer, for the specific designs and locations of all wayfinding signing. The Design-Build Team may use GuideSign software or other sign design software in compliance with MUTCD guidelines for the wayfinding sign designs. (Reference Section 2D.50 of the MUTCD)

Sign Sheeting Requirements for Overhead Signs

The Design-Build Team shall design and fabricate all overhead signs with Grade A retro-reflective sheeting for sign legends (text), borders, and all Interstate, US and NC route shields, arrows, and exit panels. The Design-Build Team shall design and fabricate all overhead signs with Grade C retro-reflective sheeting for the background.

Black non-reflective sheeting shall be used for all black arrows, legends (text), and borders on overhead signs.

Speed Limit

Within the Roadway Construction Signing Limits, the posted speed limit for the mainline shall be 45 mph.

Interstate, US and NC Route Designation

Interstate, US and NC highway routing is coordinated within the Traffic Mobility and Safety Division of NCDOT. Prior to designing any signs that display new or revised Interstate, US, or NC routes, the Design-Build Team shall confirm all highway routes with the Department. Concurrent with the Release for Construction (RFC) Signing Plans submittal, the Design-Build Team shall notify the State Signing and Delineation Engineer, in writing, of all new or revised Interstate, US or NC routes.

Sign Locations

The Design-Build Team shall determine the station location of all signs and sign structures.

The Design-Build Team shall provide a minimum of two advanced guide signs for 1) all freeway / expressway interchange approaches located within the roadway construction signing limits and

2) for eastbound NC 67 (Silas Creek Road) located outside the roadway construction signing limits.

To avoid placing a sign or sign structure in a location that might be in conflict with future roadway projects and / or limit its usefulness / lifespan, the Design-Build Team shall coordinate all proposed sign designs and locations with the Department.

Ground Mounted Sign Supports

The Design-Build Team shall locate, design, fabricate and install ground mounted signs supports in accordance with the revised NCDOT Roadway Standard Drawing No. 903D10, Sheets 1 and 2 of 3, dated July 26, 2013. The aforementioned revised Roadway Standard Drawing and the associated software for the design of Type A and B ground mounted sign supports may be referenced on the website noted below:

<https://connect.ncdot.gov/resources/safety/Pages/Signing-and-Delineation.aspx>

Once final grading has been completed, the Design-Build Team shall 1) field verify all Type A and B ground mounted sign supports, 2) recalculate the field verified S-Dimensions, using the latest edition of the design software on the website noted above, and 3) revise the beam sections, where applicable.

Unless otherwise approved by the Department, the vertical mounting height for ground mounted signs shall be a minimum of seven feet and maximum of eight feet from the edge of the travel lane to the bottom of the sign.

On freeways and expressways, the minimum lateral offset for Type A and B ground mounted signs on breakaway supports shall be 30 feet, unless approved otherwise by the Department. The lateral offset shall be measured from the edge of the travel lane closest to the shoulder to the closest sign edge.

On freeways and expressways, all Type A and B ground mounted signs on simple (non-breakaway) supports shall be protected by guardrail, barrier or another form of approved positive protection. The minimum lateral distance between the face of guardrail and the closest sign edge shall be six feet.

Unless noted otherwise in this RFP, all Type D, E and F signs shall be installed on U-channel posts in accordance with the NCDOT Roadway Standard Drawings. Type D signs shall not exceed eight feet in width and / or 24 square feet. Unless positively protected, all Type D signs shall be installed on a maximum of two U-channel posts.

Overhead Sign Structures

The Design-Build Team shall consider the proposed roadway geometry, number of lanes, and all advisory signing needs when selecting the type of overhead signing for a given location. At a minimum, the Design-Build Team shall provide overhead signing at the locations identified in

the *MUTCD*, Section 2E.24 – Signing for Interchange Lane Drops, Section 2A.17 - Overhead Sign Installations, Items A – M, and the following locations, unless allowed otherwise elsewhere in this RFP:

- An option lane at a multi-lane exit or freeway / ramp split (use Arrow Per Lane signs)
 - At I-40 Eastbound, Exit 188 – The Design-Build Team shall provide a series of three Arrow-per-Lane Guide Signs
 - At US 421 Southbound, Exit 238– The Design-Build Team shall provide a series of two Arrow-per-Lane Guide Signs
- At the US 421 / I-40 Business / Peters Creek Parkway Interchange – The Design-Build Team shall provide a minimum of four full-span overhead sign assemblies
- A freeway ends and “All Traffic Must Exit”
- A freeway and / or expressway lane ends (freeway / expressway lane drop)
- Three or more lanes on a freeway ramp
- Interchange Sequence Signs for closely spaced interchanges

The Design-Build Team shall locate, design and install overhead sign structures that meet all Department requirements, including the calculation of windload areas. The windload area shall be flush with the sign height, including exit panels, and sign width. In addition to the area of signs on the structure at the completion of the project, the windload area shall include the area of all future signs that have larger areas. The wind speed for the overhead sign structure and foundation designs for this project shall be 90 mph.

The Design-Build Team shall design, fabricate and install overhead sign supports and foundations in accordance with the *Foundation and Anchor Rod Assemblies for Metal Poles, Overhead and Dynamic Message Sign Foundations* and *Overhead Sign Supports Project Special Provisions* found elsewhere in this RFP.

For all overhead sign assemblies mounted on concrete median barrier, the Design-Build Team shall design, fabricate and install median barrier footing and median transitional barrier in accordance with the 2012 Roadway Standard Drawing No. 854.05.

The minimum vertical clearance beneath all existing overhead sign assemblies that require sign modification(s) and are retained shall be 17 feet. The vertical clearance beneath all proposed overhead sign assemblies shall be no less than 17 feet and no greater than 18 feet. For all overhead sign assemblies, the Design-Build Team shall submit documentation that verifies the actual vertical clearance at all critical points.

Lighting and walkways will not be required on any overhead sign assembly.

Pedestal Overhead Sign Structures

Pedestal mounted overhead signs will not be allowed at an exit direction sign location or at any location where Exit Only signs are required. Pedestal mounted overhead signs shall only be

allowed for advance guide signs and interchange sequence signing, if **all** of the following conditions are met:

- There are three or less travel lanes in each direction
- Only a single sign is required

Excluding interchange sequence signs for closely spaced interchanges, all pedestal mounted overhead signs shall be 1) located on the right side of the roadway, 2) located 25 feet or less from the edge of the travel lane and 3) protected by guardrail or other approved positive protection.

Shop Drawings for Overhead Sign Structures

The Design-Build Team shall prepare a shop drawing for each proposed and / or modified overhead sign structure for the Department's review and approval. For shop drawing design and submittal requirements, see *Guidelines for Preparation of Signing Plans for Design-Build Projects and Standard Specifications for Roads and Structures*.

Guardrail or other Positive Protection for Overhead Sign Supports

Except as allowed below, overhead sign supports shall be located a minimum of 40 feet from the edge of the outside travel lane to the center of the sign supports. To minimize right of way, utility, drainage and / or jurisdictional impacts, or to allow a cantilever overhead sign assembly in lieu of a full-span overhead sign assembly, the minimum 40-foot offset may be reduced. All overhead sign supports that are not located a minimum of 40 feet from the edge of the outside travel lane to the center of the sign support shall be protected by guardrail or other NCDOT approved positive protection barrier. When an overhead sign support is protected by guardrail, the face of the guardrail shall be located a minimum of eight feet from the center of the sign support.

The Design-Build Team shall review the protection for all existing overhead structure supports that require sign modification(s) and are retained to determine if the existing positive protection meets current requirements. If not, the Design-Build Team shall design and construct new positive protection that adheres to current requirements.

Cable-guide rail shall not be used as positive protection for overhead sign supports.

Verification of Theoretical Information shown on Structure Line Drawings

The Design-Build Team shall verify the information on the Structure Line Drawings prior to submittal of shop drawings for the Department's review and acceptance. At a minimum, the aforementioned verification shall include confirmation of the sign(s) positioning over lanes, span length, sign offsets, drops, and the slopes at the center line of the support / upright. When theoretical dimensions or slopes are revised during construction, the Design-Build Team shall submit a revision of the Structure Line Drawing with the shop drawing.

Existing Overhead Structures

Prior to modifying an existing overhead sign assembly to accommodate proposed signs, the Design-Build Team shall perform a structural analysis of the overhead sign structure in accordance with the 2009 AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals*, 5th Edition and the 2010 and 2011 Interim Revisions. The Design-Build Team shall obtain Department acceptance of the structural analysis prior to construction. The Design-Build Team shall replace all existing overhead sign assemblies determined to be structurally inadequate for the proposed modifications, in the Department's sole discretion.

Unless allowed otherwise elsewhere in the Scope of Work, when the aforementioned structural analysis determines that an existing overhead sign structure is structurally adequate to be retained, the Design-Build Team shall remove and dispose of all the existing overhead signs.

If only the Exit Panel is replaced for the I-40 Business corridor re-designation, the Design-Build Team will not be required to replace all signs on existing overhead sign structures.

The Design-Build Team shall install new signs on the retained existing overhead sign structure that adhere to the requirements herein. The Design-Build Team shall prepare Structure Line Drawings that depict 1) the existing signs to be removed, 2) the existing sign sizes, 3) the new sign designs, 4) the vertical clearance of all new signs, 5) the new signs positioning over travel lanes, 6) the lateral placement from supports, 7) the original windload area, and 8) confirmation that the proposed windload area does not exceed the original windload area.

Excluding overhead sign structures that only require the Exit Panel to be replaced for the I-40 Business corridor re-designation, the Design-Build Team shall remove and dispose of lighting systems and walkways on all existing overhead sign structures that require sign modification(s) and are retained. In accordance with the *Cutting of Steel Sign Hangers on Overhead Signs* Project Special Provision found elsewhere in the RFP, the Design-Build Team shall remove excess sign hangers.

Removal and Disposal of Existing Signs

Unless noted otherwise elsewhere in this RFP, the Design-Build Team shall determine which existing signs, sign supports, overhead signs, and / or overhead sign supports will not be needed or relevant when the project is completed. The Design-Build Team shall remove and dispose of these signs and sign supports.

Temporary Sign and Support Design

The Design-Build Team shall locate, design and install all temporary signs and sign supports. (Reference the Signing Requirements Section of the Transportation Management Scope of Work found elsewhere in this RFP for additional temporary signing requirements)

Sign Maintenance

During project construction, the Design-Build Team shall maintain all existing signs within the Roadway Construction Signing Limits (including all temporary sign installations that may be required by the Transportation Management Plans) and all signs within the US 421 / I-40 Business Signing Limits that require modification(s) to ensure the signs are in good condition, perform as intended, and are visible to motorists. All signs and supports remaining / existing at the completion of this project that were modified and / or installed shall be plumb, oriented correctly and adhere to AASHTO requirements.

Construction Revisions

After submittal of RFC Signing Plans, the Design-Build Team shall submit all construction revisions to the Department for review and acceptance prior to incorporation.

As-Built Plans

After project completion, the Design-Build Team shall provide final electronic Signing Plans to the Department. At a minimum, these plans shall include all revisions that took place during project construction and verifications for ground mounted sign supports and overhead structures. These plans shall be provided in .pdf and MicroStation format.

PAVEMENT MARKING SCOPE OF WORK (3-22-16)**General**

The Design-Build Team shall prepare Final Pavement Marking Plans in accordance with the latest edition of the *Manual on Uniform Traffic Control Devices (MUTCD)* effective on the Technical Proposal submittal date, the 2012 *Roadway Standard Drawings*, the *Guidelines for Preparation of Traffic Control and Pavement Marking Plans for Design-Build Projects*, the *Design-Build Submittal Guideline,s* and the contract requirements contained herein.

Final Pavement Marking Plan Requirements

The Design-Build Team shall select a Private Engineering Firm (PEF) that has experience designing and sealing Pavement Marking Plans for NCDOT on comparable projects. The Design-Build Team shall list projects in the Technical Proposal, including description and similarity to the subject project, for which the PEF developed Pavement Marking Plans.

The Design-Build Team shall develop Pavement Marking Plans that maintain all types of traffic (motorists, bicyclists, and pedestrians within the highway, including persons with disabilities in accordance with the Americans with Disabilities Act of 1990 (ADA), Title II, Paragraph 35.130) as defined by the *Manual for Uniform Traffic Control Devices (MUTCD)*.

If sidewalk is constructed, the Design-Build Team shall show and station all curb ramps in the Pavement Marking Plans for signalized intersections, non-signalized intersections and points of pedestrian crossings. Curb ramps shall be constructed per current ADA standards and with guidance from the 2012 *Roadway Standard Drawings*. If the roadway geometry does not allow for the use of standard details, contact the Contract Standards and Development Unit for alternate approved curb ramp designs.

Final Pavement Marking Project Limits

The Final Pavement Marking Plans shall address all required modifications to existing pavement markings and markers located outside the project limits to ensure appropriate tie-ins. The Design-Build Team shall install all pavement markings and markers located within and outside the project limits, resulting from the project construction.

Pavement Markings, Markers and Delineation

The Design-Build Team shall submit a complete set of Final Pavement Marking Plans that includes the -L- Line, all -Y- Lines, all ramps / loops, and all intersection modifications outside the roadway construction limits for review and acceptance. The Design-Build Team shall not place any final pavement markings or markers until the aforementioned Final Pavement Marking Plans are reviewed and accepted by the Department.

The Design-Build Team shall use pavement marking and marker products that conform to all NCDOT requirements and are listed on the NCDOT's Approved Products List. The use of any

devices that are not shown on the Approved Product List shall require written approval from the NCDOT Signing and Delineation Unit prior to incorporation.

The Design-Build Team shall install pavement markings and markers in accordance with the 2012 *Standard Specifications for Roads and Structures*, and in accordance with the manufacturer's procedures and specifications.

The Design-Build Team shall install pavement markings and pavement markers on the final surface as follows:

Road	Marking	Marker
US 421 / I-40 Business (-L-), including all ramps and loops	Polyurea with Highly Reflective Elements	Snowplowable (Raised on Concrete Bridge Decks)
All -Y- Lines	Polyurea with Highly Reflective Elements	No Marker

In accordance with the Black – White Combination (10' White Skip Lines / 10' Black Skip Lines) Detail provided by the Department and the *Epoxy Pavement Marking Material* Project Special Provision found elsewhere in this RFP, the Design-Build Team shall place black epoxy contrast markings on concrete pavement.

On asphalt surfaces, the Design-Build Team shall install Heated-in-Place Thermoplastic or Extruded Thermoplastic markings for stop bars, symbols, characters, crosswalks and diagonals.

On concrete surfaces, the Design-Build Team shall install Heated-in-Place Thermoplastic or Cold Applied Plastic (Type II or III) markings for stop bars, symbols, characters, crosswalks and diagonals.

Prior to placing pavement marking material on concrete surfaces that are diamond ground, the Design-Build Team shall use an acceptable method to grind ridges smooth only where pavement marking will be installed.

Using approved methods, the Design-Build Team shall remove residue and surface laitance on concrete bridge decks prior to placing final pavement marking materials. In accordance with approved methods and the 2012 *Standard Specifications for Road and Structures*, the Design-Build Team shall remove curing compound from all other concrete surfaces prior to placing final pavement marking materials.

On all Full Control of Access interstate facilities and US Routes the Design-Build Team shall install six-inch wide pavement markings, (i.e., lane lines, edge lines and skips) for the final

pavement marking. The Design-Build Team shall install gore lines that are twice the edge line width.

The Design-Build Team shall tie proposed pavement marking lines to existing pavement marking lines.

The Design-Build Team shall replace any pavement markings that have been damaged by the end of each day's operation.

The Design-Build Team shall only remove pavement markings from concrete surfaces by hydroblasting.

In accordance with the 2012 *Roadway Standard Drawings*, the Design-Build Team shall revise Lane Drop pavement markings to supplement signs that are modified within the US 421 / I-40 Business Corridor Signing Limits. (Reference the Signing Scope of Work found elsewhere in this RFP)

TRAFFIC SIGNALS AND SIGNAL COMMUNICATIONS SCOPE OF WORK (6-24-16)**I. GENERAL**

The Design-Build Team shall design and prepare plans for the temporary traffic signal installations required by the construction phasing and / or detour routes, permanent traffic signal installations, traffic signal revisions, and signal communication plans for connection to the existing City of Winston-Salem Signal System. This work shall include, but not be limited to, the preparation of Traffic Signal Plans, Metal Pole Loading Diagrams, Electrical and Programming Details, Utility Make-Ready Plans, Signal Communication Routing Plans including Splice Plans, and Project Special Provisions. These plans shall be prepared in accordance with the *Design-Build Submittal Guidelines*, and the *Guidelines for the Preparation of ITS & Signal Plans by Private Engineering Firms* available on the Design-Build website located at:

<https://connect.ncdot.gov/letting/Pages/Design-Build-Resources.aspx>

The Design-Build Team shall select a Private Engineering Firm (PEF) that has experience designing and sealing ITS & Signal Plans for NCDOT on comparable projects. The Technical Proposal shall list projects, including descriptions and similarity to the subject project, on which the PEF has developed ITS & Signal Plans.

A pre-design meeting shall take place between the NCDOT ITS & Signals Unit, the Design-Build Team, the Division 9 Traffic Engineer, the Regional Traffic Engineer, the City of Winston-Salem Transportation Department, and any other pertinent NCDOT personnel before signal designs begin. Traffic Signal Plan submittals shall only be reviewed and accepted by the NCDOT ITS & Signal Unit after this pre-design meeting. The Design-Build Team shall concurrently provide plan submittals to the NCDOT ITS & Signal Unit and the City of Winston-Salem Transportation Department. However, the NCDOT ITS & Signal Unit will ultimately be responsible for the traffic signal submittal reviews and comments. All Traffic Signal Plans shall be accepted by the ITS & Signals Unit prior to beginning traffic signal construction or plan implementation.

The Design-Build Team shall coordinate and implement all signal designs at the appropriate time as directed by the Engineer. Prior to final design and installation, the Design-Build Team shall coordinate all signal phasing recommendations with the Division 9 Traffic Engineer, the Regional Traffic Engineer, the City of Winston-Salem Transportation Department, and the NCDOT ITS & Signals Unit. Prior to placing traffic in a new pattern, all traffic signals shall be installed and operational, including but not limited to, signal system timing plans and interconnection to the Signal System, if required below.

Except as noted otherwise elsewhere in this RFP, the Design-Build Team shall maintain, monitor, and adjust the signals, both vehicle and pedestrian, as needed throughout the project construction. Excluding signal system timing plans, the Design-Build Team shall be responsible for the design and implementation of all temporary signal designs needed to maintain vehicular and pedestrian traffic during construction. If necessary, temporary traffic signal designs and

implementation, shall include, but not be limited to, new local controller, cables, poles, signal span, controllers, cabinets, and / or signal heads.

The Design-Build Team shall be responsible for the design of all temporary traffic signal timing plans needed to maintain vehicular and pedestrian traffic during construction, and all final traffic signal timing plans for the ultimate traffic configurations, including but not limited to using the 2021 *Build Conditions Alternative 1* traffic forecast volumes to design traffic signal timing plans required to return the temporary offsite intersection improvements to their original configurations. (Reference the Roadway Scope of Work found elsewhere in this RFP) The Design-Build Team shall coordinate all signal system timing adjustments with the City of Winston-Salem Transportation Department for implementation by City forces. However, prior to implementation, all signal system timing plans shall be reviewed and accepted by the NCDOT ITS & Signal Unit.

Throughout the project construction, the Design-Build Team shall maintain full actuation, of the traffic signals located within the roadway construction project limits, unless allowed otherwise by the Engineer in writing.

The Design-Build Team shall incorporate all traffic signals on this project into the Winston-Salem Signal System, which is currently being upgraded as part of TIP Project C-5224, and provide equipment that is compatible with the Winston-Salem Signal System. To connect sidewalk networks, the Design-Build Team shall provide crosswalks and pedestrian signal heads for all approaches, as appropriate, based on field conditions.

Unless noted otherwise below, all new final signal installations shall utilize galvanized metal strain poles for support. All temporary signal installations may utilize wood poles for signal supports. All plans and associated design material and specifications shall be reviewed and accepted by NCDOT before installation.

The Design-Build Team shall not impact or remove any existing fiber optic junction box with conduit access directly into the controller cabinet.

The Design-Build Team shall deliver all existing cabinets and contents, including but not limited to fiber and telephone modems, that are not reinstalled on this project to the Division 9 Traffic Operations Office located at 375 Silas Creek Parkway, Winston-Salem, NC 27127. The Design-Build Team shall dispose of and / or retain ownership of all other traffic signal equipment.

The Design-Build Team shall be responsible for a safe and economical design for the public. The Design-Build Team shall prepare all plans and designs in accordance with the current ITS & Signals Unit design standards, including but not limited to, the version of the following documents effective on the Technical Proposal submittal date:

- NCDOT *Standard Specifications for Roads and Structures*
- NCDOT *Standard Roadway Drawings*
- ITS & Signals Unit Project Special Provisions
- ITS & Signals Unit Design Manual

- *Manual on Uniform Traffic Control Devices (MUTCD)*
- *North Carolina Supplement to the Manual on Uniform Traffic Control Devices (NCMUTCD)*
- *Guidelines for the Preparation of ITS & Signal Plans by Private Engineering Firms*

Links to additional ITS & Signals Unit design standards and aides are available on website noted below:

<http://www.ncdot.gov/doh/preconstruct/traffic/ITSS/>

II. TRAFFIC SIGNALS

The Design-Build Team shall provide one (1) new traffic signal, upgrade fifteen (15) existing traffic signals, and remove three (3) existing traffic signals. All of these signals shall be interconnected into the City of Winston-Salem Signal System. (Reference Section III for the system interconnection requirements.) Unless existing as a pre-timed signal or the Department provides written approval otherwise, the vehicle detection for the final traffic patterns shall be inductive loop detection. The Design-Build Team may provide video detection only for temporary traffic patterns during construction. The required traffic signal work for each intersection is detailed below:

Proposed Signal (1)		
Signal Inventory Number	Intersection Description	Work Requirements
09-1101	NC 150 (Peters Creek Parkway) / US 421 SB / I-40 Business EB Ramps	<p>At this location, the Design-Build Team shall design and install a new, fully actuated traffic signal with a 2070L controller operating OASIS software, including base adapters / extenders, in a 170 cabinet.</p> <p>Unless the Department provides written approval otherwise, all final signal designs shall utilize inductive loop detection.</p> <p>The Design-Build Team shall use Flashing Yellow Arrow signal heads at all protected / permissive left turns. The Design-Build Team shall coordinate all Flashing Yellow Arrow signal recommendations with the NCDOT Division Traffic Engineer and the NCDOT Regional Traffic Engineer prior to final design and installation.</p> <p>The Design-Build Team shall use NCDOT galvanized standard metal strain poles as the signal supports for the final traffic patterns. The Design-Build Team may use wood poles as the signal supports for temporary construction phases, if needed.</p> <p>The Design-Build Team shall provide pedestrian signal heads at each approach with existing or proposed sidewalk.</p> <p>Prior to final design and installation, the Design-Build Team shall coordinate all signal phasing recommendations for NCDOT signals with the Division 9 Traffic Engineer, the Regional Traffic Engineer, the ITS & Signals Unit and the City of Winston-Salem.</p> <p>Prior to final design and installation, the Design-Build Team shall coordinate all signal phasing recommendations for City owned signals with the City of Winston-Salem.</p> <p>The Design-Build Team shall incorporate these signals into the Winston-Salem Signal System.</p> <p>Upon placing these signals in operation (includes all temporary operations), the Design-Build Team shall install the required system communication equipment as described in Section III.</p>

Existing Signals to be Upgraded / Rebuilt (5)		
Signal Inventory Number	Intersection Description	Work Requirements
09-0046	NC 150 (Peters Creek Parkway) / US 421 NB / I-40 Business WB Ramps	The Design-Build Team shall modify / upgrade these existing traffic signals to match all temporary construction phasing and the proposed final traffic pattern. This may require new signal supports, signal phasing changes, signal head changes, installation of an auxiliary file, and system interconnection equipment.
09-0140	NC 150 (Peters Creek Parkway) / Academy Street	These signals already have 2070 controllers. The Design-Build Team may reuse the existing controllers and cabinets (if feasible); however all traffic signals must remain in full operation during all temporary construction phases.
09-1313	SR 2516 (Martin Luther King Drive) / SR 2578 (Eighth Street) / Trade Street	The Design-Build Team shall rebuild / upgrade the signal heads at all protected / permissive left turns to Flashing Yellow Arrow signal heads. The Design-Build Team shall coordinate all Flashing Yellow Arrow signal recommendations with the Division 9 Traffic Engineer and the Regional Traffic Engineer prior to final design and installation.
09-1331	SR 1725 (Cherry Street) / SR 1770 (Marshall Street) / SR 2578 (Eighth Street)	Vehicle detection, if existing, shall be maintained for all movements throughout construction.
City Signal C-193	NC 150 (Peters Creek Parkway) / Second Street) / First Street	The Design-Build Team shall provide pedestrian signal heads at each approach with existing or proposed sidewalk. The Design-Build Team shall use wood poles as signal supports for all temporary construction phases and for the final traffic patterns at 09-0140, 09-1313, and 09-1331. Galvanized metal strain poles shall be used for the final traffic pattern at 09-0046. Metal strain poles with a black powder coated finish shall be used for the City owned signal (C-193) at NC 150 (Peters Creek Parkway) / First Street / Second Street intersection. These signals shall be interconnected into the Winston-Salem Signal System. See Section III for signal communication requirements.

Signal Modifications (10) for Detours, Resurfacing and / or Pavement Marking Modifications		
Signal Inventory Number	Intersection Description	Work Requirements
City Signal C-194	Broad Street / First Street	The Design-Build Team shall modify these existing traffic signals to match all temporary construction phasing and the proposed final traffic pattern. This may require new inductive loops, signal phasing changes, signal head changes, phase retiming, installation of an auxiliary output file, and / or system interconnection equipment.
09-0089	SR 1770 (Marshall Street) / SR 4008 (High Street)	
09-0081	SR 1770 (Marshall Street) / First Street	
09-0082	SR 1725 (Cherry Street) / First Street	
09-0137	SR 4315 (Liberty Street) / Cemetery Street	
City Signal	SR 4315 (Liberty Street) / First Street	The Design-Build Team shall upgrade the signal heads at all protected / permissive left turns to Flashing Yellow Arrow signal heads. The Design-Build Team shall coordinate all Flashing Yellow Arrow signal recommendations with the Division 9 Traffic Engineer and the Regional Traffic Engineer prior to final design and installation.
09-0138	SR 1824 (Main Street) / Cemetery Street	
City Signal	SR 1824 (Main Street) / First Street	Vehicle detection, if existing, shall be maintained for all movements throughout the life of the project.
City Signal	Church Street / First Street	The Design-Build Team shall provide pedestrian signal heads at each approach with existing or proposed sidewalk.
09-1311	SR 2516 (MLK Jr. Drive) / SR 1824 (Main Street) / SR 4315 (Liberty Street)	
		<p>If a temporary traffic pattern closes an intersection approach(s) that significantly reduces traffic through these intersections, the associated traffic signal(s) may operate in flash mode under the following criteria:</p> <ul style="list-style-type: none"> • The flash mode decreases traffic delays. • The flash mode does not compromise pedestrian safety through the intersection. <p>Prior to modifying a traffic signal to flash mode, the Design-Build Team shall obtain prior written Department approval. Prior to opening the closed intersection approach(s) to traffic, the Design-Build Team shall return the traffic signal to steady mode.</p> <p>These signals shall be interconnected into the Winston-Salem Signal System. See Section III for signal communication requirements.</p>

Existing Signals to be Removed (3)		
Signal Inventory Number	Intersection Description	Work Requirements
09-0136	Main Street / I-40 Business WB / US 158 WB / US 421 NB Ramps	As required by the Design-Build Team's Transportation Management Plans, the Design-build Team shall modify these existing traffic signals to match all temporary construction phasing.
09-1090	Broad Street / I-40 Business WB / US 158 WB / US 421 NB Ramps	The Design-Build Team shall remove these existing traffic signals. Prior to removal, the Design-Build Team shall coordinate with the Division 9 Traffic Engineer and the Regional Traffic Engineer. However, these traffic signals shall not be removed prior to the closure of the corresponding US 421 / I-40 Business ramps.
09-1091	Broad Street / I-40 Business EB / US 158 EB / US 421 SB Ramps	The Design-Build Team shall return the traffic signal controllers, cabinets, including all contents, and signal heads to the Division 9 Traffic Operations Office located at 375 Silas Creek Parkway, Winston-Salem, NC 27127. The Design-Build Team shall dispose of and / or retain ownership of all other traffic signal equipment.

III. SIGNAL COMMUNICATIONS PLANS

A. SIGNAL COMMUNICATIONS ROUTING PLANS

The Design-Build Team shall design, install, relocate, and maintain the following fiber optic communications network signal systems:

- a) City of Winston-Salem Signal System
- b) City of Winston-Salem Information System
- c) NCDOT ITS

One, all, or any combination of the fiber types / owners noted above (a, b or c) may be involved with any roadway segment of this project.

Throughout project construction, coordination to reduce the downtime / disruption of all the fiber optic communications network signal systems is critical. The Design-Build Team shall coordinate all proposed downtime and / or disruptions in service with each fiber owner noted above.

Reference the ITS Scope of Work found elsewhere in this RFP for additional ITS requirements.

B. REFERENCE MATERIALS / PLANS

For informational purposes only, the Department has provided plans for Project C-5224A - Phase A; Eastern Section and Downtown Traffic Signal Designs, and Project C-5224B - Western Section Traffic Signal Designs, for the Winston-Salem Signal System.

These plans show the approximate locations of signals and fiber lines, along with Splice Plans, for both the City of Winston-Salem's Signal System and the City of Winston-Salem's Information System. Also included is information pertaining to the fiber for NCDOT CCTV cameras and DMS signs.

C. PROJECT OPERATION REQUIREMENTS

Intermediate Contract Time #22 for Failure to Repair a Damaged Traffic Signal Fiber Optic Communications Cable and Restore Communication

The Design-Build Team shall repair all existing traffic signal fiber optic communication cables damaged during construction. The Design-Build Team shall immediately report damages to the Engineer and the Triad Regional Transportation Management Center (TRTMC) at (336) 315-7080. The Design-Build Team shall repair all damages within 24 hours at no cost to the Department, the City of Winston-Salem or the City of Winston-Salem Information Systems Department. The Design-Build Team shall bring all affected traffic signal fiber optic communication cables back on line within the same 24 hours. A "damaged" traffic signal fiber optic communications cable is any fiber communications cable that is determined damaged due to an accidental or unscheduled outage event.

Liquidated Damages for Intermediate Contract Time #22 for failure to repair a damaged traffic signal fiber optic communications cable and restore communication within 24 hours are \$500.00 per hour or any portion thereof.

Intermediate Contract Times #23 and #24 for Failure to Reestablish Traffic Signal Fiber Communications

During construction, the Design-Build Team shall coordinate any disruption in traffic signal fiber optic communications with the Engineer and fiber owner. The Design-Build Team shall notify the Engineer and fiber owner a minimum of seven days prior to all proposed disruptions in service. A minimum of 21 days prior to any disruption in traffic signal fiber optic communications, the Design-Build Team shall develop and provide a plan for the Department's approval that defines 1) an anticipated disruption timeframe and 2) a plan of action for reestablishing traffic signal communications within a 72-hour period.

Liquidated Damages for Intermediate Contract Time #23 for failure to reestablish traffic signal fiber communications within 72 hours are \$2,500.00 per 12-hour period or any portion thereof.

Liquidated Damages for Intermediate Contract Time #24 for failure to provide a plan that defines 1) an anticipated traffic signal fiber optic communications disruption timeframe and 2) a plan of action for reestablishing traffic signal communications a minimum of 21 days prior to a proposed disruption are \$10,000.00 per failure.

D. SIGNAL COMMUNICATION SYSTEMS

1. NC 150 (Peters Creek Parkway) / I-40 Business Interchange

Owners:

- a) City of Winston-Salem Signal System - Fiber
- b) City of Winston-Salem Information System - Fiber
- c) NCDOT ITS - Fiber

SIGNAL INV #	INTERSECTION	OWNERS INVOLVED	DESCRIPTION OF WORK
C-193 EXISTING	Peters Creek Parkway / First Street	a, b, c	Maintain / relocate / install communications.
09-0046 EXISTING	Peters Creek Parkway / I-40 Business WB Exit / Entrance Ramp	a, b, c	Maintain / relocate / install communications
09-1101	Peters Creek Parkway / I-40 Business EB Entrance / Exit Ramp	a	Add to Winston-Salem Signal System once signal is installed
City of Winston- Salem Signal System	From Peter Creek Parkway westward, through gore area of I-40 Business EB Exit Ramp, to parallel run along Apple Street	a, b	Maintain / relocate / install communications.
City of Winston- Salem Signal System (HUB CABINET – “D”)	From Peters Creek Parkway eastward, through gore area of I-40 Business EB Entrance / Exit Ramp, to parallel run along Apple Street	a, b	Maintain / relocate / install communications and hub cabinet, as necessary.

2. Broad Street / I-40 Business Interchange

Owners:

- a) City of Winston-Salem Signal System - Fiber
- b) City of Winston-Salem Information System - Fiber
- c) NCDOT ITS - Fiber

SIGNAL INV #	INTERSECTION	OWNERS INVOLVED	DESCRIPTION OF WORK
C-194 and Splice Cabinet	Broad Street / First Street	a, b, c	Possible relocation of signal cabinet and splice cabinet
09-1090	Broad Street / I-40 Business WB Entrance / Exit Ramps	a, b, c	Ramp signal to be removed. Maintain communications through system
09-1091	Broad Street / I-40 Business EB Entrance / Exit Ramps	a, b	Ramp signal to be removed. Maintain communications through system

3. Marshall Street / I-40 Business Interchange

Owners:

- a) City of Winston-Salem Signal System - Fiber
- b) City of Winston-Salem Information System - Fiber
- c) NCDOT ITS - Fiber

SIGNAL INV #	INTERSECTION	OWNERS INVOLVED	DESCRIPTION OF WORK
09-0089	Marshall Street / High Street	a	Maintain communications to signal. Communications does not cross I-40 Business. It originates south of the intersection.

4. Liberty Street / I-40 Business Interchange

Owners:

- a) City of Winston-Salem Signal System - Fiber
- b) City of Winston-Salem Information System - Fiber
- c) NCDOT ITS - Fiber

SIGNAL INV #	INTERSECTION	OWNERS INVOLVED	DESCRIPTION OF WORK
09-0137	Liberty Street / Cemetery Street	a, b	Maintain communications.

5. Main Street / I-40 Business Interchange

Owners:

- a) City of Winston-Salem Signal System – Wireless and Fiber
- b) City of Winston-Salem Information System - Fiber
- c) NCDOT ITS - Fiber

SIGNAL INV #	INTERSECTION	OWNERS INVOLVED	DESCRIPTION OF WORK
09-0136	Main Street / I-40 Business Exit Ramp	a	Maintain communications to signal
09-0137	Liberty Street / Church Street	a, b	Maintain communications to signal
09-0138	Main Street / Cemetery Street	a, b	Maintain communications to signal

6. Cherry Street / I-40 Business Interchange

No known Fiber.

7. Church Street / I-40 Business Interchange

Owners:

- a) City of Winston-Salem Signal System – Wireless and Fiber
- b) City of Winston-Salem Information System - None
- c) NCDOT ITS - Fiber

An existing 72 fiber cable begins at First Street and runs southward, along the west side of Church Street to Cemetery Street. This cable is **CRITICAL** to the Winston-Salem Signal System as it contains the City's redundant fiber rings (A, B, C & D; as shown on the Winston-Salem Signal System Plans provided by the Department). The fiber originates in the Bryce A. Stuart Municipal Building, which is the control center for the Winston-Salem Signal System. The fiber leaves the Municipal Building and enters a duct-bank owned by Time Warner Cable. The fiber exits the duct bank in proximity to the Church Street / I-40 Business Overpass and continues southward on a pole line along Church Street to Cemetery Street. This fiber was installed under TIP Project U-2826B.

8. Eighth Street Corridor

Owners:

- a) City of Winston-Salem Signal System - Fiber
- b) City of Winston-Salem Information System - Fiber
- c) NCDOT ITS - Fiber

SIGNAL INV #	INTERSECTION	OWNERS INVOLVED	DESCRIPTION OF WORK
09-1331	Eighth Street / Marshall Street	a, b	Maintain communications
No Signal	Eighth Street / Oak Street	a, b	Fiber runs northward along Oak Street where it intersects Eight Street and then runs eastward along Eight Street to 09-1312. Additionally, fiber enters the Public Safety Center in this area. Maintain communications.
09-1313	Eighth Street / Trade Street	a, b	Maintain communications
09-1311	MLK Jr. Drive / Main Street / Liberty Street	a	Maintain communications along Eight Street to the signal cabinet.

9. NC 150 (Peters Creek Parkway) / Academy Street Interchange

Owners:

- a) City of Winston-Salem Signal System - Fiber
- b) City of Winston-Salem Information System - Fiber
- c) NCDOT ITS - Fiber

SIGNAL INV #	INTERSECTION	OWNERS INVOLVED	DESCRIPTION OF WORK
09-0140	NC 150 (Peters Creek Parkway) / Academy Street	a, b	Maintain communications
CCTV – Winston-Salem	NC 150 (Peters Creek Parkway) / Academy Street	a	Maintain communications

E. PLANS AND SUBMITTALS

The Signal Communications Routing Plans and Project Special Provisions shall consist of the two major items listed below:

- Signal Communications Routing Plans, including Splice Plans

- **Project Special Provisions**

Prior to construction, the Design-Build Team shall provide a detailed set of Signal Communications Routing Plans and Project Special Provisions for the Department's review and acceptance. No construction related to the installation of the communications system shall begin until NCDOT has accepted the RFC Signal Communications Routing Plans and Project Special Provisions. The Design-Build Team shall concurrently provide Signal Communications Routing Plans and Project Special Provisions submittals to the affected utility owners for review and comments.

The Design-Build Team shall schedule coordination meetings with each affected utility owner and pertinent NCDOT personnel.

Where the existing underground communications systems are comprised of multiple conduit segments / spares, the Design-Build Team shall ensure the revised systems are identical to the spare runs of conduits.

Utility Make-Ready Plans

In conjunction with the development of the Traffic Signal Plans and Signal Communications Routing Plans, the Design-Build Team shall also develop a set of Utility Make-Ready Plans.

The Design-Build Team shall install all traffic signal equipment, communications cables and conduit systems in such a manner that avoids conflicts with other utilities. All aerial communications cable installations shall be installed in accordance with the National Electrical Safety Code. The Design-Build Team shall be responsible for coordinating all Utility Make Ready Work with the proper utility representatives.

F. MATERIALS

When existing equipment (signal cabinets, hub cabinets, Ethernet equipment, electronic equipment, fiber, conduit, messenger cable, etc.) is replaced, the Design-Build Team shall replace existing equipment with new equipment. All material, equipment and work shall adhere to the 2012 *Standard Specifications for Roads and Structures* requirements. Materials, where applicable, shall be pre-approved on the Department's QPL. The QPL web site is:

<https://connect.ncdot.gov/resources/safety/Pages/default.aspx>

Prior to incorporation, the Design-Build Team shall provide detailed specifications for all material, equipment and / or work that is not covered in the 2012 *Standard Specifications for Roads and Structure* for Department approval . The Design-Build Team shall provide specifications and plans that address the material requirements and construction methods. No equipment or material shall be installed until it has been approved by the Department in writing. Catalog cuts will not be required for items on the QPL. Items not listed on the QPL will require Department written approval prior to incorporation.

Unless noted otherwise elsewhere in this RFP, the Design-Build Team shall return all existing electronic equipment to the Department. A minimum of one week prior to removal of electronic equipment, the Design-Build Team shall contact J. P. Couch, PE,

Division 9 Traffic Engineer during normal business hours (336-747-7800), to coordinate a specific day and time for the Design-Build Team to deliver the salvaged material to the Department. Prior to delivery to the Department, the Design-Build Team shall stockpile all salvaged material to prevent damage.

G. MAINTENANCE AND REPAIR REQUIREMENTS

From the beginning of construction until the final project acceptance, the Design-Build Team shall maintain and repair all system components within the project scope, including but not limited to, signal cabinets, loops, signal heads, conduit systems, communications lines, HUB cabinets, etc. After project acceptance, the Design-Build Team shall perform all system repairs resulting from faulty materials and / or workmanship, in accordance with the *Twelve Month Guarantee* Project Special Provision found elsewhere in this RFP, or longer if the Design-Build Team extends the aforementioned warranty period.

H. PLAN OF RECORD DOCUMENTATION

The Design-Build Team shall prepare and submit to the Department Plan of Record (POR) documentation that depicts the conduit and equipment device locations. The Design-Build Team shall submit final POR documentation in electronic and hard copy format for acceptance by the Department. At a minimum, the POR documentation shall include, but not be limited to, the following:

- Electronic plans in MicroStation (latest release in use by the Department) format on CD
- Hard copy documentation on 22 x 34 inch plan sheets
- Final location and depth of conduits, wiring external to the cabinets, locations of splice closures, junction box locations, and SMFO cable terminations
- Real world coordinates for all devices, splice enclosures, junction boxes, and equipment cabinets installed or utilized under this project
- Coordinates in English units using the North Carolina State Plane coordinate system (1983 North American Datum also known as NAD '83)
- Coordinates that do not deviate more than 1.7 feet in the horizontal plane and 3.3 feet in the vertical plane. Global positioning system (GPS) equipment able to obtain the coordinate data within these tolerances may be used

I. LOCAL AREA NETWORK

The Design-Build Team shall furnish and install media access control (MAC) addresses for all equipment utilized as part of this project. MAC address labels shall be affixed to each device utilized. IP addresses shall be furnished for all equipment utilized as part of this project. When replacing existing equipment or installing new equipment, IP address information shall be obtained from the equipment operator to ensure proper operations within their respective systems. Final IP address labels shall be affixed to each device utilized. LAN equipment shall be fully integrated, providing local device failover and fault tolerance, virus protection, user authentication, and security functions to prevent unauthorized user and data from entering the LAN.

The Design-Build Team shall ensure that all plans and designs conform to the NCDOT and NC Statewide IT Policies and Standards as described at <https://www.scio.nc.gov/mission/itPoliciesStandards.aspx>. The Design-Build Team shall submit all architecture of the IT modules for review and approval by NCDOT IT and the NC Office of Information Technology architecture groups.

J. INTEGRATION & TESTING

The Design-Build Team shall integrate each system device with its respective system, and work with the system operator to ensure that each device is functioning properly within the system.

The Design-Build Team shall develop unit and system test plans and procedures for each device and component and submit to the Engineer for review and approval. This includes, but is not limited to, signal equipment, fiber optic communications cable, local and central equipment. Upon completion of the system installation and integration, the Design-Build Team shall conduct unit and system tests according to the approved test plans and procedures. The Design-Build Team shall be responsible for providing all necessary test equipment.

In case of failures and substandard performance, the Design-Build Team shall identify the cause of failure and / or substandard performance, repair or replace the faulty parts and components and repeat the test. If the problem persists, the Design-Build Team shall replace the entire unit causing the problem prior to repeating the test at no additional cost.

After successful completion of all units and system test, the Design-Build Team shall submit the test reports, along with the record of repairs and part replacements, to the Engineer.

ITS SCOPE OF WORK (7-18-16)**GENERAL**

Design, furnish, and install the following ITS devices and communications cable system along US 421 / I-40 Business between the proposed CCTV to be installed at the US 158 (Reidsville Road) / US 421 / I-40 Business interchange to the proposed DMSs to be installed along US 421 / I-40 Business between Exits 1 and 2. Relocate existing ITS devices that are impacted by the construction activities as described in this Scope of Work. Interconnect the new fiber optic communications cables with existing fiber optic communications cable. Integrate the new DMS and CCTV devices into the existing computer and network hardware and software at the NCDOT Triad Regional Transportation Management Center (TRTMC) Transportation Management System (TMS) located at 201 South Chimney Rock Road, Greensboro, NC 27409. Major items of work include, but are not limited to, the following:

- Conduit System (two – 2 inch conduits for communication and one – 2 inch conduit for electrical)
- 144 fiber single-mode fiber optic communications cable with tracer wire
- Fiber optic drop cable assemblies with tracer wire
- Junction boxes
- Wood Poles
- Metal Poles
- Splice enclosures
- One (1) Digital CCTV camera
- Four (4) New 8' x 15' Front Access Dynamic Message Signs (DMS) on pedestal mount structures. Relocate one (1) existing DMS on a new overhead or pedestal mount DMS structure
- Electrical service equipment
- Local Area Network equipment

Furnish and install guardrail to protect the ITS devices, as required.

Determine the location of each ITS device, obtain the Engineer's approval of the locations, install and implement test procedures, and integrate the devices with the TRTMC.

Prior to any underground work, locate existing utilities, communications cable, power cable, and adjust work activities to protect these facilities. Immediately cease work and notify the Engineer and the affected owners if damage to existing utilities occurs. Repair damages to existing utilities, communications cable, and / or power cable at no cost to the Department.

Perform all work in accordance with the *Dynamic Message Sign* and *High Definition CCTV Metal Pole and Field Equipment* Project Special Provisions found elsewhere in this RFP, the 2012 NCDOT *Standard Specifications for Roads and Structures* and the 2012 NCDOT *Roadway Standard Drawings*.

Refer to the Traffic Signals and Signal Communications Scope of Work for additional ITS and fiber optic communications requirements.

PROJECT OPERATION REQUIREMENTS

Intermediate Contract Time #25 for Failure to Repair a Damaged ITS Fiber Optic Communications Cable and Restore Communication

The Design-Build Team shall repair all existing fiber optic communication cables damaged during construction. The Design-Build Team shall immediately report damages to the Engineer and TRTMC at (336) 315-7080. The Design-Build Team shall repair all damages within 24 hours at no cost to the Department, the City of Winston-Salem or the City of Winston-Salem Information Systems Department. The Design-Build Team shall bring all affected ITS fiber optic communication cables back on line within the same 24 hours. A “damaged” ITS fiber optic communications cable is any fiber communications cable that is determined damaged due to an accidental or unscheduled outage event.

Liquidated Damages for Intermediate Contract Time #25 for failure to repair a damaged ITS fiber optic communications cable and restore communication within 24 hours are \$500.00 per hour or any portion thereof.

Intermediate Contract Times #26 and #27 for Failure to Reestablish ITS Fiber Communications

During construction, the Design-Build Team shall coordinate any disruption in ITS fiber optic communications with the Engineer and fiber owner. The Design-Build Team shall notify the Engineer and fiber owner a minimum of seven days prior to all proposed disruptions in service. A minimum of 21 days prior to any disruption in ITS fiber optic communications, the Design-Build Team shall develop and provide a plan for the Department’s approval that defines 1) an anticipated disruption timeframe and 2) a plan of action for reestablishing ITS communications within a 72-hour period.

Liquidated Damages for Intermediate Contract Time #26 for failure to reestablish ITS fiber optic communications within 72 hours are \$2,500.00 per 12-hour period or any portion thereof.

Liquidated Damages for Intermediate Contract Time #27 for failure to provide a plan that defines 1) an anticipated ITS fiber optic communications disruption timeframe and 2) a plan of action for reestablishing ITS communications a minimum of 21 days prior to a proposed disruption in service are \$10,000.00 per failure.

DESIGN REQUIREMENTS

Design the field-to-center communication network using Gigabit Fiber Optic Ethernet technology. For all equipment not specified herein, including but not limited to, encoders and Ethernet equipment, provide product specifications for the Department’s review and approval

prior to incorporation. Furnish, install, and / or upgrade all field and central equipment, including but not limited to, encoders and switches. Furnish managed Ethernet routing switches and edge switches that provide Ethernet connectivity at transmission rates of 1000 megabits per second from each ITS device to the TRTMC.

Reuse and maintain the current fiber optic network equipment and configuration.

Splice into the existing fiber optic communications cable. (Reference the "U-2827B_C-5620A" Teamsite for existing fiber optic communications plans)

Prior to beginning construction within the Norfolk Southern Railway Corporation (NSRC) right of way, the Design-Build Team shall adhere to all of the NSRC requirements. (Reference the *Requirements for Cables Crossing Railroads* Project Special Provision found elsewhere in this RFP)

DIGITAL CCTV CAMERA

Strategically locate and install one (1) digital CCTV camera on a 50-foot CCTV metal pole at the US 158 (Reidsville Road) / US 421 / I-40 Business interchange that views both corridors, with US 421 / I-40 Business being the priority.

Determine the exact location of the CCTV camera, obtain Engineer's approval of the location, and install the camera. Furnish site survey, including but not limited to bucket truck surveys, to ensure camera coverage areas are acceptable.

It may be necessary to relocate the existing CCTV cameras and fiber optic communications cable impacted by the project construction. Existing CCTV cameras that may be impacted include the following locations:

1. NC 150 (Peters Creek Parkway) / US 421 / I-40 Business Interchange - Gore area of I-40 Business eastbound exit / entrance ramp
2. Broad Street / US 421 / I-40 Business Interchange – Gore area of I-40 Business westbound exit / entrance ramps
3. Main Street / US 421 / I-40 Business Interchange - Northwest Quadrant
4. US 421 / I-40 Business east of Church Street - South side of US 421 / I-40 Business
5. NC 150 (Peters Creek Parkway) / Academy Street Interchange - City of Winston-Salem CCTV

NEW DMS

The Design-Build Team shall locate, design and install four (4) new front access DMSs. Determine the exact location of the DMSs, obtain the Engineer's approval of the locations, and install the DMSs. Locate the DMS in the following areas:

1. Eastbound US 421 / I-40 Business between Exit 1 (I-40 / US 421) and Exit 2 (Silas Creek Parkway)

2. Eastbound US 421 / I-40 Business between Exit 7 (East Fifth Street) and Exit 8 US 158 (Reidsville Road)
3. Westbound US 421 / I-40 Business between Exit 5 (Peter's Creek Parkway) and Exit 6 (US 52)
4. Westbound US 421 / I-40 Business between Exit 1 (I-40 / US 421) and Exit 2 (Silas Creek Parkway)

The DMSs installed under this project must be selected from the NCDOT ITS & Signals 2012 Qualified Products List.

EXISTING DMS

The Design-Build Team shall disconnect, remove and stockpile the existing full size walk-in DMS and remove and dispose of the existing DMS structure located on US 421 / I-40 Business west of Broad Street. The Design-Build Team shall re-install the existing DMS on a new overhead span structure or pedestal mount structure. The new DMS location and structure type must be approved by the Engineer.

The removal, transport, stockpiling and installation of the existing DMS shall be in accordance with the requirements noted below:

- Prior to disconnecting and / or removing the existing DMS, the following shall occur:
 - To demonstrate that the DMS is fully operational, the Design-Build Team shall perform a DMS Operational Field Test in accordance with the DMS Testing Requirements Section of the *Dynamic Message Sign* Project Special Provision found elsewhere in this RFP. The aforementioned DMS Operational Field Test shall occur under the observation of Department representatives.
 - To document the DMS condition, the Design-Build Team shall take pictures of the DMS and provide them to the Engineer. Prior to the Design-Build Team beginning the disconnection and / or removal process, the Engineer shall concur that the pictures sufficiently document the DMS condition.
- The Design-Build Team shall disconnect and remove the DMS and associated equipment. Except as directed otherwise by the Engineer, the Design-Build Team shall stockpile the removed DMS and associated equipment.
- To ensure that the DMS and associated equipment are not damaged, the Design-Build Team shall adhere to all manufacturer requirements, and use the appropriate equipment / methods, included but not limited to, fastening belts, during their removal, transport, stockpiling, and installation.
- In the event that the Design-Build Team damages the existing DMS and / or associated equipment, the Design-Build Team shall immediately report the damages to the Engineer. Prior to performing the DMS Operational Field Test required after installation (see below),

the Design-Build Team shall repair or replace the damaged DMS and / or associated equipment.

- The Design-Build Team shall determine the exact location of the new overhead span structure / pedestal mount structure and obtain the Engineer's approval of the location prior to installing the overhead span structure / pedestal mount structure.
- The Design-Build Team shall install the existing DMS and all associated equipment and cabling on the new DMS overhead structure as described below. Once the DMS is installed and the Department has approved all required repairs / replacements, the Design-Build Team shall perform a DMS Operational Field Test in accordance with the requirements noted above.

CONDUIT

Furnish and install two (2) – 2 inch conduits (for communication) and all necessary hardware, including tracer wire and delineator markers by 1) plowing, trenching or directional drilling in accordance with Section 1715 and 1733 of the 2012 NCDOT *Standard Specifications for Roads and Structures* for installing the fiber optic communications cable, and / or 2) in accordance with the Structures Scope of Work found elsewhere in this RFP. Conduit shall not be placed in the median or under the roadway, except for lateral traverse crossings.

Intercept the existing conduit installed at US 421 / I-40 Business and Martin Luther King Jr. Boulevard (MLK Jr. Drive) and install new conduit from this location WB within the NCDOT right-of-way to the proposed DMS located EB / WB at US 421 / I-40 Business between Exits 1 and 2.

Furnish and install one (1) – 2 inch conduit and all necessary hardware by trenching or directional drilling in accordance with Section 1715 of the 2012 NCDOT *Standard Specifications for Roads and Structures* for installing the power service to the ITS devices.

Upon completion of the conduit installation furnish the Engineer with Plan of Record documentation showing the horizontal and vertical locations of the installed conduits.

JUNCTION BOXES

Furnish and install junction boxes (pull boxes) with all necessary hardware in accordance with Section 1098-5 of the 2012 NCDOT *Standard Specifications for Roads and Structures*. Provide oversized junction boxes with minimum inside dimensions of 36"(l) x 24"(w) x 24"(d) for installing fiber optic communications cable. Install junction boxes at maximum intervals of fifteen hundred (1500) feet or at locations where underground splicing is necessary.

Furnish and install junction boxes (pull boxes) with all necessary hardware in accordance with Section 1098-5 of the 2012 NCDOT *Standard Specifications for Roads and Structures*. Provide standard junction boxes with minimum inside dimensions of 16"(l) x 10"(w) x 10"(d) for electrical service.

Terminate the fiber optic communications cable in an oversized junction box with a splice enclosure capable of accepting a minimum of six cables at the proposed DMSs located on US 421 / I-40 Business, eastbound and westbound, between Exits 1 and 2.

WOOD POLES

Furnish and install wood poles, with all necessary grounding systems and hardware necessary in accordance with Section 1720 of the 2012 NCDOT *Standard Specifications for Roads and Structures*. Provide wood poles sized as necessary for the intended application.

Use 6" x 6" x 8' treated wood posts for underground electrical service structures.

Furnish and install related items of work including but not limited to risers with weatherhead or heat shrink tubing and all necessary hardware in accordance with Section 1720 of the 2012 NCDOT *Standard Specifications for Roads and Structures*.

CCTV METAL POLES

Design, furnish and install 50-foot CCTV metal poles with drilled pier foundations, grounding systems, and all necessary hardware.

Reference the *High Definition CCTV Metal Pole and Field Equipment* Project Special Provision found elsewhere in this RFP for detailed material specifications and construction requirements.

FIBER OPTIC CABLE / DROP CABLE

Furnish and install a 144 single mode fiber-optic communications cable, drop cable assemblies, and all necessary hardware in accordance with the Section 1098-10 of the 2012 NCDOT *Standard Specifications for Roads and Structures*.

Comply with the testing requirements in accordance with the Section 1731 of the 2012 NCDOT *Standard Specifications for Roads and Structures*.

Install drop cable assemblies to the existing CCTV camera located at US 421 / I-40 Business and MLK Jr. Drive. Install drop cable assemblies to all existing CCTV camera locations that are relocated as part of this project.

ELECTRICAL SERVICE

Install new electrical service with 200 Amps, 240/120 VAC service drops for each ITS device. Furnish and install related items of work, including, but not limited to standard size junction boxes, risers, guy assemblies, and wood poles with all necessary hardware in accordance with Section 1700 of the 2012 NCDOT *Standard Specifications for Roads and Structures*. (Reference the Utilities Coordination Scope of Work found elsewhere in the RFP for additional coordination / approval requirements and payment responsibilities)

FIBER-OPTIC SPLICE CENTERS

Furnish and install fiber-optic splice enclosures and all necessary hardware where required to join fiber optic cables. Comply with the Section 1731 of the 2012 NCDOT *Standard Specifications for Roads and Structures*.

Modify existing splice enclosures impacted by the project if necessary. Obtain approval from the Engineer prior to entering any existing splice enclosures.

Within enclosures, provide the necessary number of hinged mountable splice trays to store the number of splices required, plus the capacity to house twelve (12) additional splices. Provide a fiber containment basket for storage of loose buffer tubes that are expressed through the enclosure. Ensure enclosures allow sufficient space to prevent damage of the buffer tubes when coiled.

LOCAL AREA NETWORK

Furnish and install new local area network (LAN) equipment. Furnish equipment that complies with IEEE Standard 802. Furnish Ethernet Switches that comply with UL60950 or CSA C22.2 No. 60950 and FCC Part15 Class A for EMI emissions. Furnish all necessary equipment for a complete LAN, including but not limited to field-hardened video encoders; central video decoders (if applicable); central media converters; field Ethernet switches; and core Ethernet switches.

Conform to the NCDOT and NC Statewide IT Policies and Standards as described at <http://it.nc.gov/statewide-resources/policies>. The architecture of the IT modules must be approved by NCDOT IT and the NC Office of Information Technology architecture groups.

OTHER CODES AND STANDARDS

All ITS materials shall conform to the latest version of the applicable standards of the National Electrical Code (NEC), National Electric Manufacturer's Association (NEMA), the Underwriters' Laboratories, Inc. (UL), the Electronic Industries Association (EIA), the International Municipal Signal Association (IMSA), and the National Electrical Safety Code (NESC). All materials and workmanship must conform to the requirements of the NESC, standards of the American Society for Testing and Materials (ASTM); American National Standards Institute (ANSI). Comply with all federal laws, state laws, and city codes in accordance with the 2012 NCDOT *Standard Specifications for Roads and Structures*.

SUBMITTALS

Submit a 50% set of preliminary plans, 90% set of preliminary plans, and 100% set of project plans, including specifications for materials, catalog cuts, and installation and testing requirements for review and acceptance by the Department. No construction of the ITS devices and / or relocation of communications cable shall begin until the Department has accepted the 100% plans and specifications. Provide the Department with a minimum of 10 working days for each review.

MATERIALS & CONSTRUCTION

Furnish and install new materials and hardware that meet the requirements of the 2012 NCDOT *Standard Specifications for Roads and Structures* and this Scope of Work.

DIGITAL CCTV CAMERA

Install a new digital CCTV camera on a new metal pole. Install digital CCTV equipment in a 336S equipment cabinet mounted on the pole. Install the following minimum equipment in the digital CCTV equipment cabinet:

- Digital Video Encoder
- 4-port Field Ethernet switch with two long haul fiber optic ports for single mode fiber optic cable
- Fiber optic Interconnect Center
- Power equipment including power supplies, circuit breakers, surge protectors, and other related materials.

At the digital CCTV camera location, install six-fiber fiber optic drop cable in 2-inch underground conduit. Splice the drop cable into the new 144-fiber fiber optic trunk cable as approved by the Engineer.

Refer to the *High Definition CCTV Metal Pole and Field Equipment* Project Special Provision found elsewhere in this RFP for detailed material specifications and construction requirements.

DYNAMIC MESSAGE SIGNS

At locations approved by the Engineer, install DMSs on the structure type required elsewhere in this RFP. Install DMS equipment in an approved equipment cabinet mounted on the structure. Install the following minimum equipment in each DMS equipment cabinet:

- DMS controller
- 4-port Field Ethernet switch
- UPS and power equipment, including power supplies, circuit breakers, surge protectors, and other related materials

Refer to the *Dynamic Message Sign* Project Special Provision found elsewhere in this RFP for detailed material specifications and construction requirements.

SINGLE MODE FIBER OPTIC COMMUNICATIONS CABLE AND DROP CABLE

Reference Section 1098-10, 1098-11, 1730, and 1731 of the 2012 NCDOT *Standard Specifications for Roads and Structures*.

CONDUIT

Furnish and install two (2) – 2 inch inside diameter conduits and all necessary hardware in accordance with Sections 1091 and 1715 of the 2012 NCDOT *Standard Specifications for Roads and Structures* and / or in accordance with the Structures Scope of Work found elsewhere in this RFP, as appropriate.

TRACER WIRE

Furnish "green" insulated Number 14 AWG, THWN, stranded, copper wire to serve as a tracer wire in one of the conduits. Install the tracer wire in the same conduit through the entire length of the conduit system. Where tracer wire is spliced, provide waterproof butt splices. Splicing shall only be allowed only in junction boxes.

JUNCTION BOXES

Furnish and install oversized junction boxes (pull boxes) at maximum intervals of fifteen hundred (1500) feet and as necessary for device installation and directional drilling conduit segments in accordance with Sections 1098-5 and 1716 of the 2012 NCDOT *Standard Specifications for Roads and Structures*.

Furnish and install standard size junction boxes at locations requiring electrical service in accordance with Sections 198-5 and 1700 of the 2012 NCDOT *Standard Specifications for Roads and Structures*.

Provide junction box covers with standard “NCDOT Fiber-Optic Cable” or “Electrical Service” logo, pull slots and stainless steel pins.

Comply with Article 1411-3 of the 2012 NCDOT *Standard Specifications for Roads and Structures*, except as follows:

Install junction boxes flush with finished grade.

Do not install sealant compound between junction boxes and covers.

Install junction boxes where underground splicing of cable is necessary and where transitioning from below ground to above ground installation or vice-versa.

DELINEATOR MARKERS

Furnish and install delineator markers with all necessary hardware in accordance with the provisions of Section 1098-13 and 1733 of the 2012 NCDOT *Standard Specifications for Roads and Structures*.

Place delineator markers at every splice and junction box location.

Provide text, including the division contact number that is hot stamped in black on a yellow background material that will not fade or deteriorate over time. Provide delineator markers with a nominal message height of 15 inches and that contain the following text visible from all directions approaching the assembly:

**WARNING
NCDOT FIBER OPTIC CABLE
BEFORE EXCAVATING OR
IN AN EMERGENCY
CALL: (336) 315-7080**

Install delineator markers using a method that securely anchors the delineator marker in the ground to prohibit twisting and easy removal.

QUALIFIED PRODUCTS LIST

Submit a listing of items including Dynamic Message Signs on the NCDOT 2012 Qualified Products List (QPL) to receive approval for use on the project. Catalog cuts will not be required for items on the QPL. The QPL website is:

<https://connect.ncdot.gov/resources/safety/Pages/default.aspx>

MAINTENANCE AND REPAIR REQUIREMENTS

The Design-Build Team shall maintain and repair all ITS components within the project scope, including but not limited to, ITS devices, ITS conduit system, and all related ITS components, from the beginning of construction until the final acceptance of the project by the NCDOT. After acceptance of the project, the Design-Build Team shall be responsible for repairing the system due to faulty materials or workmanship in accordance with the *Twelve Month Guarantee* Project Special Provision found elsewhere in this RFP, or longer if the Design-Build extends the aforementioned warranty period.

PLAN OF RECORD DOCUMENTATION

Prepare and submit to the Department Plan of Record (POR) documentation that depicts the conduit and ITS device locations. Submit final POR documentation in electronic and hard copy format for Department approval. Provide electronic plans in MicroStation (latest release in use by the Department) format on CD. Submit hard copy documentation on 22 x 34 inch plan sheets. POR documentation shall include the final location and depth of conduits, wiring external to the cabinets, locations of splice closures, junction box locations, and SMFO cable terminations. Include in the POR documentation real world coordinates for all ITS devices, splice enclosures, junction boxes, and equipment cabinets installed or utilized under this project. Provide the coordinates in feet units using the North Carolina State Plane coordinate system (1983 North American Datum also known as NAD '83). Furnish coordinates that do not deviate more than 1.7 feet in the horizontal plane and 3.3 feet in the vertical plane. Global positioning system (GPS) equipment able to obtain the coordinate data within these tolerances may be used.

LOCAL AREA NETWORK

Furnish and install media access control (MAC) address for all equipment utilized as part of this project. Affix MAC address labels to each device utilized. Furnish IP address for all equipment utilized as part of this project. Affix final IP address labels to each device utilized. Fully integrate LAN equipment providing local device failover and fault tolerance. Fully integrate LAN equipment to provide virus protection, user authentication, and security functions to prevent unauthorized user and data from entering the LAN.

Conform to the NCDOT and NC Statewide IT Policies and Standards as described at <http://it.nc.gov/statewide-resources/policies>. The architecture of the IT modules must be approved by NCDOT IT and the NC Office of Information Technology architecture groups.

Develop a Requirements Definition Document that will form as the basis for the overall network architecture and design for the Department review and approval.

INTEGRATION

Upon completion of the ITS device installations, integrate the new devices with the TRTMC - TMS. Provide all necessary central equipment, including but not limited to, digital video decoders (if applicable), central Ethernet switch with appropriate number of copper and

fiber optic ports, fiber optic and copper patch cords, and all other material and labor required for the successful integration of new devices. Ensure all existing ITS devices along the project corridor remain integrated with the TRTMC - TMS.

Modify, as necessary, the existing central hardware and software modules including but not limited to databases, to provide operators access to new devices through the operators' Graphical User Interface. Coordinate with and obtain the Engineer's approval prior to starting any work in the TRTMC or modifying any existing hardware or software.

TESTING

Develop unit and system test plans and procedures for each ITS device and component and submit to the Engineer for review and approval. This includes, but is not limited to, digital CCTVs, DMSs, fiber optic communications cable, local and central equipment.

Upon completion of the system installation and integration, conduct unit and system tests according to approved test plans and procedures. Provide all necessary test equipment.

In case of failures and substandard performance, the Design-Build Team shall identify the cause, repair or replace the faulty parts and components and repeat the test. If the problem persists, the entire unit causing the problem shall be replaced prior to retest.

After successful completion of all units and system test, submit the test reports along with the record of repairs and part replacements to the Engineer.

LIGHTING SCOPE OF WORK (6-16-16)

**** NOTE **** Throughout this Scope of Work, references to the lighting design / plans provided by the Department only refers to roadway lighting and the Peters Creek Parkway pedestrian culvert lighting. The Design-Build Team shall be responsible for all lighting designs / plans for the two pedestrian bridges.

The Design-Build Team shall provide and install roadway lighting equipment and materials, in accordance with the Final Lighting Plans provided by the Department, Division 14 of the January 2012 NCDOT *Standard Specifications for Roads and Structures*, and the January 2012 NCDOT *Roadway Standard Drawings*, except as amended below. Prior to the Technical Proposal submittal date, the NCDOT will provide the Preliminary Lighting Plans. The Department will finalize the lighting design based upon the Design-Build Team's Release for Construction (RFC) Roadway Plans and Structure Plans.

The Design-Build Team shall include all costs required to 1) remove and properly dispose of the existing City owned lighting along the outside shoulder of US 421 / I-40 Business, 2) construct the new roadway lighting system(s) shown in the aforementioned Preliminary Lighting Plans provided by the Department and 3) design and construct the lighting on the pedestrian bridges in their lump sum price bid for the entire project.

The new lighting system(s) shall include, but not be limited to the following:

- Single arm, twin arm, and high mast poles and fixtures
- Underpass lighting at the Peters Creek Parkway Bridge and Brookstown Avenue Bridge
- Pedestrian lighting mounted inside the Peters Creek Parkway pedestrian culvert
- Conduit for **future** lighting on all roadway structures
- Lighting on the pedestrian bridges

The Department shall only compensate the Design-Build Team for additional lighting construction costs that result from design revisions incorporated at the Department's discretion and / or that result from errors or omissions in the Department's Preliminary Lighting Plans. The Design-Build Team shall be solely responsible for all additional lighting construction costs that result from design revisions incorporated at the Design-Build Team's discretion.

After the RFC Roadway and RFC Structure Plans for the Peter's Creek Parkway bridge and culvert have been accepted by the Department, the Design-Build Team shall submit MicroStation files of the RFC Roadway and Structure Plans for the Department to complete the lighting design. The Design-Build Team shall allow the Department ten days after this submittal to update and finalize the lighting design.

After the RFC Structure Plans for the remaining roadway bridges have been accepted by the Design-Build Unit, the Design-Built Team shall submit MicroStation files of the RFC Structure Plans for the remaining roadway bridges for the Department to complete the electrical conduit system design for future decorative lighting elements on these bridges. The Design-Build Team shall allow the Department ten days after this submittal to update and finalize the electrical conduit system design.

The Design-Build Team shall allow ten days for Department review of each submittal for all materials including poles and foundation designs. An additional ten days shall be required for pole submittals from vendors that do not commonly do business with the Department.

All high mast lighting inside the Peter's Creek Parkway interchange shall be installed and functioning prior to the Two-Year Full Closure of US 421 / I-40 Business. This section of lighting shall operate normally for the duration of the project.

Reference the Transportation Management Scope of Work found elsewhere in this RFP for the Two-Year Full Closure of US 421 / I-40 Business and other time restrictions and lane closure requirements.

Reference the Aesthetics Design Scope of Work found elsewhere in this RFP for fixture types.

Reference the *Lighting* Standard Special Provisions found elsewhere in this RFP for additional requirements.

Pedestrian Bridge Lighting

The Design-Build Team shall design and construct pedestrian lighting for the Green Street Pedestrian Bridge and the Strollway Pedestrian Bridge in accordance with Division 14 of the January 2012 NCDOT *Standard Specifications for Roads and Structures*, the January 2012 NCDOT *Roadway Standard Drawings*, the *Lighting* Standard Special Provision found elsewhere in this RFP, the Aesthetics Scope of Work found elsewhere in this RFP, the Business 40 Aesthetic Guidelines provided by the Department and the requirements noted below:

- All electrical conduit systems shall be installed at locations within each pedestrian bridge that prevent them from being seen by pedestrians and vehicular traffic.
- After the RFC Structure Plans for the pedestrian bridges have been accepted by the Department, the Design-Build Team shall submit Preliminary Lighting Plans for each pedestrian bridge. At a minimum the Preliminary Lighting Plans shall contain the electrical conduit systems, special provisions and design details. The Design-Build Team shall allow the Department ten business days to review the Preliminary Lighting Plans.
- Upon acceptance of the Preliminary Lighting Plans by the Department, the Design-Build Team shall submit Final Lighting Plans for each pedestrian bridge that, at a minimum, contain the information noted above. The Design-Build Team shall allow the Department ten business days to review the Final Lighting Plans.
- A North Carolina Registered Professional Engineer shall sign and seal the Final Lighting Plans for the pedestrian bridges.

MAINTENANCE

During construction of the Peter's Creek Parkway interchange and before the Two-Year Full Closure of US 421 / I-40 Business, Duke Energy Progress, through the existing agreement with the City of Winston-Salem, will continue to maintain the existing lighting system(s) along the project corridor.

During the Two-Year Full Closure of US 421 / I-40 Business, the remaining existing lighting shall be removed in accordance with the lighting plans provided by the Department and *Lighting Standard Special Provision* found elsewhere in this RFP.

Throughout construction, the Design-Build Team shall assume responsibility for routine maintenance of the newly installed lighting system(s) in accordance with Division 14 of the January 2012 NCDOT *Standard Specifications for Roads and Structures*, except as amended below.

- NCDOT will assume maintenance responsibility for the completed lighting systems after the project is accepted, and there is no chance of construction-related damage.
- The Design-Build Team shall replace any newly installed non-functional lighting system components within the project limits. All luminaires must be operational at project acceptance.

EROSION AND SEDIMENTATION CONTROL SCOPE OF WORK (6-21-16)

The NCDOT Roadside Environmental Unit shall review and accept all Erosion and Sedimentation Control Plans. Clearing & Grubbing and Final Grade Release for Construction (RFC) Erosion Control Plans shall be submitted to all NCDOT Personnel listed in the Design-Build Submittal Guidelines before **any** land disturbing activities, including clearing and grubbing, can commence. If the Design-Build Team chooses to perform the work in discrete sections, then a complete set of Clearing & Grubbing and Final Grade RFC Erosion Control Plans shall be submitted, accepted, and distributed as noted above prior to land disturbing activities, including clearing and grubbing, commencing in that section. No land disturbing activities, including clearing and grubbing, shall occur in any location that does not have accepted Clearing & Grubbing and Final Grade RFC Erosion Control Plans. Refer to the most recent version of the *NCDEQ - Erosion and Sediment Control Planning and Design Manual* for erosion control design guidelines not addressed in this Scope of Work.

To ensure adherence with the August 3, 2011 NCG-010000 General Construction Permit, issued by the North Carolina Department of Environmental Quality, Division of Water Resources, the Design-Build Team shall formally submit a project-wide Vegetation Management Procedure for the Department's review and acceptance prior to any land disturbing activities. After this initial review, the Design-Build Team shall concurrently provide the Resident Engineer and Roadside Environmental Field Operations Engineer updated versions of the Vegetation Management Procedure on a monthly basis. These updated versions will not require formal submittal to the Design-Build Unit, but will be subject to review comments by the aforementioned field personnel. All versions of the Vegetation Management Procedure shall include, but not be limited to, 1) provisions for the early establishment of grasses / vegetation, 2) provisions for obtaining the required 80% permanent vegetation stand, as defined in the August 3, 2011 NCG-01000 General Construction Permit and in accordance with the *Permanent Vegetation Establishment* Project Special Provision found elsewhere in this RFP, by the project final completion date, and 3) procedure and schedule details for fertilizer topdressing, supplemental seeding, mowing and repair seeding. The Vegetation Management Procedure shall be closely coordinated with the grading and hauling operations. The Design-Build Team shall provide a narrative overview of the Vegetation Management Procedure in the Technical Proposal.

From the beginning through the end of construction, the Design-Build Team shall maintain comprehensive "red-line" As-Constructed Drawings that detail when and where permanent / temporary / repair seeding and fertilizer topdressing have been performed.

Erosion and Sedimentation Control Plans shall at a minimum address the following:

I. Complete Set of Plans**A. Clearing and Grubbing Phase**

1. Use correct NCDOT symbology.

2. Protect existing drainage structure inlets with Rock Inlet Sediment Trap Type 'A' (RIST-A), Rock Inlet Sediment Trap Type 'C' (RIST-C), Rock Pipe Inlet Sediment Trap Type 'A' (PIST-A), etc.
3. Utilize adequate perimeter controls (temporary silt ditches (TSD), temporary silt fence (TSF), etc.).
4. Clean Water Diversions (CWD) shall not be used to divert offsite runoff through the project construction limits.
5. Utilize skimmer basins and rock measures with sediment control stone (Temporary Rock Sediment Dam Type 'B' (TRSD-B), Temporary Rock Silt Check Type 'A' (TRSC-A), etc.) at drainage outlets.
6. Take into account topography and show existing contour lines on Clearing & Grubbing Plans only.
7. Utilize Temporary Rock Silt Checks Type 'B' (TRSC-B) to reduce velocity in existing ditches with spacing of 250 feet divided by percentage of ditch grade. Also utilize TRSC-B's in proposed TSD's and temporary diversions (TD).
8. Protect existing streams; do not place erosion control devices in live streams unless permitted by the Division of Water Resources 401 Certification and the Army Corps of Engineers 404 Permit.
9. Sediment basins shall be sized to provide adequate silt storage for 3600 cubic feet per disturbed acre with surface area equal to 435 square feet per cubic foot per second (cfs) of the peak inflow rate, Q10, using 10-year peak rainfall data (NCDEQ - *Erosion and Sediment Control Planning and Design Manual* or NOAA's National Weather Service website <http://dipper.nws.noaa.gov/hdsc/pfds/> for partial duration (ARI) time series type). A Sediment Basin Designer Spreadsheet will be provided by the NCDOT Roadside Environmental Unit upon request.
10. Skimmer Basins shall be sized to provide adequate silt storage for 1800 cubic feet per disturbed acre with surface area equal to 325 square feet per cubic foot per second (cfs) of the peak inflow rate, Q10, using the 10-year peak rainfall data (NCDEQ - *Erosion and Sediment Control Planning and Design Manual* or NOAA's National Weather Service website <http://dipper.nws.noaa.gov/hdsc/pfds/> for partial duration (ARI) time series type). Skimmer Basins shall be designed to dewater in two to three days. A Skimmer Basin Designer Spreadsheet will be provided by the NCDOT Roadside Environmental Unit upon request.
11. Design Riser Basins to the following standards:
 - a. Surface Area shall be determined by Equation A (sq. feet) = Q10 (cfs) * 435.
 - b. Volume requirement shall be 1800 cubic feet per disturbed acre draining to the riser basin.
 - c. Riser Pipe shall have a cross-sectional area 1.5 times that of the barrel pipe.
 - d. The riser pipe shall be non-perforated with a skimmer attached to the bottom of the pipe, one foot from the bottom of the basin.
 - e. See NCDEQ - *Erosion and Sediment Control Planning and Design Manual* for additional design criteria.
12. The minimum and maximum length to width ratio of all Sediment Basins shall be 2:1 and 6:1, respectively.

13. Coir Fiber Baffles shall be installed in all silt basins and sediment dams at drainage outlets. For silt basins with a 20-foot or longer length, three Coir Fiber Baffles shall be installed with a spacing of 1/4 the basin length. For silt basins with a length less than 20 feet, a minimum of two Coir Fiber Baffles shall be installed, with a spacing of 1/3 the basin length. The Design-Build Team will not be required to show the individual baffles on the Erosion Control Plans, but shall be required to incorporate the Coir Fiber Baffle Detail on the Erosion Control Plans.
14. Include any culvert and / or pipe construction sequence plan sheets in the Clearing & Grubbing Plans; all pipes 48 inches or larger, or any combination of pipes that total 48 inches or more shall require a construction sequence. Prior to installation of pipes smaller than 48 inches in jurisdictional areas, the Design-Build Team shall submit a phasing plan for managing the watercourse to the Resident Engineer for review and acceptance. The phasing plan shall be in accordance with the Best Management Practices for Construction and Maintenance Activities.
15. During construction, provide temporary sediment basins that dewater from the surface at all permanent stormwater devices.
16. Utilize Coir Fiber Wattles with Polyacrylamide (PAM) and / or TRSC-As with Matting and PAM in temporary and permanent, existing and proposed ditches at a spacing of 50 feet in areas where sediment basins are not feasible at drainage outlets and in areas where sediment basins at drainage outlets with sediment traps (i.e. PIST-A, RIST-A, etc.), cannot be properly sized to surface area and / or sediment storage requirements due to safety concerns, right of way restrictions, utility conflicts, or other construction limitations approved by the NCDOT Roadside Environmental Unit.
17. Place a device utilizing PAM at all sediment basin inlets.
18. At a maximum spacing of 200 feet, and as directed, utilize Special Sediment Control Fence drainage breaks in silt fence.
19. Do not place erosion control devices that require excavation (i.e. sediment basins, silt ditches, etc.) in wetlands.
20. Within the entire project limits, provide disturbed and undisturbed drainage areas in MicroStation Format.
21. For all drainage outlets where the runoff cannot be treated with a sediment basin and / or the sediment basin cannot be constructed to the required sediment storage or surface area requirements, provide a written explanation.
22. Excluding perimeter Sediment Basins that will function only during Clearing and Grubbing operations, all perimeter Sediment Basins shall be placed outside of fill slopes.

B. Final Grade Phase

1. Use correct NCDOT symbology.
2. Protect existing and proposed drainage structure inlets with RIST-A, RIST-C, PIST-A, etc.
3. Utilize adequate perimeter controls (TSD, TSF, etc.).
4. Clean Water Diversions (CWD) shall not be used to divert offsite runoff through the project construction limits.
5. Utilize TRSC-B's to reduce velocity in existing and proposed ditches with spacing of 250 feet divided by percentage of ditch grade. Also utilize TRSC-B's in proposed TSD's and TD's.
6. Utilize temporary slope drains and earth berms at top of fill slopes eight feet or higher and a fill slope steeper than 4:1, or where there are superelevations above 0.04 and fills are greater than five feet. Maximum slope drain spacing shall be 200 feet.
7. Utilize a rock energy dissipater at outlet of all slope drains.
8. Devices at all drainage turnouts shall utilize, skimmer, or sediment control stone (TRSD-B, TRSC-A, etc.) and a spillway with an adequately designed base length to distribute outflow.
9. Sediment basins shall be sized to provide adequate silt storage for 3600 cubic feet per disturbed acre with surface area equal to 435 square feet per cubic foot per second (cfs) of the peak inflow rate, Q10, using 10-year peak rainfall data (NCDEQ - *Erosion and Sediment Control Planning and Design Manual* or NOAA's National Weather Service website <http://dipper.nws.noaa.gov/hdsc/pfds/> for partial duration (ARI) time series type). A Sediment Basin Designer Spreadsheet will be provided by NCDOT Roadside Environmental Unit upon request.
10. Skimmer Basins shall be sized to provide adequate silt storage for 1800 cubic feet per disturbed acre with surface area equal to 325 square feet per cubic foot per second (cfs) of the peak inflow rate, Q10, using the 10-year peak rainfall data (NCDEQ - *Erosion and Sediment Control Planning and Design Manual* or NOAA's National Weather Service website <http://dipper.nws.noaa.gov/hdsc/pfds/> for partial duration (ARI) time series type). Skimmer Basins shall be designed to dewater in two to three days. A Skimmer Basin Designer Spreadsheet will be provided by the NCDOT Roadside Environmental Unit upon request.
11. Design Riser Basins to the following standards:
 - a. Surface Area shall be determined by Equation A (sq. feet) = Q10 (cfs) * 435.
 - b. Volume requirement shall be 1800 cubic feet per disturbed acre draining to the riser basin.
 - c. Riser Pipe shall have a cross-sectional area 1.5 times that of the barrel pipe.
 - d. The riser pipe shall be non-perforated with a skimmer attached to the bottom of the pipe, one foot from the bottom of the basin.
 - e. See NCDEQ - *Erosion and Sediment Control Planning and Design Manual* for additional design criteria.
12. Provide matting for erosion control in all ditch lines, including but not limited to temporary ditch lines (TDs) utilized to divert offsite runoff around construction areas, where the velocity is greater than 2.0 feet / sec, and the shear stress is 1.55 psf

- or less. For ditch lines with a shear stress above 1.55 psf, Permanent Soil Reinforcement Mat or Rip Rap shall be utilized.
13. Unless otherwise approved by the Roadside Environmental Field Operations Engineer, provide matting for erosion control on all slopes (cut and fill) that are steeper than 4:1 and a height of eight feet or greater.
 14. Along all slopes (cut and fill) that are 30 feet or higher, place parallel rows of 12-inch Excelsior Wattles at a spacing height of 20 feet.
 15. The minimum and maximum length to width ratio of all Sediment Basins shall be 2:1 and 6:1, respectively.
 16. Coir Fiber Baffles shall be installed in all silt basins and sediment dams at drainage outlets. For silt basins with a 20-foot or longer length, three Coir Fiber Baffles shall be installed with a spacing of 1/4 the basin length. For silt basins with a length less than 20 feet, a minimum of two Coir Fiber Baffles shall be installed, with a spacing of 1/3 the basin length. The Design-Build Team will not be required to show the individual baffles on the Erosion Control Plans, but shall be required to incorporate the Coir Fiber Baffle Detail on the Erosion Control Plans.
 17. During construction, provide temporary sediment basins that dewater from the surface at all permanent stormwater devices.
 18. Utilize Coir Fiber Wattles with Polyacrylamide (PAM) and / or TRSC-As with matting and PAM in temporary and permanent, existing and proposed ditches at a spacing of 50 feet in areas where sediment basins are not feasible at drainage outlets, and in areas where sediment basins at drainage outlets with sediment traps (i.e. PIST-A, RIST-A, etc.) cannot be properly sized to surface area and / or sediment storage requirements due to safety concerns, right of way restrictions, utility conflicts, or other construction limitations approved by the NCDOT Roadside Environmental Unit.
 19. Place device utilizing PAM at all sediment basin inlets.
 20. At a maximum spacing of 200 feet, and as directed, utilize Special Sediment Control Fence drainage breaks in silt fence.
 21. Do not place erosion control devices that require excavation (i.e. sediment basins, silt ditches, etc.) in wetlands.
 22. Within the entire project limits, provide disturbed and undisturbed drainage areas in MicroStation Format.
 23. For all drainage outlets where the runoff cannot be treated with a sediment basin and / or the sediment basin cannot be constructed to the required sediment storage or surface area requirements, provide a written explanation.
 24. All perimeter Sediment Basins shall be placed outside of fill slopes.

C. Intermediate Phase

Intermediate Erosion Control Plans shall only be required if design modifications and / or site conditions require additional erosion control design or design revisions to the RFC Clearing and Grubbing and / or RFC Final Grade Erosion Control Plans. Intermediate Plans shall be submitted for review and shall be accepted prior to construction of any aspect impacted by

the revised erosion control design. For any intermediate phase, comply with Section B, "Final Grade Phase" above.

II. Detail Sheets and Notes

- A. Provide project specific special notes and details, including but not limited to, skimmer basin, coir fiber wattle with Polyacrylamide (PAM), etc.
- B. Provide matting summary sheet(s): matting for erosion control and permanent soil reinforcement mat
- C. Provide reforestation sheet(s): regular, wetland, streambank and / or buffer showing appropriate species

III. Title Sheet

- A. Show correct notes: NCG-01, HQW, ESA, clearing and grubbing, etc.
- B. Show correct standards for project
- C. List of standard NCDOT symbology
- D. Show name and certification number of Level III certified individual responsible for designing and / or reviewing Erosion and Sedimentation Control Plans
- E. Show name of primary NCDOT Roadside Environmental Unit Erosion and Sedimentation Control Plan reviewer

IV. Special Provisions

- A. Erosion Control Special Provisions are available at the following website:

http://www.ncdot.org/doh/operations/dp_chief_eng/roadside/soil_water/special_provisions/

- B. References in Erosion Control Special Provisions from the aforementioned website to Method of Measurement, Basis of Payment, or any other statement regarding direct payment for Erosion & Sediment Control measures shall be disregarded.
- C. *Erosion & Sediment Control / Stormwater Certification* Project Special Provision found elsewhere in this RFP.

V. Miscellaneous

- A. Plan submittals shall include all pertinent design information required for review, such as design calculations, drainage areas, etc.
- B. The NCDOT Roadside Environmental Unit will provide a sample set of Erosion and Sedimentation Control Plans (including any special details or special provisions used by the NCDOT Roadside Environmental Unit) and MicroStation Erosion Control Workspace to the Design-Build Team for reference upon request.
- C. Plans shall address any environmental issues raised during the permitting process.

- D. Sufficient time shall be allowed for the Design-Build Team to make any changes to the Erosion and Sedimentation Control Plans deemed necessary by the NCDOT Roadside Environmental Unit.
- E. Temporary access and haul roads, other than public roads, constructed or used in connection with the project shall be considered a part of the project and addressed in the Erosion and Sedimentation Control Plans. Temporary access and haul roads located within the footprint and / or the right of way / easement corridor of the project shall be part of the highway Erosion and Sedimentation Control Plans. Temporary access and haul roads associated with borrow pits and staging areas shall be included in the Reclamation Plan.
- F. To contain concrete waste water and associated concrete mix from washing out ready-mix trucks, drums, pumps, or other equipment, provide Concrete Washout Structures at egress points. Concrete Washout Structures must collect and retain all concrete waste water and solids so that this material does not migrate to surface waters or into the ground water. The Concrete Washout Structures are not intended for concrete waste not associated with washout operations. The Concrete Washout Structures may include devices above or below ground and / or commercially available devices designed specifically to capture concrete waste water. Concrete Washout Structure options may be found in the special provision, available at the website noted in Section IV above. For construction details of an above grade and below grade Concrete Washout Structure, reference the website noted below:

**[http://www.ncdot.gov/doh/operations/dp_chief_eng/roadside/soil_water/pdf/
ConcreteWashoutStructuresdetail.pdf](http://www.ncdot.gov/doh/operations/dp_chief_eng/roadside/soil_water/pdf/ConcreteWashoutStructuresdetail.pdf)**

- G. Borrow or waste areas that are part of the project shall require a separate Reclamation Plan, unless the borrow or waste activity is regulated under the *Mining Act of 1971*, or is a landfill regulated by the NCDEQ, Division of Waste Management (DWM). For newly created borrow pit(s) that require dewatering, Borrow Pit(s) Dewatering Basins shall be required and shall be in accordance with the applicable Special Provision available at the website noted in Section IV above. The Design-Build Team shall submit the location and permit number for waste / borrow sites covered by the aforementioned Mining Act or regulated by the NCDEQ DWM concurrently to the Design-Build Unit and the Resident Engineer. For Reclamation Procedures, see:

**[http://www.ncdot.org/doh/operations/dp_chief_eng/roadside/fieldops/
downloads/Files/ContractedReclamationProcedures.pdf](http://www.ncdot.org/doh/operations/dp_chief_eng/roadside/fieldops/downloads/Files/ContractedReclamationProcedures.pdf)**

- H. Whenever the Engineer determines that significant erosion and sedimentation continues despite the installation of approved protective practices, the Design-Build Team shall be required to, and shall, take additional protective action.
- I. An accepted Erosion and Sedimentation Control Plan shall not exempt the Design-Build Team from making every effort to contain sediment onsite.
- J. Any Erosion Control Design revision made during the construction of the project shall be submitted to NCDOT Roadside Environmental Unit by the 15th of the month via the Design-Build Unit. At anytime requested by the Engineer or the NCDOT Roadside Environmental Unit, the Design-Build Team shall provide an updated version of the

Erosion and Sedimentation Control Plans for distribution to all parties involved in the construction process.

- K. The Design-Build Team shall comply with the North Carolina Administrative Code *Title 15A Environmental Quality* Chapter 4, Sedimentation Control.
- L. A pre-submittal meeting shall take place between the NCDOT Roadside Environmental Unit Soil & Water Engineering Section, the Design-Build Team, and any other pertinent NCDOT personnel before any Erosion and Sedimentation Control Designs are submitted to NCDOT Roadside Environmental Unit. Erosion and Sedimentation Control Plan submittals shall only be reviewed and accepted by NCDOT Roadside Environmental Unit after the Erosion and Sedimentation Control Pre-Submittal Meeting. The Design-Build Team shall be required to submit a tentative Erosion and Sedimentation Control Plan submittal schedule at the pre-submittal meeting.
- M. At a minimum, the Design-Build Team shall bring one erosion control plan sheet with a Clearing & Grubbing erosion control design to the Erosion and Sedimentation Control Pre-Submittal Meeting.
- N. All RFC Erosion and Sedimentation Control Plans, including any red line revisions, shall be kept on site at all times throughout the duration of the project.
- O. Immediately after the clearing and grubbing erosion control measures have been installed for the entire project, or for individual sections if the Design-Build Team has divided the project into construction segments, the Design-Build Team's erosion and sedimentation control designer shall field verify constructed dimensions and installation of all erosion control devices. After this initial inspection(s), the aforementioned designer shall review the project conditions a minimum of every 30 days during the heavy grading operations, and as directed by the Engineer, to verify the field conditions of disturbed areas draining to erosion control devices and to ensure that the erosion control devices provide the current field condition requirements for sediment storage and surface area. During construction, the NCDOT may conduct separate field inspections of the project conditions and the erosion control devices. The erosion and sedimentation control designer shall make appropriate design revisions to the Clearing and Grubbing, Intermediate Erosion Control Plans and / or Final Grade Erosion Control Plans resulting from / required by the Design-Build Team and / or the Departmental field inspections for the Department's review and acceptance, in accordance with the Design-Build Submittal Guidelines. The Design-Build Team shall concurrently provide written documentation of all field verifications / inspections performed by the Design-Build Team to the NCDOT Roadside Environmental Unit, Soil and Water Engineering and Field Operations Section, and the Resident Engineer. At a minimum, this documentation shall detail what was observed during the field verification / inspection and all resulting required actions with a timeframe for implementation. When the project conditions no longer warrant, in the sole discretion of the Department, inspections by the erosion and sedimentation control designer may cease.
- P. The Design-Build Team's erosion and sedimentation control designer shall submit design calculations, for the Department's review and acceptance, for all modifications to the Erosion and Sedimentation Control Plans that result in dimension modifications and / or relocations, other than minor shifts to accurately place, to the devices noted below:

- Riser Basin
- Skimmer Basin and all devices with Skimmers
- Temporary Rock Sediment Dam Type A
- Temporary Rock Sediment Dam Type B
- Temporary Rock Silt Check Type A
- Culvert Construction Sequences
- Temporary and Permanent Stream Channel Relocations

- Q. Erosion & Sediment Control / Stormwater Certification shall be required according to the Project Special Provision found elsewhere in this RFP.
- R. Prior to installation of any erosion control devices, the Design-Build Team shall verify boundaries of jurisdictional areas in the field and delineate with Safety Fence or flagging. For guidance on Safety Fence and flagging in jurisdictional areas, see:

http://www.ncdot.org/doh/operations/dp_chief_eng/roadside/fieldops/downloads/

- S. Once RFC Erosion and Sedimentation Control Plans are issued, any major design change or addition, any change that involves calculations, and any addition, deletion, or relocation of a sediment basin shall be submitted to the NCDOT Roadside Environmental Unit for review and acceptance. Minor changes such as moving silt fence, adding or moving temporary ditches (unless adding new runoff flow to a sediment basin), and adding or moving slope drains shall be reviewed by the Engineer in the field.
- T. All erosion control measures with stone extending beyond the construction limits shall be considered temporary fill. If impacted wetland areas are permitted as Hand Clearing, then the aforementioned temporary fill shall be permitted as Temporary Fill in Hand Cleared Areas for Erosion Control. (Reference the Environmental Permits Scope of Work found elsewhere in this RFP)
- U. Sediment basins that drain directly into jurisdictional water or have a total drainage area of one acre or more shall be designed and constructed with outlet structures that only withdraw water from the surface. For sediment basins that do not drain directly into jurisdictional water or have less than one acre of total drainage area, surface dewatering outlets and stone outlets may be provided.
- V. In accordance with the requirements noted herein, the Design-Build Team shall be responsible for erosion control design, plans, plan implementation and maintenance of erosion control measures for all utility installation and relocation work performed by the Design-Build Team. To ensure that the Design-Build Team's erosion control designs, plan implementation and / or maintenance of erosion control measures do not conflict with the erosion control design, plan implementation and / or maintenance of erosion control measures for utility installation and / or relocation work performed by others, the Design-Build Team shall coordinate with the utility companies performing Utilities by Others (UBO) work.
- W. Ground Cover Stabilization Requirements - NCG010000 (7 - 14 Days)

Ground cover stabilization shall comply with the timeframe guidelines specified by the North Carolina Department of Environmental Quality, Division of Water Resources NCG-010000 General Construction Permit that became effective on August 3, 2011. Excluding the slopes noted below, temporary and permanent ground cover stabilization shall be provided within seven calendar days from the last land-disturbing activity. The Design-Build Team shall label all slopes subject to the seven-day ground cover stabilization requirements on all Erosion and Sedimentation Control Plans submitted to the Department for review and acceptance.

For the slopes noted below, temporary and / or permanent ground cover stabilization shall be provided within 14 calendar days from the last land-disturbing activity:

Slopes between 2:1 and 3:1, with a slope length of ten feet or less
Slopes 3:1 or flatter, with a slope length of 50 feet or less
Slopes 4:1 or flatter

Temporary and / or permanent ground cover stabilization shall be provided in accordance with the provisions in this RFP, the Vegetation Management Procedure developed by the Design-Build Team and NCG-010000.

X. Additional Ground Cover Stabilization Requirements

Once the Design-Build Team identifies the area for stabilization due to inactivity, the Design-Build Team shall obtain concurrence from the Engineer and adhere to the following options based on the estimated amount of time the area will remain inactive. If the area stabilized exceeds the estimated timeframe, the Design-Build Team shall implement the next level of stabilization as directed by the Engineer.

All application rates noted below are in pounds per acre.

Short Term Stabilization - For areas that will remain inactive for up to 21 days

Erodible areas shall be stabilized utilizing non-vegetative cover. Non-vegetative cover options include straw mulch, hydraulic applied erosion control products or rolled erosion control products. If straw mulch is used, it shall provide 100% groundcover and be tacked sufficiently to hold the mulch in place for the duration of the inactive period. All other methods shall be installed according to the manufacturer's directions.

Mid-Term Stabilization -For areas that will remain inactive for up to 90 days

Erodible areas shall be stabilized utilizing the following stabilization protocol:

August 1 - June 1

50# Rye Grain
 500# Fertilizer
 4000# Limestone

May 1 - September 1

50# German or Browntop Millet
 500# Fertilizer
 4000# Limestone

At the Engineer's sole discretion, the use of limestone on sandy soils that require topsoil for stabilization may be eliminated. The Design-Build Team shall consult with, and obtain written approval from, the NCDOT Roadside Environmental Unit prior to eliminating limestone.

Upon obtaining written approval from the Engineer, the Design-Build Team may use wood mulch and / or ground clearing and grubbing debris as an option for Mid-Term Stabilization. If approved, the aforementioned mulch and / or debris shall be installed at a thickness that prevents erosion.

Long Term Stabilization - For areas that will remain inactive for more than 91 days

Erodible areas shall be stabilized utilizing the following stabilization protocol:

Shoulder and Median Areas**August 1 – June 1**

20# Kentucky Bluegrass Cultivars *
 75# Hard Fescue Cultivars **
 35# Bermuda (unhulled)
 25# Rye Grain
 500# Fertilizer
 4000# Limestone

May 1 – September 1

20# Kentucky Bluegrass Cultivars *
 75# Hard Fescue Cultivars **
 25# Bermuda (hulled)
 10# German or Browntop Millet
 500# Fertilizer
 4000# Limestone

Riparian and Wetland Locations**August 1 – June 1**

18# Creeping Red Fescue Cultivars ***
 6# Indiangrass
 8# Big Bluestem
 4# Switchgrass
 35# Rye Grain
 500# Fertilizer
 4000# Limestone

May 1 – September 1

18# Creeping Red Fescue Cultivars ***
 6# Indiangrass
 8# Big Bluestem
 4# Switchgrass
 25# German or Browntop Millet
 500# Fertilizer
 4000# Limestone

Areas Beyond the Mowing Pattern, Waste and Borrow Areas**August 1 – June 1**

100# Tall Fescue Cultivars ****
 15# Kentucky Bluegrass Cultivars *
 30# Hard Fescue Cultivars **
 35# Bermuda (unhulled)
 25# Rye Grain
 500# Fertilizer
 4000# Limestone

May 1 – September 1

100# Tall Fescue Cultivars ****
 15# Kentucky Bluegrass Cultivars *
 30# Hard Fescue Cultivars **
 25# Bermuda (hulled)
 10# German or Browntop Millet
 500# Fertilizer
 4000# Limestone

*** Approved Kentucky Bluegrass Cultivars**

4-Season	Blue Velvet	Gladstone	Quantum Leap
Alexa II	Blueberry	Granite	Rambo
America	Boomerang	Hampton	Rhapsody
Apollo	Brilliant	Harmonie	Rhythm
Arcadia	Cabernet	Impact	Rita
Aries	Champagne	Jefferson	Royce
Armada	Champlain	Juliet	Rubicon
Arrow	Chicago II	Jump Start	Rugby II
Arrowhead	Corsair	Keeneland	Shiraz
Aura	Courtyard	Langara	Showcase
Avid	Delight	Liberator	Skye
Award	Diva	Madison	Solar Eclipse
Awesome	Dynamo	Mercury	Sonoma
Bandera	Eagleton	Midnight	Sorbonne
Barduke	Emblem	Midnight II	Starburst
Barnique	Empire	Moon Shadow	Sudden Impact
Baroness	Envicta	Moonlight SLT	Total Eclipse
Barrister	Everest	Mystere	Touche
Barvette HGT	Everglade	Nu Destiny	Tsunami
Bedazzled	Excursion	NuChicago	Unique
Belissimo	Freedom II	NuGlade	Valor
Bewitched	Freedom III	Odyssey	Voyager II
Beyond	Front Page	Perfection	Washington
Blacksburg II	Futurity	Pinot	Zinfandel
Blackstone	Gaelic	Princeton 105	
Blue Note	Ginney II	Prosperity	

**** Approved Hard Fescue Cultivars**

Aurora II	Eureka II	Oxford	Scaldis II
Aurora Gold	Firefly	Reliant II	Spartan II
Berkshire	Granite	Reliant IV	Stonehenge
Bighorn GT	Heron	Rescue 911	
Chariot	Nordic	Rhino	

***** Approved Creeping Red Fescue Cultivars**

Aberdeen	Boreal	Epic	Cindy Lou
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****** Approved Tall Fescue Cultivars**

06 Dust	Escalade	Justice	Serengeti
2 nd Millennium	Essential	Kalahari	Shelby
3 rd Millennium	Evergreen 2	Kitty Hawk 2000	Sheridan
Apache III	Falcon IV	Legitimate	Signia
Avenger	Falcon NG	Lexington	Silver Hawk
Barlexas	Falcon V	LSD	Sliverstar
Barlexas II	Faith	Magellan	Shenandoah Elite
Bar Fa	Fat Cat	Matador	Sidewinder
Barrera	Festnova	Millennium SRP	Skyline
Barrington	Fidelity	Monet	Solara
Barrobusto	Finelawn Elite	Mustang 4	Southern Choice II
Barvado	Finelawn Xpress	Ninja 2	Speedway
Biltmore	Finesse II	Ol' Glory	Spyder LS
Bingo	Firebird	Olympic Gold	Sunset Gold
Bizem	Firecracker LS	Padre	Taccoa
Blackwatch	Firenza	Patagonia	Tanzania
Blade Runner II	Five Point	Pedigree	Trio
Bonsai	Focus	Picasso	Tahoe II
Braveheart	Forte	Piedmont	Talladega
Bravo	Garrison	Plantation	Tarheel
Bullseye	Gazelle II	Proseeds 5301	Terrano
Cannavaro	Gold Medallion	Prospect	Titan Ltd
Catalyst	Grande 3	Pure Gold	Titanium LS
Cayenne	Greenbrooks	Quest	Tracer
Cessane Rz	Greenkeeper	Raptor II	Traverse SRP
Chipper	Gremlin	Rebel Exeda	Tulsa Time
Cochise IV	Greystone	Rebel Sentry	Turbo
Constitution	Guardian 21	Rebel IV	Turbo RZ
Corgi	Guardian 41	Regiment II	Tuxedo RZ
Corona	Hemi	Regenerate	Ultimate
Coyote	Honky Tonk	Rendition	Venture
Darlington	Hot Rod	Rhambler 2 SRP	Umbrella
Davinci	Hunter	Rembrandt	Van Gogh
Desire	Inferno	Reunion	Watchdog
Dominion	Innovator	Riverside	Wolfpack II
Dynamic	Integrity	RNP	Xtremegreen
Dynasty	Jaguar 3	Rocket	
Endeavor	Jamboree	Scorpion	

From January 1 – December 31, the Design-Build Team shall apply an additional 20# of Sericea Lespedeza on cut and fill slopes 2:1 or steeper.

Fertilizer shall be 10-20-20 analysis or a different analysis that provides a 1-2-2 ratio applied at a rate that provides the same amount of plant food as a 10-20-20 analysis and as directed.

Soil Analysis

If vegetation establishment indicates a deficiency in soil nutrients or an incurred pH level is present, the Design-Build Team shall take soil samples and apply additional soil amendments to the affected area and as directed.

Fertilizer Topdressing

In accordance with the requirements noted below, the Design-Build Team shall apply a minimum of one Fertilizer Topdressing application to all permanently seeded areas immediately prior to completion of the project, twice during every growing season from April 1st through September 30th, and at other times as directed.

Fertilizer used for topdressing shall be 10-20-20 analysis applied at a rate of 500 pounds per acre; or a different analysis that provides a 1-2-2 ratio applied at a rate that provides the same amount of plant food as a 10-20-20 analysis and as directed.

Fertilizer used for waste and borrow areas shall be 16-8-8 grade applied at a rate of 500 pounds per acre; or a different analysis that provides a 2-1-1 ratio applied at a rate that provides the same amount of plant food as a 16-8-8 analysis and as directed.

Supplemental Seeding

For all supplemental seeding, the kinds of seed and proportions shall be the same as specified above for *Long Term Stabilization*. The rate of application for supplemental seeding shall be between 25# to 75# per acre. Prior to topdressing, the Design-Build Team shall determine the actual rate per acre for supplemental seeding and submit the supplemental seeding rate and areas to the Department for review and acceptance.

To prevent disturbance of existing vegetation, minimum tillage equipment, consisting of a sod seeder, shall be used to incorporate seed into the soil where degree of slope allows. Where degree of slope prevents the use of a sod seeder, a clodbuster (ball and chain) may be used.

Mowing

The minimum mowing height shall be six inches.

EROSION CONTROL COORDINATION MEETINGS

Preliminary Construction Meeting

Prior to any land disturbing activity, the Engineer will schedule a meeting with Division construction personnel, Design-Build Team senior management, Design-Build Team project staff, NCDOT project staff, consultant engineering / inspection staff, NCDOT Construction Unit, NCDOT Roadside Environmental Unit, Land Quality, Department of Water Resources and any other party associated with activities that impact the overall effectiveness of the project's erosion control.

During this meeting, the attendees shall review the Design-Build Team's Traffic Control Plans and identify potential erosion control issues. All attendees will provide comments, recommendations and supportive information to help facilitate resolution to the aforementioned potential erosion control issues.

Construction Meetings

Once construction begins, the Engineer will schedule monthly meetings to review the erosion control status. All parties listed above for the Preliminary Construction Meeting shall participate in these monthly construction meetings.

During the construction meetings, the erosion control efforts / issues to date will be reviewed and discussed. Additionally, the upcoming construction phases will be reviewed to identify potential erosion control issues. After the construction meeting, a project review may occur to identify site specific issues and identify solutions. The Design-Build Team shall be responsible for all actions, corrections and / or resolutions resulting from the construction meetings and / or subsequent site visits.

The NCDOT senior management will discuss issues that are repeatedly identified on inspection reports and / or discussed during the construction meetings with the Design-Build Team's senior management.

If project activities do not change the erosion control status / conditions, the Engineer may elect to change the construction meeting frequency or cancel a meeting.

EROSION CONTROL DAMAGES

The Design-Build Team shall observe and comply with Federal and State Laws, Local Laws, Ordinances, and Regulations; as well as Orders and Decrees of Bodies having any jurisdiction or authority in accordance with Section 107 of the January 2012 NCDOT *Standard Specifications for Roads and Structures*.

The Design-Build Team shall take all reasonable precautions to comply with all regulations of all authorities having jurisdiction over public and private land governing the protection of erosion

and sedimentation. Any fines, remediation required or charges levied against the Department for failing to comply with all rules and regulations concerning erosion and sediment control, due to the Design-Build Team's negligence, carelessness, or failure to implement the Erosion and Sedimentation Control Plans and Specifications; or failure to maintain an approved Storm Water Pollution Prevention Plan (SWPPP), regardless of absence of neglect, shall be deducted from monies due the Design-Build Team. In addition to said fines, remediation required, or charges levied, any associated engineering costs or actions taken by the Department in order for the Department to comply with rules and regulations, as a result of the Design-Build Team's negligence, carelessness, or failure to implement the Erosion and Sedimentation Control Plans and Specifications; and / or the SWPPP, regardless of absence of neglect, shall be deducted from the monies due to the Design-Build Team.

UTILITIES COORDINATION SCOPE OF WORK (7-6-16)

The Design-Build Team shall obtain the services of a Professional Services Firm (PSF) knowledgeable in the NCDOT Utility Coordination Process involved with utility relocation / installation and highway construction. The Design-Build Team shall be responsible for coordinating all utility relocations, removals, and / or adjustments where the Design-Build Team and utility owner, with concurrence from the Department, determine that such work is essential for highway safety and performance of the required highway construction. Coordination shall be for all utilities whether or not they are specifically identified in this scope of work and shall include any necessary utility agreements when applicable. NCDOT will be the approving authority for all utility agreements and approval of plans.

In accordance with the requirements herein, the Design-Build Team shall relocate / coordinate the relocation of all existing facilities that are 1) parallel to a roadway in full control of access, 2) in physical conflict with the construction, 3) beneath the existing or proposed pavement structure and structurally inadequate, and / or 4) beneath the existing or proposed pavement structure and consist of unacceptable material. Proposed / relocated underground facilities that are located beneath the pavement structure shall only be allowed to cross the roadway, as close to perpendicular as possible.

Project Details

The Design-Build Team shall be responsible for verifying the utility locations, type of facilities, and identifying the utility owners in order to coordinate the relocation of any utilities, known and unknown, in conflict with the project. The following utilities are known to be located within the project construction limits:

Utility Owner	Utility Type	Cost Responsibility
Duke Energy	Power (Transmission)	NCDOT (normally)
Duke Energy	Power (Distribution)	NCDOT (normally)
AT&T	Telecommunications	AT&T (normally)
Verizon	Telecommunications	Verizon (normally)
City of Winston-Salem	Water and Sewer	Design-Build Team (NCDOT will obtain an agreement with Winston-Salem allowing the Design-Build Team to work on their facilities)
Piedmont Natural Gas	Gas	NCDOT (with easement) or PNG
Time Warner	CATV	Time Warner (normally)
Duke Net	Fiber Optic	Duke Net (normally)
NCDOT / City of Winston-Salem	ITS	Design-Build Team (NCDOT will obtain an agreement with Winston-Salem allowing the Design-Build Team to work on their facilities)

Water and Sewer

If the Design-Build Team's design and / or construction requires the relocation and / or encasement of existing water and / or sewer facilities, designs shall be coordinated with the NCDOT Utilities Unit. All costs associated with the design and construction for relocation and / or encasement of these existing water and / or sewer facilities shall be the responsibility of the Design-Build Team and shall be included in the lump sum bid for the project. The Design-Build Team shall develop designs; prepare all plans for needed agreements and permits; submit permits directly to the agencies and obtain approval from the agencies. The Design-Build Team shall be responsible for all permit fees.

Designs shall be coordinated with the NCDOT Utilities Unit and the utility owners or their representatives. The Design-Build Team shall submit five (5) sets of 11 x 17 utility construction drawings to the State Utilities Manager, via the Design-Build Unit, for further handling. Each set shall include a title sheet, plan sheets, profiles and special provisions, if required. Once accepted by the State Utility Manager, the plans, with the appropriate agreement, will be sent to the utility owner for review and concurrence.

In accordance with the January 21, 2016 *Evaluation of Aerial Water Mains Crossing Business 40 – Revised Modeling Results* developed by Hazen, the Design-Build Team shall design and construct 1) the relocations of the aerial water main crossings at Church Street, Cherry Street, Marshall Street, Spruce Street, Broad Street and Green Street; and 2) the relocation of the existing underground water main crossing US 421 / I-40 Business parallel to Liberty Street.

The Design-Build Team shall design and construct an irrigation system on the Strollway Pedestrian Bridge that connects to the Winston-Salem / Forsyth County water system at Liberty Street. The Design-Build Team shall purchase a meter directly from the Winston-Salem Revenue Division for the irrigation system. The Design-Build Team shall coordinate with Jack Fitzgerald, Sr., Civil Engineer / Plans Review Coordinator, at (336)747-7309, to submit the application for the water meter to the Winston-Salem Parks and Recreation Department for review, approval, and signature. (Reference the Aesthetics Scope of Work found elsewhere in this RFP)

The Design-Build Team shall design and construct the relocations of the existing sanitary sewer mains located in the southeast and northeast quadrants of the US 421 / I-40 Business / NC 150 (Peters Creek Parkway) interchange. The aforementioned sanitary sewer main relocations shall be upsized to an 18" sanitary sewer main, shall not be relocated to the US 421 / I-40 Business / NC 150 (Peters Creek Parkway) interchange southwest quadrant, and shall tie to the existing sanitary sewer system at Points A, B and C, as shown on the July 18, 2016 *Peters Creek Parkway Sanitary Sewer Routing Option* provided by the Department.

Within the construction limits that modify the existing ground elevation, the Design-Build Team shall replace all existing vitrified clay pipes (VCP) sanitary sewer mains with ductile iron pipe (DIP), including but not limited to the design and construction of the relocations / replacements noted below:

- The Design-Build Team shall replace the existing 12", 16" and 18" VCP sanitary sewer mains located within the existing sanitary sewer easements between Cherry Street and Main Street with DIP facilities.
- The Design-Build Team shall replace the existing 6" and 8" VCP sanitary sewer mains along Liberty Street with DIP facilities.
- The Design-Build Team shall replace the existing 8" VCP sanitary sewer main along the Marshall Street westbound entrance ramp with a DIP facility. The aforementioned DIP replacement shall be located outside the ramp travel lane, but may be located within the control of access.

The relocation of the sewer and water facilities shall be done in accordance with the NCDOT policies, as well as the latest City of Winston Salem Technical Specifications and Detail Drawings for Water Line and Sanitary Sewer Line Construction. In the event of conflicting design parameters in the requirements noted above, the proposed design shall adhere to the most conservative values. The materials and appurtenances proposed by the Design-Build Team shall require approval by both NCDOT and the aforementioned appropriate utility owner prior to installation.

Utility Relocation Plans

In the event of a utility conflict, other than water and sewer, the Design-Build Team shall request that the utility owner submit relocation plans (Highway Construction Plans to be provided by the Design-Build Team to utility owners) that show existing utilities and proposed utility relocations for approval by the NCDOT.

The Design-Build Team shall submit (3) three copies of the Utility Relocation Plans to the NCDOT State Utilities Manager, via the Design-Build Unit, for review and approval prior to relocation work beginning. The Design-Build Team shall also be responsible for submitting the appropriate agreements to be used with the Utility Relocation Plans (See Agreements found elsewhere in this scope of work). After the review process is complete, the NCDOT Utilities Unit will submit one (1) copy of the authorization letter to the Design-Build Team. The NCDOT Utilities Unit will also provide two copies of the approved Utility Relocation Plans, estimate and agreement to the Department's Resident Engineer. If the Utility Relocation Plans are approved subject to changes, it shall be the Design-Build Team's responsibility to coordinate these changes with the appropriate utility owner.

Cost Responsibility

The Design-Build Team shall be responsible for all costs associated with relocating water and sewer facilities, as described in the Water and Sewer Section of this Scope of Work.

The NCDOT will be responsible for all other non-betterment utility relocation cost when the utility owner has prior rights of way / compensable interest. The utility owner shall be responsible for the relocation costs if they cannot furnish evidence of prior rights of way or a compensable interest in their facilities. The Design-Build Team shall be responsible for verifying / determining the cost responsibility (prior rights and compensable interest) for the utility relocations. The Design-Build Team shall be responsible for all costs associated with utility relocations due to haul roads and / or any other temporary conditions resulting from the Design-Build Team's methods of operation or sequence of work.

Compensable Interest

Typically, affidavits, recorded easements or NCDOT agreements can serve as evidence of prior rights. A compensable interest is identified as follows:

- (A) Existing or prior easement rights within the limits of the project, either by recorded right of way or adverse possession (Utility occupying the same location for twenty (20) plus years outside the existing highway rights of way).
- (B) Entities covered under *General Statute 136-27.1* and *136-27.2*. Statute requires the NCDOT to pay the non-betterment cost for certain water, sewer and gas relocations.
- (C) Utilities that have a joint-use agreement that constitutes a compensable interest with entities that have existing or prior easements rights within the project limits.

Work Performed by Design-Build Team for Utility Owners

If the Design-Build Team elects to make arrangements with a utility owner for proposed utility construction not required herein, in which the utility owner shall be responsible for the costs of work to be performed by the Design-Build Team, the Design-Build Team shall be responsible for negotiating all costs associated with the proposed construction. Once the Design-Build Team and the utility owner agree on a plan and a lump sum estimated cost for the utility construction, the Design-Build Team shall submit five (5) sets of 11 x 17 utility construction drawings to the State Utilities Manager, via the Design-Build Unit, for further handling. Each set shall include a title sheet, plan sheets, profiles and special provisions if required. Also, a letter from the utility owner agreeing to the plans and lump sum cost must accompany this package. The NCDOT will reimburse the Design-Build Team the estimated lump sum cost under a Supplemental Agreement. The necessary Utility Agreement to the utility owner for reimbursement shall be a two party agreement between the NCDOT and the utility owner; and will be developed and executed by the Department.

If the Design-Build Team is requested, in writing, by a utility owner to relocate facilities not impacted by the project's construction, and / or upgrade or incorporate new facilities as part of the highway construction, designs shall be coordinated with the utility owner and the NCDOT Utilities Unit. The associated design and construction costs shall be negotiated and agreed upon

between the Design-Build Team and the utility owner. The Design-Build Team shall develop designs; prepare all plans for needed agreements and permits; submit permits directly to the agencies and obtain approval from the agencies. The Design-Build Team shall be responsible for all permit fees.

Cable TV

The cost in relocating CATV due to highway construction shall be the responsibility of the CATV Company; however, 1) if the CATV Company can validate a recorded easement for facilities outside the maintained NCDOT right of way, the Department will bear the relocation expense; and 2) if the adjustment is needed on existing utility poles to accommodate a proposed NCDOT Traffic Management System Fiber Optic Communication Cable Project, the Design-Build Team shall be responsible for the relocation cost.

The NCDOT will not permit CATV to place poles within the highway right of way but will allow down guys for their facilities within the highway right of way. Under most circumstances, the CATV Company will continue a joint-use attachment with the local Power and Telephone Company. If the CATV proposed relocation places buried facilities within the highway right of way then plans and encroachment agreements shall be required by the NCDOT.

Communication Cables / Electrical Services for Lighting, Traffic Signals

Prior to establishing the location for new meter poles, the Design-Build Team shall coordinate with the local Power Distribution Company concerning accessibility of E/C service and safety in maintenance of the meter.

Prior to installation, the Design-Build Team shall provide plans for review and approval for all service taps that require a parallel installation within the C/A.

Parallel service installation within a C/A shall be buried and located as close to the right of way line as practical. Only due to unusual circumstances will parallel aerial service installations within C/A be allowed. Temporary relocation of utility poles will be allowed within the US 421 / I-40 Business / NC 150 (Peters Creek Parkway) interchange. The Design-Build Team shall justify the allowance of parallel aerial service installation and obtain NCDOT approval prior to installation

The Design-Build Team shall be responsible for all coordination activities, including deposit fees, required for the utility company to provide service taps. Prior to the Design-Build Team developing the associated design and / or instructing the utility company to proceed with providing the service taps, the Design-Build Team shall obtain written approval of the service tap locations from the Resident Engineer.

Adjusting Existing Utilities due to Proposed Traffic Management Systems Fiber Optic Communications Cables

The Design-Build Team shall be responsible for all costs for coordinating and adjusting any utilities that are in conflict with any proposed traffic signal communication cables.

Requirements for Attachments to Existing and / or Proposed Structures

**** NOTE **** The requirements in this section are not applicable to NCDOT ITS facilities. Attaching NCDOT ITS facilities to existing and / or proposed structures shall be in accordance with the Structures Scope of Work found elsewhere in this RFP.

The Design-Build Team shall avoid attachments to structures where feasible. Attachments shall only be considered when other alternatives are cost prohibitive and / or are not feasible due to environmental or geographical features. All utility related attachments must be evaluated and approved by the State Utilities Manager, including any existing attachments to any structure(s) that require modification or replacement. Attachments shall be prohibited under the following criteria:

- (A) No attachments shall be allowed to a bridge located parallel within the C/A carrying the freeway over streams, other roadways or railroads. (No parallel utility installations within the C/A)
- (B) No attachments shall be allowed to cored-slab bridges.
- (C) No attachments shall be allowed to curved bridges.

Attachments to structures, if approved by the State Utilities Manager, shall meet the following criteria:

- (A) No attachments shall be allowed below the bottom of the beams and / or girders.
- (B) Drilling of, or attachments to, beams and / or girders shall not be allowed. Attachments shall only be allowed to the bottom of the bridge deck.
- (C) For water and sewer force mains, only restrained joint ductile iron pipe shall be allowed.
- (D) A minimum of 18" of clearance to beams and / or girders shall be maintained if possible.

Documentation of adverse conditions or cost estimates of all feasible alternatives shall be submitted to the NCDOT State Utilities Manager, via the Design-Build Unit, when seeking approval of a structure attachment. Cost estimates shall consider all costs involved with each alternative and impacts to the utility and the highway project as a whole.

General

The Design-Build Team shall not commence work at points where the highway construction operations are adjacent to utility facilities, until making arrangements with the utility company to protect against damage that might result in expense, loss, disruption of service or other undue inconvenience to the public or utility owner. The Design-Build Team shall be responsible for damage to the existing or relocated utilities resulting from the Design-Build Team's operations. In the event of interruption of any utilities by the project construction, the Design-Build Team shall promptly notify the utility owner and cooperate with the utility owner in the prompt restoration of service.

The Design-Build Team shall accommodate utility adjustments, reconstruction, new installation and routine maintenance work that may be underway or take place during the progress of the contract.

If total property acquisition is unavoidable due to encroachment into wells and / or septic systems, then the Design-Build Team shall investigate and determine if extending water and / or sewer lines to the affected property is cost effective. If the Department concurs with the determination that a utility extension is cost effective, the costs associated with the utility design and construction shall be addressed in accordance with Article 104-7 of the 2012 *Standard Specifications for Roads and Structures*.

The Design-Build Team shall be required to use the guidelines as set forth in the following:

- (A) *NCDOT Utility Manual - Policies & Procedures for Accommodating Utilities on Highway Rights of Way* and the NCDOT Utilities Policy Manual. If the two aforementioned manuals contradict each other, the Utilities Policy Manual shall govern. Reference the website noted below for the current version of the NCDOT utility manuals, and additional information on the transition to the new utility manuals that shall be adhered to:

<https://connect.ncdot.gov/municipalities/Utilities/Pages/UtilitiesManuals.aspx>

- (B) *Federal Aid Policy Guide* - Subchapter G, Part 645, Subparts A & B
- (C) *Federal Highway Administration's Program Guide, Utility Adjustments & Accommodations on Federal Aid Highway Projects*
- (D) *NCDOT Construction Manual* Section 105-8
- (E) *NCDOT Right of Way Manual* - Chapter 16 Utility Relocations
- (F) *NCDEQ, Public Water Supply* - Rules governing public water supply

- (G) *NCDEQ, Division of Water Resources* - Title 15A - Environment and Natural Resources

Agreements

If a utility company can provide evidence of prior rights of way or a compensable interest in their facilities, the Design-Build Team shall coordinate the non-betterment utility relocation costs with the utility company and develop the Utility Relocation Agreement.

The NCDOT State Utilities Manager must execute approved agreements on Design-Build projects. The Utility Relocation Agreements (Cost Agreement) and Encroachment Agreements are available from the NCDOT Utilities Unit. Reference Pages 59 and 60 of the *NCDOT Utility Manual on Policies & Procedures for Accommodating Utilities on Highway Rights of Way* for the different types of encroachment agreements available for use.

The Design-Build Team shall utilize the NCDOT Standard Utility Encroachment Agreements, as necessary, in relocating utilities. The encroachment agreements shall be used under the following conditions:

- (A) If a utility company is not occupying a valid right of way / compensable interest and the proposed relocation will place the relocated utilities within the existing or proposed highway right of way.
- (B) For **all** new utility installations not covered under a Utility Agreement and within the existing or proposed highway right of way. This includes all water, sewer and gas lines owned by entities covered under *General Statute 136-27.1* and *136-27.2*.
- (C) In either case above, the Design-Build Team shall submit 5 copies of the encroachment plans plus 2 originals and 3 copies of the Encroachment Agreement to the NCDOT State Utility Agent, via the Design-Build Unit, for approval.

ENVIRONMENTAL PERMITS SCOPE OF WORK (7-8-16)**General**

The Design-Build Team shall be responsible for preparing all documents necessary for the Department to obtain the environmental permits required for the project construction. Permit applications shall be required for the: US Army Corps of Engineers (USACE) Section 404 Permit and NC Department of Environmental Quality (DEQ) Division of Water Resources (DWR) Section 401 Water Quality Certification.

The Design-Build Team shall not begin ground-disturbing activities, including utility relocation in jurisdictional areas, until the environmental permit has been issued (this does not include investigative borings covered under a Nationwide Permit No. 6 and utility relocation work outside jurisdictional resources noted below).

The Design-Build Team shall coordinate with the Design-Build Unit to determine if a Preconstruction Notification (PCN) is required for the Nationwide Permit No. 6. If a PCN is required, the Design-Build Team shall submit all necessary documents and forms to the Design-Build Unit for submittal to the appropriate agencies and shall not perform any geotechnical investigative work within the jurisdictional resource(s) requiring a PCN prior to obtaining the required approval. If a PCN is not required, the Design-Build Team may proceed with geotechnical investigations inside and outside jurisdictional resources, provided all of the Nationwide Permit No. 6 General Conditions are adhered to.

The Design-Build Team may begin utility relocation work prior to obtaining the aforementioned permits provided that (1) such activities are outside jurisdictional resources; (2) the Department is notified in writing prior to these activities; and (3) a meeting is held with the NCDOT and permitting agencies prior to beginning work, if necessary.

The Department will allow no direct contact between the Design-Build Team and representatives of the environmental agencies. No contact between the Design-Build Team and the environmental agencies shall be allowed either by phone, e-mail or in person, without representatives of the Department's Natural Environment Section (NES) - Environment Coordination and Permitting Group (ECAP), the Department's NES - Biological Surveys Group (BSG), or the Division's Environmental Officer present. A representative from the Design-Build Unit shall be included on all correspondence.

Project U-2827B / C-5620A is not in the Merger Process used by the environmental agencies and the Department to obtain environmental permits. On Non-Merger Projects, the Department has committed to coordination efforts with the environmental agencies. Thus, the Design-Build Team shall participate and present information for an interagency hydraulic design review meeting and an interagency permit impacts meeting. These meetings shall adhere to the Concurrence Point 4B and Concurrence Point 4C requirements of the Merger Process used by the environmental agencies and the Department to obtain environmental permits. Specifically,

the Design-Build Team shall follow the appropriate details on the Merger Process Guide Website referenced below:

<https://connect.ncdot.gov/resources/Environmental/Pages/Merger-Process-Guide.aspx>

Any variations in the Department's proposed design and / or construction methods that nullify any decisions reached between the Department and the environmental agencies; and / or require additional coordination with the environmental agencies shall be the sole responsibility of the Design-Build Team. The Department will not allow any contract time extensions or compensation associated with this additional coordination.

Unless otherwise stipulated in the Technical Proposal, the Department will schedule the interagency hydraulic design review meeting and the interagency permit impacts meeting for January 2017 and April 2017 respectively. The Design-Build Team shall clearly identify in their Technical Proposal what months they would like the Department to schedule these meetings. Failure on the part of the Design-Build Team to meet these dates shall place all responsibility for delays resulting from missing these dates solely in the hands of the Design-Build Team.

Unless otherwise noted in this RFP, the Design-Build Team shall be bound by the terms of all signed planning documents, and approved minutes and commitments of all interagency meetings. The Design-Build Team shall be held accountable for meeting all permit conditions. The Design-Build Team shall be required to staff any personnel necessary to provide permit compliance.

Unless noted otherwise elsewhere in this RFP, the Department will not honor any requests for additional contract time or compensation for any efforts required in order to obtain any permit or permit modification, including but not limited to public involvement, additional design effort, additional construction effort, and / or additional environmental agency coordination and approvals.

Permit Application Process

It shall be the Design-Build Team's responsibility to acquire information and prepare permit drawings that reflect the impacts and minimization efforts resulting from the aforementioned interagency hydraulic design review meeting and interagency permit impacts meeting, and from the project as designed by the Design-Build Team. Further it shall be the Design-Build Team's responsibility to provide these permit impact sheets (drawings) depicting the design and construction details to the Department as part of the permit application. The Design-Build Team shall be responsible for developing the permit application for all jurisdictional impacts. The permit application shall include all utility relocations required by the project. At a minimum, the permit application shall consist of the following:

- Cover Letter
- Minutes from the interagency hydraulic design review meeting and the interagency permit impacts meeting

- Permit drawings (with and without contours)
- Wetland Permit Impact Summary Sheets
- Half-size Plans
- Completed forms (Section 404 ENG 4345, etc.) appropriate for impacts
- Stormwater Management Plan
- Division of Mitigation Services Acceptance Letter

The Department will re-verify and update, as needed, the required environmental data that expires prior to the completion of the activity causing the impact in the jurisdictional areas. These include, but are not limited to, federally protected species, re-verification of wetland jurisdictional areas, historic and archaeological sites, and 303d (impaired) streams.

Excluding the Nationwide Permit No. 6 for geotechnical investigations, the Design-Build Team shall submit one permit application for the entire project. The Design-Build Team shall not submit multiple applications to develop a “staged permitting” process to expedite construction activities in a phased fashion.

Direct coordination between the Design-Build Team, the Design-Build Unit, Resident Engineer, Division Environmental Officer (DEO) and the Project Development and Environmental Analysis Unit - Natural Environment Section (PDEA - NES) shall be necessary to ensure proper permit application development. Upon completion of the permit application package, the Design-Build Team shall concurrently forward the package to the Design-Build Unit, Resident Engineer, Division Environmental Officer, Hydraulics Unit and PDEA - NES for review and approval. After all revisions are complete, the Department will subsequently forward the package to the appropriate environmental agencies.

Any temporary construction measures, including de-watering, construction access, etc. shall be addressed in the permit application. Impacts that result from so-called temporary measures may not be judged to be temporary impacts by the environmental agencies. These issues shall be addressed by the Design-Build Team and reviewed by PDEA - NES prior to the interagency hydraulic design review meeting and the interagency permit impacts meeting, and resolved with the environmental agencies during the aforementioned meetings.

The Design-Build Team shall clearly indicate the location of and impacts of haul roads and utility relocations in jurisdictional areas. The Design-Build Team shall also identify all proposed borrow and waste sites. Further, the Design-Build Team shall describe the construction methods for all structures. The temporary impact descriptions (haul roads, utility relocations, work bridges, etc.) shall include restoration plans, schedules and disposal plans. The aforementioned information, descriptions and details shall be presented during the interagency hydraulic design review meeting and the interagency permit impacts meeting, and be included in the permit application.

The NCDOT hereby commits to ensuring, to the greatest extent practicable, that the footprint of the impacts in areas under the jurisdiction of the Federal Clean Water Act will not be increased during the Design-Build effort. In accordance with the Department of Water Resources’

NCG 010000, all fill material shall be stabilized and maintained to prevent sediment from entering adjacent waters or wetlands. The Design-Build Team shall be responsible for ensuring that the design and construction of the project will not impair the movement of aquatic life.

Requests made for modifications to the permits obtained by the Design-Build Team shall only be allowed if the Engineer determines it to be in the best interest of the Department and shall be strongly discouraged. The Design-Build Team shall not take an iterative approach to hydraulic design issues. The hydraulic design shall be complete prior to permit application.

Individual Permit Timeframe

The Design-Build Team should expect it to take up to **eleven** months to accurately and adequately complete all designs necessary for the permit application, submit the application to the Department, and obtain permit approvals from the environmental agencies. Environmental agency review time will be approximately **120** days from receipt of a “complete” package. No requests for additional contract time or compensation will be allowed if the permits are obtained within this **eleven**-month period. With the exception of location and survey work, utility relocation work outside jurisdictional resources that adheres to the aforementioned requirements, permitted investigative borings covered under a Nationwide Permit No. 6 and / or Preconstruction Notification secured by the Design-Build Team, no mobilization of men, materials, or equipment for site investigation or construction of the project shall occur prior to obtaining the permits (either within the **eleven**-month period or beyond the **eleven**-month period). The Department will not honor any requests for additional contract time or compensation, including idle equipment or mobilization or demobilization costs, for the Design-Build Team mobilizing men, materials (or ordering materials), or equipment prior to obtaining all permits. The Department will consider requests for contract time extensions for obtaining the permits only if the Design-Build Team has pursued the work with due diligence, the delay is beyond the Team’s control, and the **eleven**-month period has been exceeded. If time were granted it would be only for that time exceeding the **eleven**-month period. This **eleven**-month period is considered to begin on the Date of Availability as noted elsewhere in the RFP.

The Design-Build Team needs to be aware that the timeframes listed above for the NCDWR, and the USACE to review a permit application begin only after a fully complete and 100% accurate submittal.

Mitigation Responsibilities of the Design-Build Team

As required by the NEPA Process and the USACE / EPA Section 404 (b)(1) Guidelines, to offset potential wetland and stream impacts, the Department has reviewed the roadway project corridor for potential on-site mitigation opportunities. Since no on-site mitigation opportunities were identified, the Department has acquired the compensatory mitigation for unavoidable impacts to wetlands and surface waters due to the project construction from the NC Division of Mitigation Services. This mitigation was based on impacts as identified in the Department’s Preliminary Plans.

Any changes proposed by the Design-Build Team to any design or construction details provided by the Department shall be approved by the Department prior to being submitted to the environmental agencies for their approval.

Should additional jurisdictional impacts result from revised design and / or construction methods, suitable compensatory mitigation for wetlands and / or streams shall be the sole responsibility of the Design-Build Team. Therefore, it is important to note that additional mitigation will have to be approved by the environmental agencies and such approval shall require, at a minimum, the preparation and approval of a Mitigation Plan before permits are approved and before construction may commence. To mitigate for these additional jurisdictional impacts, the Design-Build Team shall be responsible for all costs associated with acquiring suitable mitigation. Construction of any on-site mitigation shall be performed by a contractor that has successfully constructed similar on-site mitigation. In the absence of suitable on-site mitigation, the Design-Build Team shall be responsible for acquiring additional mitigation from the NC Division of Mitigation Services or an approved compensatory mitigation banking resource.

The Design-Build Team shall analyze all new areas to be impacted that have not been analyzed during the NEPA Process and any staging areas that are located outside the project right of way. This analysis shall include performing all environmental assessments. These assessments shall require the Design-Build Team to engage the services of a competent environmental consultant to conduct a full environmental investigation to include, but not be limited to, Federally Listed Threatened and Endangered Species, wetlands, streams, avoidance and minimization in jurisdictional areas, compensatory mitigation, FEMA compliance, and historical, archaeological, and cultural resources surveys in these areas. The environmental consultant shall obtain concurrence through PDEA - NES to document compliance with Section 7 of the *Endangered Species Act* for those species requiring such concurrence. In addition, the Design-Build Team shall identify additional mitigation required, identify the amount of time beyond the aforementioned eleven-month period, and fulfill all other requirements that the permitting agencies impose to obtain the permit. Any contract time extensions resulting from additional environmental assessments required by the Design-Build Team's design and / or construction methods impacting areas outside those previously analyzed through the NEPA Process shall be solely at the Department's discretion.

Commitments

The NCDOT is committed to incorporating all reasonable and practicable design features to avoid and minimize wetland and stream impacts and to provide full compensatory mitigation of all remaining wetland and stream impacts. Avoidance measures were taken during the planning and NEPA Process and minimization measures were incorporated as part of the preliminary design provided by the Department. The Design-Build Team shall incorporate these avoidance and minimization features, plus any minimization identified during the interagency hydraulic design review meeting and the interagency permit impacts meeting, into the design and / or construction methods.

All work by the Design-Build Team must be accomplished in strict compliance with the plans submitted with the permit applications and in compliance with all conditions of the permits and certifications issued by the environmental agencies. The Design-Build Team shall provide each of its contractors and / or agents associated with the construction or maintenance of this project with a copy of the permits and certifications.

Unless noted otherwise elsewhere in this RFP, the Design-Build Team shall strictly adhere to these commitments, as well as others, including but not limited to, those included in the Environmental Assessment (EA), Finding of No Significant Impact (FONSI), Construction Consultation, Programmatic Categorical Exclusion, all permits, interagency meetings, and site visits.

If the Design-Build Team discovers any previously undocumented historic or archaeological resources while conducting the authorized work, they shall immediately notify, in writing, the NCDOT Archaeology Supervisor and NCDOT Project Development Supervisor, as listed below, who will initiate any required State / Federal coordination after a timely initial assessment. The Design-Build Team shall also immediately notify a representative from the Design-Build Unit. Inadvertent or accidental discovery of human remains shall be handled in accordance with North Carolina General Statutes 65 and 70. All questions regarding these discoveries shall be addressed to Mr. Matthew Wilkerson, NCDOT Archaeology Group Leader at (919) 707-6089, or Ms. Beverly G. Robinson, NCDOT Project Development Group Supervisor (919) 707-6041.

RIGHT OF WAY SCOPE OF WORK (6-20-16)

**** NOTE ** Prior to negotiating property acquisition with property owners, the Design-Build Team shall meet with the appropriate NCDOT Location and Surveys, Right of Way and Design-Build personnel.**

The Design-Build Team shall employ qualified, competent personnel who are currently **approved by the NCDOT Right of Way Unit**, herein after referred to as the Department, to provide all services necessary to perform all appraisal (except appraisal reviews and updated appraisals required solely for condemned parcels), negotiation and relocation services required for all right of way, control of access and easements, including but not limited to permanent utility easements, necessary for completion of the project in accordance with G.S. 136-28.1 of the General Statutes of North Carolina, as amended, and in accordance with the requirements set forth in the *Uniform Appraisal Standards and General Legal Principles for Highway Right of Way*, the *North Carolina Department of Transportation's Right of Way Manual*, the *North Carolina Department of Transportation's Rules and Regulations for the Use of Right of Way Consultants*, the *Code of Federal Regulations*, and Chapter 133 of the *General Statutes of North Carolina* from Section 133-5 through 133-18, hereby incorporated by reference, including the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended. The Design-Build Team shall also field stake all right of way, control of access and easements, including but not limited to utility easements, in accordance with the requirements noted above. For a list of firms currently approved, the Design-Build Team should contact Mr. Neal Strickland, in the NCDOT Right of Way Unit, at 919-707-4364. The Design-Build Team shall perform the services as set forth herein and furnish and deliver to the Department reports accompanied by all documents necessary for the settlement of claims and the recordation of deeds, or necessary for condemnation proceedings covering said properties. The Design-Build Team, acting as an agent on behalf of the State of North Carolina, shall provide right of way acquisition services for TIP Project U-2827B / C-5620A in Forsyth County.

Acquisition services required outside of the project construction limits due solely to a rise in the floodplain water elevation on insurable structures will be considered extra work and paid for in accordance with Article 104-7 of the 2012 Standard Specifications for Roads and Structures.

Through the Advance Acquisition Process, the Department has acquired the Branch Banking & Trust Company property, Parcel No. 900, located at 236 South Liberty Street, Parcel ID No. 6835-24-3987.

The Design-Build Team shall carry out the responsibilities as follows:

- With respect to the payments, costs and fees associated with the acquisition of right of way, easements and / or control of access, the Department will be responsible for only direct payments to property owners for negotiated settlements, recording fees, any relocation benefits, and deposits and fees involved in the filing of condemnation claims. The Department will assume responsibility for all costs associated with the litigation of condemned claims, including testimony by the appraiser(s). The Design-Build Team shall be

responsible for all other acquisition services related to payments, costs and fees, including but not limited to attorney fees required for all non-condemnation acquisitions.

- A Department representative will be available to provide technical guidance on right of way acquisition procedures and to make timely decisions on approving relocation benefits and approving administrative adjustment settlements on behalf of the Department over and above the authority granted to the Department Right of Way Consultant Project Managers.
- The Design-Build Team shall submit a right of way project tracking report and right of way quality control plan to the Department. The Department standard forms and documents shall be used to the extent possible.
- The Design-Build Team shall provide a current title certificate for each parcel as of the date of closing or the date of filing of condemnation, unless required otherwise in the NCDOT April 2015 *Right of Way Manual*.
- The Department will prepare all Condemnation Maps. The Design-Build Team shall prepare all Final Condemnation Reports. Upon approval of the Final Condemnation Report, the Department will require a minimum of four weeks to establish the Condemnation Action Date. For all plan revisions on condemned parcels that modify the area acquired, modify the control of access and / or impact the appraised value, the Design-Build Team shall be responsible for the following:
 - The Design-Build Team shall notify the Division Right of Way Agent, the Area Negotiator, Area Appraiser, and the Attorney General, in writing, that revisions have been made that impact a condemned parcel, and provide updated plan sheets and revised area takes.
 - The Design-Build Team shall consult with the Attorney General and the Area Appraiser to determine the status of the negotiations and appraisal(s).
 - If the Attorney General and / or Area Appraiser recommend an updated appraisal, the Design-Build Team shall provide an updated Summary Sheet to the Area Appraiser for the Department's use in obtaining an updated appraisal(s).
 - Upon receipt of the approved updated appraisal(s), the Design-Build Team shall develop a revised written offer. If settlement is not reached, the Design-Build Team shall submit an updated Final Condemnation Report. If settlement is reached, the Design-Build Team shall notify the Attorney General and Area Appraiser in writing and submit an updated Final Condemnation Report with all necessary documentation.
 - The Department will be responsible for payment for the additional deposit to the Attorney General's Office and the Attorney General will prepare and file an Amendment to the Declaration of Taking.

- The following shall be required:
 - Unless otherwise approved by the NCDOT Assistant State Negotiator in writing, the Design-Build Team shall provide right of way, control of access and easement descriptions in metes and bounds format (bearings and distances). The Design-Build Team shall provide exhibits, diagrams and / or other information required to verify the aforementioned descriptions.
 - In accordance with the NCDOT April 2015 *Right of Way Manual*, the Design-Build Team may prepare red-line adjustments for parcels that are not condemned. The Department must approve a red-line adjustment, in writing, prior to the Design-Build Team making an offer based on the red-line adjustment.
 - The Design-Build Team shall prepare, execute and record documents conveying title to acquired properties to the Department with the Register of Deeds
 - The Design-Build Team shall deliver all executed and recorded deeds and easements to the Department.
 - For all property purchased in conjunction with the project, title shall be acquired in fee simple or easement and shall be conveyed to “The North Carolina Department of Transportation”, free and clear of all liens and encumbrances, except permitted encumbrances.
- It is understood and agreed by and between the parties hereto that all reports, surveys, studies, specifications, memoranda, estimates, etc., secured by and for the Design-Build Team shall become and remain the sole property of the Department upon termination or completion of the work, and the Department shall have the right to use same for any public purpose without compensation to the Design-Build Team.
- The Design-Build Team shall prepare appraisals in accordance with the Department’s *Uniform Appraisal Standards and General Legal Principles for Highway Right of Way Acquisitions*. The Design-Build Team’s appraiser shall be on the Department’s approved state certified appraiser list. The Design-Build Team may request its state certified appraiser be added to the approved state certified appraiser list, subject to approval by the Department’s Area Appraiser and State Appraiser.
- The Design-Build Team shall provide two appraisals, at their expense, for parcels as noted below:
 - All parcels with an initial appraisal, with just compensation, equal to or greater than One Million Dollars (\$1,000,000.00).
 - All parcels where the initial appraisal indicates damages to the remaining property equal to or greater than Two Hundred Fifty Thousand Dollars (\$250,000.00), where damages to the remaining property are defined as a loss in value to the remaining land and / or

- improvements and / or a cost to cure. The second appraisal may be waived by the Department's Area Appraiser and / or the State Appraiser.
- The Design-Build Team shall obtain the second appraisal for the above conditions, and submit to the Department's Area Appraiser and / or State Appraiser for approval. The selected appraiser shall have the necessary expertise and experience in appraising the above type properties.
 - The NCDOT, or its agent, will provide appraisal reviews complying with the Department's *Uniform Appraisal Standards and General Legal Principles for Highway Right of Way Acquisitions*. The reviewer will ensure that the appraisal meets the Department's guidelines and requirements, conforms to acceptable appraisal standards and techniques, does not include any non-compensable items or exclude any compensable items and that the value conclusions are reasonable and based on facts presented in the appraisal. The reviewer has the authority to approve, adjust, request additional data or corrections, or not to recommend and request another appraisal. Within ten business days from the date of receipt, all appraisals will be reviewed by NCDOT Review Appraisers or Review Appraisers under contract to the corresponding NCDOT Area Appraisal Office. Upon returning an appraisal to the Design-Build Team for corrections, a new ten business day review cycle will begin once corrections have been provided to the NCDOT Review Appraiser. The NCDOT will sign as approving any and all appraisals to be used in acquisitions.
 - The NCDOT will provide relocation reviews and approvals for all Replacement Housing Payment calculations and all Rent Supplement Payment calculations prior to the Design-Build Team making any offers to the displacees. Within five business days of the receipt of the Replacement Housing Payment or Rent Supplement Payment calculation documentation, which shall include all documentation required for an Evaluation Package, the Department will approve the calculation, and the signed FRM15-D will be returned to the Design-Build Team, or a request for an updated calculation or documentation will be presented to the Design-Build Team for further handling. At this time, the Relocation Coordinator in the NCDOT Right of Way Unit is the approving authority for the aforementioned calculations.
 - The Design-Build Team shall coordinate with the Health Department to determine if septic systems can be relocated / modified to remain operational. The Department will only be responsible for the Health Department fees associated with these determinations. The Design-Build Team shall determine the relocation / modification design and construction costs required for the septic systems to remain operational and include these costs in the property right of way appraisals. (Reference the Utilities Coordination Scope of Work found elsewhere in this RFP)
 - All Claims for Payment involving relocation benefits must be submitted to the NCDOT Relocation Coordinator in the Right of Way Unit for approval and processing.
 - The Design-Build Team shall provide a right of way certification prior to entering the property.

- The Design-Build Team shall prepare Right of Way Transmittal Summaries and / or Narrative Appraisals for all right of way, control of access and easement acquisitions. Claim Reports will not be allowed for any acquisition.
- In accordance with Chapter 133 of the *General Statutes of North Carolina*, Section 133-40, the Council of State must approve acquisition of property with contaminated soil. Thus, prior to acquiring right of way, control of access and / or easement from any parcel with contaminated soil, the Design-Build Team shall provide a written priority list of all properties with contaminated soil that require right of way, control of access and / or easement acquisition to the Division Right of Way Agent, the Area Negotiator, the Area Appraiser, and the Real Property Coordinator, Terry Niles. At a minimum, the aforementioned priority list shall contain the following information:
 - Project TIP Number, description and county
 - Parcel number(s) requiring acquisition of contaminated soil
 - Acquisition Appraisal(s)
 - GeoEnvironmental Impact Evaluation and Hazardous Materials Report provided by the Department
 - Description, with metes and bounds, of the area(s) to be acquired

The Department will require 90 days from receipt of the information noted above to coordinate with the Council of State and obtain their approval for the acquisition of contaminated property.

PUBLIC INFORMATION SCOPE OF WORK (1-5-16)

NCDOT will take the lead role on this project and be responsible for a portion of the public information efforts through the Department's Communications Office and Public Involvement Group in accordance with the current edition of the *U.S. 421 / Business 40 Improvement Project Strategic Marketing and Communications Plan*. Unless noted otherwise elsewhere in this RFP, the NCDOT responsibilities include:

- Organizing public meetings, including venue selection, reservation and fee
- Providing media announcements
- Developing and producing informational print materials for all meetings and workshops
- Soliciting and administering advertisements, as deemed necessary
- Mailings to the identified target audiences, including postage
- If necessary, developing and producing informational print materials for Limited English Proficiency (LEP) outreach.

The Design-Build Team shall coordinate with the Department to promote public awareness for this project. The amount of public involvement required for this project shall be directly based on the Design-Build Team's Transportation Management Plan and construction details. The Design-Build Team's responsibilities shall include, but are not be limited to, the following:

- Providing information requested by the Department to develop and produce informational printed materials for all meetings and workshops
- Providing details surrounding the impacts to the public
- Providing advance notice to the Department of upcoming project impacts
- Assisting the Department in the development of the target audience list
- Attending and / or speaking at public meetings
- Hand delivery of time sensitive informational materials

Within eight weeks of the project Award date, the Design-Build Team shall hold an initial project coordination meeting with NCDOT to discuss project impacts to the public. This information will be used by the Department to update the *U.S. 421 / Business 40 Improvement Project Strategic Marketing and Communications Plan*.

To ensure that project information can be distributed to the public using standard methods, including but not limited to notices to newspapers, media outlets, and the project website, the Design-Build Team shall inform the Department at least twenty-one (21) calendar days in advance of any construction activity that will have significant impact on the public. These activities shall include, but are not limited to, the start of construction, major traffic shifts, road closures, ramp closures, detours, night work and project completion.

NCDOT will develop, with the assistance of the Design-Build Team, the specific list of target audiences for this project. The following groups are identified as typical target audiences to receive informational materials:

- Governmental agencies
- Municipalities directly affected by construction
- Transportation services
- Emergency services
- Neighborhood groups and private homes
- Industry and businesses
- Chamber of Commerce
- Individual schools effected by the project
- County / City school systems
- Any other organization as deemed necessary by the Department.

The minimum public information requirements solely associated with the Transportation Management Plans shall include, but are not be limited, to the following:

- Public Meetings – If Beginning of Construction meeting for area businesses and residents is held, attending and / or speaking at this event.
- Distribution of Informational Materials - For beginning of construction and for all road closures with detour routes, the Design-Build Team shall be responsible for providing time sensitive informational material to the NCDOT for distribution to the target audiences. If the Design-Build Team informs the Department of the aforementioned activities less than twenty-one (21) calendar days in advance, the Design-Build Team shall hand deliver the materials to the impacted target audiences.

The Department will be responsible for establishing, creating, maintaining and updating the project website (**www.business40nc.com**) for this project. However, throughout the project duration, the Design-Build Team shall coordinate with Miracle King (**miracleking@ncdot.gov**), the Division 9 Communications Officer / Business 40 Marketing Coordinator, to ensure the accuracy of the aforementioned project website. At a minimum, the Design-Build Team shall designate a contact for public information inquiries / coordination. Throughout construction, this contact shall provide weekly updates to Miracle King, including, but not limited to, traffic control phasing, graphic illustrations, project pictures, etc.

The Design-Build shall discuss in the Technical Proposal their approach to providing the public with communication access to project personnel to inquire as to traffic impacts, including vehicular and pedestrian.

The Design-Build Team shall include in their Lump Sum Bid price for the project, all costs associated with their involvement in the Public Information Scope of Work.

AESTHETICS SCOPE OF WORK (7-20-16)**General**

The project shall include aesthetic treatments to roadways, bridges, and other elements consistent with the Business 40 Aesthetics Guidelines provided by the Department. The Business 40 Aesthetic Guidelines are based on stakeholder input from public involvement efforts and provide a visual representation of the desired aesthetic theme throughout the US 421 / I-40 Business Corridor. Thus, in case of discrepancy or conflict in the aforementioned Business 40 Aesthetics Guidelines and the RFP, the RFP shall govern.

The Design-Build Team shall utilize details that aesthetically match the Business 40 Aesthetics Guidelines. In accordance with the RFP requirements, the Design-Build Team shall utilize the aforementioned Business 40 Aesthetic Guidelines to develop the designs, plans and details necessary for aesthetic treatments of the roadways, bridges, and other elements as outlined herein.

The Business 40 Aesthetic Guidelines are guidelines; however they shall serve as the basis for achieving the aesthetic theme desired throughout the US 421 / I-40 Business Corridor. The Design-Build Team is cautioned that the Business 40 Aesthetics Guidelines are not engineered drawings and may be modified to suit the design. The Design-Build Team is encouraged to consider aspect ratios in the modification of any dimension shown in the Business 40 Aesthetics Guidelines; but warned that design modifications shall not lessen the visual effect on the travelling public. The Design-Build Team shall ensure that all aspects of the aesthetic features including but not limited to structural details and dimensions, adhere to the appropriate engineering standards and the RFP requirements.

The Design-Build Team shall provide conceptual designs and renderings for the required aesthetic features in the Technical Proposal.

Green Street Pedestrian Bridge

All structural steel shall be painted to match Sherwin Williams Generator Green SW 4070 or an equivalent color approved by the Engineer.

Pedestrian fencing shall be ten foot high at the mid-span of the bridge and taper on a parabolic curve to an eight foot high at the ends. The pedestrian fencing shall be Black Vinyl Coated Chain Link fencing with anodized black rails and posts.

The concrete bridge deck shall be a non-slip surface, broom finish perpendicular to the travel direction.

Reference the Lighting Section below for lighting requirements.

Strollway Pedestrian Bridge

The concrete bridge deck shall be a non-slip surface, broom finish perpendicular to the travel direction.

Pedestrian fencing shall be twelve-foot high at the mid-span of the bridge and taper on a parabolic curve to an eight foot high at the ends. The pedestrian fencing shall be Black Vinyl Coated Chain Link fencing with anodized black rails and posts.

Reference the Lighting Section below for lighting requirements.

Landscaping

The Design-Build Team shall develop a landscaping plan for review and acceptance by the Department. The landscaping plan shall include but is not limited to planting plan, plant palette, insulation, irrigation system, drainage, specifications, material requirements and / or construction processes needed to accomplish the landscape work. Upon approval, the Design-Build Team shall install the landscaping in accordance with the approved plan.

Plant Palette Example

The plant palette shall include plants native to North Carolina. An example of a plant palette is as follows:

Small Trees/Large Shrubs (5' Max. Dia.)

- Calycanthus floridus- Carolina allspice
- Sambucus Canadensis- Elderberry
- Physocarpus opulifolius 'Diablo'- Eastern Ninebark
- Hydrangea quercifolia- Oakleaf Hydrangea
- Viburnum rafinesquianum- Downy Viburnum

Approximately 15 plants at 5 gal or larger

Medium Shrubs/Perennials/Ornamental Grasses (3' Max. Dia.)

- Clethra acuminata- Mountain Pepperbush
- Eupatorium purpureum- Sweet Joe Pye Weed
- Ilex glabra- Inkberry
- Itea virginica-Virginia Sweetspire
- Muhlenbergia capillaris- Pink Muhly Grass
- Panicum virgatum- Switchgrass
- Yucca filamentosa- Spoonleaf Yucca

Approximately 61 plants at 3 gal

Perennials/Ornamental Grasses (18" O.C.)

- Amsonia tabernaemontana- Bluestar
- Asclepias tuberosa-Butterfly Weed
- Baptisia tinctoria-Wild Indigo

- Echinacea purpurea- Purple Coneflower
 - Helianthus atrorubens- Purpledisk Sunflower
 - Heuchera americana- American Alumroot/Coral Bells
 - Monarda didyma-Bee Balm
 - Solidago speciose- Showy Goldenrod
 - Sorghastrum nutans- Indian Grass
- Approximately 253 plants at 1 gal

Perennials/Ornamental Grasses (12" O.C.)

- Carex pennsylvanica- Pennsylvania sedge
- Coreopsis auriculata- Lobed Coreopsis
- Coreopsis verticillata- Threadleaf Coreopsis
- Lobelia cardinalis- Cardinal Flower
- Phlox paniculata- Garden Phlox
- Rudbeckia hirta- Black Eyed Susan
- Schizachyrium scoparium- Little Bluestem

Approximately 385 plants between 1 quart and 1 gal size

All plant material shall conform to the most recent issue of American Standards For Nursery Stock (ASNS) and installation shall conform to the 2012 NCDOT Standard Specifications for Roads and Structures.

The plant palatte must be approved in writing by the Engineer and City of Winston-Salem prior to proceeding with the landscaping plan.

Insulation Specifications

Polystyrene Insulation: The insulation shall be a closed cell extruded polystyrene panels shall at a minimum conform to ASTM C 578-92 2.0 pound properties and meet the following details:

- One inch thickness with a continuous skin surface
- R Value at one-inch thick at 75 degrees Fahrenheit: 4.35
- Minimum Comprehensive Deformation (PSI): 29
- Shear Modulus (PSI): 36
- Absorption Volume Maximum %: 2.0
- Degradation due to Moisture: None
- Degradation due to Fungal or Bacterial Growth: None

The Design-Build Team shall submit the name of the manufacturer, product name, description and data to Engineer for approval. A sample, two-foot square, shall be submitted to the Engineer for approval.

Adhesive: This adhesive will be used to adhere the polystyrene directly to the inside walls of the planter boxes. The adhesive shall be a water-based asphalt emulsion, trowel grade,

and recommended by the manufacturer for use with extruded polystyrene insulation or another adhesive approved by the Engineer. The Design-Build Team shall submit the name of the manufacturer, product name, description and data to Engineer for approval.

Geotextile: The geotextile shall meet MARV requirements for a Type 4 (soil stabilization) Geotextile as described in Table 1056-1 (Geotextile Requirements) (p.10-56) of 2012 *Standard Specifications for Roads and Structures*. The Design-Build Team shall submit the name of the manufacturer, product name, description and data to Engineer for approval. A sample two-foot square shall be submitted to the Engineer for approval.

Installation Of Above Components: The polystyrene insulation shall be installed without gaps and directly to the inside of the planter wall. The polystyrene insulation shall be installed from the bottom of the planter to within six-inches (soil depth) from the top of the planter. The polystyrene insulation shall be adhered to the inside of the planter using dabs of adhesive. A continuous coating of adhesive is not needed. The geotextile shall be installed over the #58 stone, perforated pipe, and the vertical polystyrene insulation, but before the engineered soil is installed. The geotextile shall line and wrap over the top of the polystyrene insulation and fold down between the polystyrene insulation and the planter wall for a minimum of 4 inches. The geotextile shall be lapped or joined where necessary with a continuous bead of adhesive approved by the manufacturer for this purpose or as approved by the Engineer.

Irrigation System

The Design-Build Team shall provide the Engineer with a professionally designed irrigation system plan and installation details.

Basic installation details for this project include: the system shall be constructed using new pipe, elbows, connectors, controller components, etc. No used, or secondary-market components will be permitted. At a minimum the irrigation system design shall include the location of a backflow preventer / device, shutoff(s) and a drain(s) for winterization, and schedule 40 primed and glued PVC piping appropriately sized to deliver adequate water pressure and flow to pop-up, fully adjustable irrigation heads. Note: the application of PVC approved cleaner/primer and the subsequent application of glue (PVC approved) shall be two-separate applications. The system shall be an electric system with an onsite control box - zoned to deliver uniform, head-to-head coverage of entire planter box surface. No stream-rotors shall be included in the design.

Prior to the start of any work, the Contractor shall verify available static water pressure (PSI) and gallons per minute (GPM) at point of connection to water service. Any replacement, relocation or additional materials required as a failure to check (PSI) and (GPM) shall be done at the Contractor's expense.

The irrigation contractor shall, in the presence of City of Winston-Salem employees responsible for maintenance of the system, meet the following obligations:

- Explain the complete operation of the system,
- Be available to answer any questions of system operators during the first year of operation,
- Winterize the system, during November of the first year of operation,
- Reenergize the irrigation system in April the following year and check the system for full operation.

Control wire must meet the following installation specifications:

- Wire shall be insulated single strand copper designed for twenty (20) to fifty (50) volts and UL approved as Type U.F. (Underground Feeder),
- Copper conductor must meet or exceed ASTM B-3 requirements,
- Red and white colors shall be available for common and lead-in wires,
- Yellow color shall be provided for spare wires,
- All pipe shall be trenched to a minimum of 12 inches and backfilled with the engineered soil or irrigation may be installed prior to the last 12 inches of engineered soil is installed. The irrigation pipe shall be installed so as to not interfere with plant placement. Control wire and PVC pipe shall be installed in the same trench.

Other irrigation specifications:

- Electrical tape shall be black plastic, three-quarters (3/4) inch wide and a minimum of 0.007 inches thick and the all-weather type,
- All flexible nipples or pipe joints shall be "Toro Funny Pipe"; "Rainbird Swing Pipe"; "Triple Swing Joint Assembly" or approved equal,
- All electrical wire splices must be made watertight with sealing 3M Direct Burial Splice Kit or approved equal,
- Thrust blocking shall be on three (3) inch and larger mainline piping only.

Planter – Soil Mix Specifications

Description: The work covered by this special provision shall consist of furnishing and installing the soil mix in the planters as shown on the plans and as directed by the Engineer. The Design-Build Team shall provide a soil mix which provides the physical properties specified herein and is composed of the specified components. The Design-Build Team shall be responsible for all testing to verify these specifications are achieved. ASTM Standard Specifications For Woven Wire Test Sieve Cloth And Test Sieves (ASTM E11 – 15) noted in link below shall be used to make the following determinations:

<http://www.advantechmfg.com/pdf/ASTM%20E11-15%20Standards%20Table.pdf>

Material: It shall be the Design-Build Team's responsibility to determine the initial input percentages of the following components so that the final composition of the soil mix is as follows:

- Approximately 35% by volume shall be WELL AGED PINE BARK with half being probase and half being mini-nuggets both meeting the following particle size analysis:
 - PINE BARK PROBASE: shall be 0.05 inches (12.5 mm) or less. 60 to 100% shall be between 0.5 inches (12.5 mm) and 0.02 inches (0.5 mm) and a maximum of 40% shall be less than 0.02 inches (0.5 mm).
 - MINI-NUGGETS: shall be 0.75 inches (18.75 mm) and less. 80 to 100% shall be between 0.75 inches (18.75 mm) and 0.31 inches (8 mm) and a maximum of 20% shall be less than 0.31 inches (8 mm).
- Approximately 10% by volume shall be WELL DECOMPOSED TURKEY COMPOST of which 60-70% shall be wood chips with particle sizes of 0.62 inches (15.63mm) and less. The corresponding 30-40% shall be adult turkey manure. The pH level shall be adjusted to a range of 6.5 to 8.0. Minor elements including sodium and zinc shall not be present in levels which are toxic to selected planter plant material. The cured product shall not have a temperature rising above 110 degrees Fahrenheit. A sample shall be submitted to the Engineer. The Engineer shall submit this sample to the Agronomic Laboratory of the North Carolina Department of Agriculture and Consumer Services for a Soil Analysis Report. At its discretion, the Department may use an independent scientific service to provide a review or analysis of this mix or its components. The results of this report shall be utilized to verify element content and pH levels.
- Approximately 55% by volume shall be a MINERAL COMPONENT of which approximately 41% of the 55% shall be a coarse sand and approximately 14% of the 55% shall be a topsoil both meeting the following particle size analysis:
 - Coarse Sand shall be 0.25 inches (6.3 mm) and less. A maximum of 10% shall be greater than 0.08 inches (2 mm), 65 to 100% shall be between 0.08 inches (2 mm) and 0.01 inches (0.25 mm), and a maximum of 25% shall be less than 0.01 inches (0.25 mm).
 - Topsoil shall be 0.25 inches (6.3 mm) and less. The distribution of particle sizes shall fall within these ranges:

<u>Particle Size (inches)</u>	<u>Percent</u>
<u>AGGREGATE:</u>	
0.08 (2.0mm)	Maximum of 2.5
<u>SAND:</u>	
	<u>Min. / Max.</u>
Very Coarse: 0.04 to 0.08 (1.0 – 2.0mm)	8 – 14
Coarse: 0.02 to 0.04 (0.5 – 1.0mm)	18 – 27
Medium: 0.01 to 0.02 (0.25 – 0.5mm)	13 – 21
Fine: 0.004 to 0.01 (0.10 – 0.25mm)	7 – 14

Very Fine: 0.002 to 0.004 (0.05 – 0.10mm)	2 – 7
Silt and Clay: 0.002 and less (0.05mm and less)	20 – 40

A two pound sample of each component, along with the source of the component, shall be submitted to the Engineer for laboratory testing. A particle analysis shall be performed on each component including the turkey compost. An inspection of the source for each component may also be performed.

Each component must be approved by the Engineer prior to proceeding with preparing a soil mix sample.

Mixing: The soil mix components shall be thoroughly mixed by a mechanical device designed specifically for producing uniform soil mixes. The process for mixing shall be submitted in writing to the Engineer prior to mixing. An onsite inspection of the mixing procedure may be required prior to approval of the mixing process. No sample shall be prepared prior to receiving approval of the mixing process.

After approval of the soil mix components and approval of the mixing process have been obtained, a sample of the combined mixture shall be prepared for testing. Approximately two cubic feet will be submitted to the Engineer for organic and physical analysis. The remaining soil mix will not be prepared until results of the testing are received and approved by the Engineer.

Physical analysis testing shall be run on samples that have been compacted at 45 foot pounds when at 15.75 inches (40 cm) moisture tension. The water permeability will be run for five (5) hours with a one-inch (25 mm) hydraulic head at 68 degrees Fahrenheit (20 degrees Celsius). The following properties will be analyzed and the results shall fall within the ranges provided.

Water permeability (inches per hour)	15 to 35
Pore Space (%)	
Aeration	20 to 25
Capillary	15 to 25
Bulk Density	
0.0073 to 0.0084 pounds per inch (1.3 to 1.5grams per cubic centimeter)	
Percent Moisture Retention	
(at 15.75 inches (40 cm) moisture tension)	12 to 17

Should variations outside of the given ranges specified above occur, the Design-Build Team shall be responsible for making the necessary adjustments to the initial input percentages of the components in order to bring the soil mix within the specified ranges at no additional cost to the Department.

During the mixing operation, the Design-Build Team shall be responsible for maintaining a soil mix which meets the specifications. Random samples will be submitted as requested by

the Engineer in order to test for mix uniformity and to verify that it remains within the specified ranges for the physical properties.

All the individual components as well as the soil mix shall be reasonably free of weed seed or toxic substances or any other material which would be harmful to plant growth, and shall be maintained free from such during stockpiling, transport, and installation. If the soil mix is to be stockpiled, the location chosen for stockpiling must be reasonably free of weed seed, vegetation, toxic substances, or any other material which would be harmful to plant growth. The stockpiling location must be approved by the Engineer prior to stockpiling.

Testing: It shall be the Design-Build Team's responsibility to use a Certified Soil Testing Laboratory with the following professional accreditations to conduct the evaluations outlined in the RFP.

- American Society for Testing and Materials - A.S.T.M.
- Council on Soil Testing and Plant Analysis
- Compost Analysis Proficiency Program (US Composting Council)
- Soil Science Society of America - S.S.S.A.
- Mid-Atlantic Soil and Plant Testing Workgroup
- United States Golf Association's Putting Green Materials Testing Committee (P.U.G.)
- North American Proficiency Testing Program (NAPT)

The Design-Build Team shall identify the Laboratory (name, address, telephone and contact person) to perform testing of the soils.

The Laboratory shall have a specific working knowledge of engineered soils and North Carolina native soils. To verify this requirement, the Design-Build Team shall submit a list of North Carolina specific soil related projects dated within the last twelve (12) months for which the laboratory has provided analysis. The Design-Build Team shall provide NCDOT with a list of input material sources. The Design-Build Team shall submit a copy of the Laboratory's most recent NAPT quarterly report.

Laboratory accuracy should be within +10 percent of the "true" soil test value. Laboratory precision should be + 20 percent. The laboratory shall provide proof that all of their instruments are checked and calibrated using NAPT standards. Every batch of analyses shall include standard samples with known nutrient levels. If the results from these standards do not match the known values, ALL results shall be discarded and the entire evaluation process shall be reviewed until the source(s) of error(s) is found and corrected.

The Design-Build Team shall submit results of the laboratory analysis of the individual components and subsequent mix(s) to: NCDOT-Roadside Environmental Unit (attn.: Derek Smith), 1557 Mail Service Center, Raleigh, NC 27699-1557 for review and approval prior to installation.

Installation: Place above mix in planter over 6 to 9 inches of #57 washed stone and filter fabric in horizontal layers. Each 12 inch layer of mix will be thoroughly compacted by means of water saturation using spray or sprinkler before next layer is added. After a minimum of a 24 hour settling period adjust planter mix to achieve a finished grade within 1" of proposed capacity.

The soil mix shall be installed in order that the finish grade after settlement shall be as specified on the plans and as directed by the Engineer.

The Design-Build Team shall provide an additional five percent of the total soil mix the planter (after compaction) for delivery to the City of Winston Salem Lowery Street Facility located at 2000 Lowery Street, Winston-Salem, NC 27101-4717. The Design-Build Team shall contact either Bobby Branch, Street Supervisor at 336-414-7536, Marlene Davis, Street Supervisor at 336-462-0099 or Joe Duncan, Senior Crew Coordinator at 336-462-0156 prior to delivery. This overage shall be covered with plastic sheeting to prevent weed seed from blowing into the mix.

Care shall be taken to avoid damage to existing components (e.g. insulation, filter fabric and irrigation system within the planter trough(s)). Filter fabric shall be maintained free of wrinkles or gaps during the soil-mix filling operation. Insulation shall be maintained in place.

If during stockpiling, the installation process, or after installation weeds begin to germinate, they shall be treated with a post-emergence herbicide before the undesirable vegetation reaches 8 inches in height. If a bio-mass of 8 inches or more should develop it shall be physically removed from the planter by the Design-Build Team. The use of any herbicide must be approved by the Engineer prior to use. All applications must be performed by a licensed pesticide applicator according to General Statutes administered by the North Carolina Department of Agriculture and Consumer Services.

Gabion Elements

The Design-Build Team shall design and construct gabion elements in locations denoted on plans developed by the Design-Build Team. (Reference the Geotechnical Scope of Work, the Structures Scope of Work, and the *Gabion* Project Special Provisions found elsewhere in this RFP).

The Design-Build Team shall construct three sample gabion baskets at the project site that shall be approved by the Engineer. Upon approval by the Engineer, the sample baskets shall be used as the quality standard for the project. After the approval of the completed gabion elements, the Design-Build Team shall dispose of the sample baskets, as directed by the Engineer.

The Design-Build Team shall use locally quarried stone for the gabion elements.

Roadway Bridges

Unless noted otherwise elsewhere in this RFP, the Design-Build Team shall design and construct concrete arch facades for all roadway bridges over US 421 / I-40 Business and the MUP. (Reference the Structures Scope of Work found elsewhere in this RFP) The concrete arch facades shall have a smooth finish and shall provide sufficient clearance for future bridge maintenance and inspections, including but not limited to inspection of exterior girders. If the Design-Build Team provides a cored slab or box beam bridge on Fourth Street over US 421 / I-40 Business, concrete arch facades will not be required.

For bridges utilizing steel girders, the exterior girders shall be painted black.

For bridges utilizing concrete girders other than cored slabs or box beams, the exterior girder shall be stained black.

All proposed bridge barrier rails on roadways over US 421 / I-40 Business shall have Sherwin Williams Generator Green SW 4070 or an equivalent color approved by the Engineer anodized metal rails.

The Design-Build Team's design shall provide for the future construction of concrete plinths at all corners of the roadway bridges noted below. The future plinths shall not be attached to the proposed bridge structure and shall not hinder future bridge maintenance or inspections. Lighting requirements for the future plinths are as shown on the Preliminary Lighting Plans provided by the Department. The location and dimensions of the future plinths are as follows:

Bridge	Offset Distance from end of Bridge Rail / Parapet to Face of Future Plinth	Offset Distance from back of Guardrail to Face of Future Plinth	Dimension of Future Plinths (W x L x H)
Peters Creek Parkway	8 feet	3 feet	5 feet x 5 feet x 16 feet
Fourth Street, Broad Street, Marshall Street, Cherry Street, Liberty Street, Main Street and Church Street	5 feet	3 feet	3 feet x 3 feet x 5 feet

The Design-Build Team shall design and construct mid-span concrete plinths on the Church Street Bridge. The mid-span concrete plinths shall be centered over the proposed median bent cap. The dimensions of the mid-span concrete plinths shall be three (3) foot wide, three (3) foot long and be equal to the height of the bridge rail. The mid-span concrete plinths face shall be flush with the sidewalk side of the bridge rail parapet.

The Design-Build Team shall design and construct square columns for the proposed median bents.

Retaining Walls and Vertical Abutment Walls

Unless otherwise noted elsewhere in this RFP, the traffic face of all retaining walls and vertical abutment walls, including retaining walls in front of roadway bridge end bents, shall be designed and constructed as noted below:

- The Design-Build Team shall design and construct walls with a minimum eight-foot panel width.
- The Design-Build Team shall design and construct all walls visible from US 421 / I-40 Business that are 10.5' tall or higher in accordance with the requirements noted below:
 - From the bottom of the single-faced concrete barrier in front of the wall to a minimum six-foot height / maximum seven-foot height, the wall shall be standard smooth finish concrete. The Design-Build Team shall step the top of the aforementioned smooth finish concrete at one-foot vertical per horizontal panel(s).
 - The top of all walls shall have concrete coping of a uniform height. The coping height shall be 18 inches, unless the overall wall height will not accommodate an additional row of bricks in one or more panels. In which case the coping height shall be uniformly increased.
 - From the top of the aforementioned smooth finish concrete portion of the wall to the bottom of the aforementioned concrete coping, the wall shall be brick embedded concrete panels that provide a traditional brick wall appearance with running bond and header courses. The brick shall match the appearance of the brick used on TIP Project U-2925 and be approved by the Engineer.
- The Design-Build Team shall design and construct all walls visible from US 421 / I-40 Business that are less than 10.5' tall with standard smooth finish concrete.
- MSE walls shall only be designed and constructed in areas that are not visible from US 421 / I-40 Business. All MSE walls shall be designed and constructed with panels that are rectangular, smoothly finished and oriented in a horizontal running bond or stacked pattern.
- Unless noted otherwise elsewhere in this RFP, the top of all retaining walls shall be stepped at two-foot vertical per horizontal panel(s).
- The top of retaining walls located between a ramp and the -L- Line shall be sloped to match the ramp profile.
- The Design-Build Team shall texture and stain the retaining walls for the end bents of the Strollway Bridge to provide the appearance of the locally quarried stone used in the gabion elements.
- The top of retaining walls in front of sloped bridge end bents shall be sloped to match the end bent slope.

- The top of retaining walls located between sections of the MUP shall be sloped to match the higher MUP profile.
- The Design-Build Team shall consistently step the top of wingwalls at either two or three-foot vertical per horizontal panel.

Aesthetic Columns

The Design-Build Team shall design and construct aesthetic columns between US 421 / I-40 Business and the proposed MUP beneath the Broad Street and Cherry Street bridges over US 421 / I-40 Business. (Reference the Structures Scope of Work found elsewhere in this RFP) These columns are to provide a visual delineation between the MUP and US 421 / I-40 Business. The columns shall be located on top of the retaining wall US 421 / I-40 Business and the MUP or directly behind the wall. The columns shall extend from the top of the retaining wall coping and / or the finished grade of the MUP to the bottom of, but not be attached to, the concrete arch façade. Columns shall be square with the minimum width and depth dimension to be determined by the width of the retaining wall coping. The columns shall be constructed of concrete with a smooth finish.

Sound Barrier Walls

Reference the *Sound Barrier Wall – Ground Mounted* Project Special Provision, the *Sound Barrier Wall – Bridge Mounted* Project Special Provision, the *Architectural Concrete Surface Treatment* Project Special Provision, and the Structures Scope of Work found elsewhere in this RFP.

Control of Access Fence

All control of access fencing shall be four-foot high and shall consist of the following types of decorative fencing:

- Vinyl Coated Chain Link fencing with anodized rails and posts. Vinyl Coated Chain Link fencing, rails and posts shall be black.
- Ornamental Fence with metal pickets and three rails with a smooth top rail. Ornamental Fence shall be black and one of the following types:

SPECRAIL
Saybrook

AMERISTAR
AEGIS Plus Majestic 3-Rail

Ultra Aluminum Mfg., Inc.
UAF 200 Flat Top

The Design-Build Team has the option of supplying an alternative type of ornamental fence, as long as the ornamental fence selected is approved, in writing, as an equal or approved alternative by the Engineer and the City of Winston-Salem.

Location of each fencing type will be in accordance with the locations shown in the Business 40 Aesthetics Guidelines and as directed by the Engineer.

Sidewalks

The Design-Build Team shall design and construct all concrete sidewalks with scored joints at five foot on center. Where used, joint sealant shall be light gray, to match concrete surface.

Crosswalks

At crosswalks the Design-Build Teams shall provide the following:

- Curb ramps and ADA Detectable Warning Mats according to ADA and NCDOT Standard 848.05. Detectable Warning Mats shall be black.
- Where medians are present and a minimum of six-foot in width, provide refuge islands for pedestrians.

Lighting

The Design-Build Team shall comply with the lighting requirements noted in the Lighting Scope of Work found elsewhere in this RFP and the requirements noted below:

US 421 / I-40 Business

The new roadway lighting system(s) on US 421 / I-40 Business shall include, but not be limited to single arm, twin arm, and high mast poles and fixtures. Single arm and twin arm fixtures shall be black and one of the following types:

Kim Lighting Altitude LED
2SB/ALT2P70/120L4K480/BL

Kim Lighting Warp p9 Pico Prism LED
2SB/WP9L2P70/120L4K480/BL

Philips RoadFocus
R145W64LED4K-T-R2M-HVU-DMG-BK

Beacon Viper-Large LED
VP-L/80NB-180/4K/T2/480V/SF2/BBT

The Design-Build Team has the option of supplying an alternative type of fixture, as long as the fixture selected is approved, in writing, as an equal or approved alternative by the Engineer and the City of Winston-Salem.

Green Street Pedestrian Bridge

The lighting system for the Green Street Pedestrian Bridge shall include, but not be limited to spotlighting for the tied arches, fence post pedestrian lights, and deck paver lighting. All lighting shall be LED.

- The spotlighting shall highlight the cables, from the bottom, which will also provide some illumination of the arches, depending on angle spread. Spotlighting fixtures for the tied arches shall be black, chosen from one of the following types:

Traxon, Nano Liner Allegro AC XB RGB, Butler XT2 Controller

Philips, Color Kinetics, ColorGraz MX4 Powercore (RGB Amber), iPlayer 3 Controller

Lumenpulse, Lumenfacade horizontal color changing, Lumentouch 2.0 Controller

The Design-Build Team shall design and construct a climate controlled box or facility if required by the manufacture for the aforementioned spotlight fixtures. The climate controlled box or facility shall be located within the existing right of way southwest of the proposed Green Street Pedestrian Bridge near the proposed Green Street turnaround.

- For pedestrian safety and visibility, the Design-Build Team shall provide small cut-off fixtures to be mounted on fence posts. These fixtures shall be small enough to be unobtrusive yet provide ample lighting for users. All pedestrian lighting shall be full cut off / Dark Sky Compliant. Fence post pedestrian light fixtures shall be black and mounted to the top of the pedestrian fence post, chosen from one of the following types:

Architectural Area Lighting, Kick Small Scale K41, Type3 Distribution

Bega, Single Light Building Element #88 977

Hess America, Linea #LN450 NW ME type 3 distribution

Landscape Forms, RAMA LED R4, 4000K

- The Design-Build Team shall design and construct the pedestrian fence posts / light poles to accommodate the aforementioned small cut-off fixtures and any transformers, conduits, etc. required by the manufacturer.
 - The Design-Build Team shall be responsible for determining the appropriate mounting design based on the selected fixture. Post mounted lights shall be spaced as needed per photometrics to achieve an average 1.5 to 2 fc at the walkway surface.
 - All post / pole mounted lights shall be mounted between eight feet and twelve feet above the walkway surface. Fence posts or light poles shall extend above the top of the fence line. Posts / poles for light fixtures shall be set in line with the pedestrian fencing on the Green Street Pedestrian Bridge.
 - Fixture, pole, bracket arms, or other hardware shall be matte black to match the fencing.
- Deck paver lighting shall be installed in the bridge deck in a random pattern utilizing a mix of sizes, see concept sketch in the Business 40 Aesthetic Guidelines. All deck paver lighting fixtures shall be outdoor wet rated, IP65 minimum. Deck paver lighting fixtures for the deck shall be black and one of the following types:

Bega, Small Scale in-grade Luminaire
#77018

FC Lighting, Mini LED Recessed Drive-over
FCD23, 4K, FG

KIM Lighting, In Grade LED
LTV83FF

The Design-Build Team has the option of supplying an alternative type of fixture(s), as long as the fixture(s) selected is approved, in writing, as an equal or approved alternative by the Engineer and the City of Winston-Salem.

Strollway Pedestrian Bridge

The lighting system for the Strollway Pedestrian Bridge shall include, but not be limited to linear LED façade lighting, fence post pedestrian lights, and deck paver lighting. All lighting shall be LED.

- The linear LED façade lighting shall highlight the mesh fence and / or the horizontal bridge beam or other façade elements. Linear LED façade lighting fixtures shall be black and one of the following types:

Philips, Vaya Tube RGB, iPlayer 3 Controller

Traxon, Media Tube RGB, Diffused, Butler XT2 Controller

Lumenpulse, Lumencove XT Direct View Color Changing,
Lumentouch 2.0 Controller

Barron Specialty LED, RGB LED Flexible Border Tube

The Design-Build Team shall design and construct a climate controlled box or facility if required by the manufacture for the aforementioned fixtures. The climate controlled box or facility shall be located within the existing right of way northwest of the proposed Strollway Pedestrian Bridge.

- For pedestrian safety and visibility, the Design-Build Team shall provide small cut-off fixtures to be mounted to posts. These fixtures should be small enough to be unobtrusive yet provide ample lighting for users. All pedestrian lighting shall be full cut off / Dark Sky Compliant. Post mounted pedestrian light fixtures shall be black and mounted to the planter side of the interior parapet wall, chosen from one of the following types:

Architectural Area Lighting, Kick Small Scale
K41, Type3 Distribution

Bega, Single Light Building Element
#88 977

Hess America, Linea #LN450 NW ME
type 3 distribution

Landscape Forms, RAMA LED
R4, 4000K

- The Design-Build Team shall design and construct the pedestrian light poles to accommodate the aforementioned small cut-off fixtures and any transformers, conduits, etc. required by the manufacturer.
- The Design-Build Team shall be responsible for determining the appropriate mounting design based on the selected fixture. Post mounted lights shall be spaced as needed per photometrics to achieve an average 1.5 to 2 fc at the walkway surface.
- All pole mounted lights shall be mounted between eight feet and twelve feet above the walkway surface. Light poles for light fixtures shall be set in line with or just behind the interior parapet walls adjacent to the Strollway walking surface.
- Fixture, pole, bracket arms, or other hardware shall be matte black to match the fencing.

- Deck paver lighting shall be installed in the bridge deck in a random pattern utilizing a mix of sizes, see concept sketch in the Business 40 Aesthetic Guidelines. All deck paver lighting fixtures shall be outdoor wet rated, IP65 minimum. Deck paver lighting fixtures for the deck shall be black and one of the following types:

Bega, Small Scale in-grade Luminaire
#77018

FC Lighting, Mini LED Recessed Drive-over
FCD23, 4K, FG

KIM Lighting, In Grade LED
LTV83FF

The Design-Build Team has the option of supplying an alternative type of fixture(s), as long as the fixture(s) selected is approved, in writing, as an equal or approved alternative by the Engineer and the City of Winston-Salem.

Preliminary Design

After the contract has been executed, the Design-Build Team shall clearly present, with appropriate visual aids, the aesthetic design intent, including but not limited to the aesthetic theme, the general plan, color scheme(s) and Preliminary General Drawings for each design element within the project for review and approval. The NCDOT will require 30 days to review this information to ensure that it is acceptable and complementary to the general theme for the US 421 / I-40 Business Corridor.

Final Design

The Design-Build Team shall include the accepted aesthetics details with the appropriate submittal of preliminary and final designs plans for each element (bridge, roadway, structure, lighting, etc.)

For each element, the Design-Build Team shall develop and submit for review and acceptance any specifications, material requirements and / or construction processes needed to accomplish the aesthetic work with the final design submittal.

Materials, Construction, and Fabrication

To demonstrate the color consistency and the facsimile to real brick, the Design-Build Team shall demonstrate the long-term durability of all proposed staining. At a minimum this demonstration shall require the Design-Build Team to provide a minimum of three test panels, produced in different batches, of each product.

Visible joints in the brick appearance or brick façade are of concern to the Department. The Design-Build Team shall demonstrate how joints will be eliminated or otherwise masked from

affecting the overall appearance and continuity of walls, piers, pylons and arches in their aesthetics details.

At a minimum, the Design-Build Team shall provide three full-size mocked-up panels for each colored aesthetic feature, including but not limited to features that are stained, anodized and / or painted. At their own risk, the Design-Build Team may elect to use production elements as the test panels. All coloring shall be supplied by a single commercial facility to avoid potential differences in tinting machines.

***** STANDARD SPECIAL PROVISIONS *******VALUE ENGINEERING PROPOSALS**

(4-6-15)

104

DB01 G116

Value Engineering Proposals (VEP), as specified in Article 104-12 of the 2012 *Standard Specifications for Roads and Structures* will be accepted. Only proposals, which alter the Technical Proposal submitted by the Design-Build Team and / or the requirements of the RFP issued by the Department, will be considered as Value Engineering Proposals.

Revise the 2012 *Standard Specifications for Roads and Structures* 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 State Value Management Engineer, the Resident Engineer and the Design-Build Unit, the Design-Build Team shall remain obligated to perform the work in accordance with the terms of the existing contract with no additional contract time or compensation.

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 Design-Build Team desire a preliminary review of a possible VEP, prior to expending considerable time and expense in full development, a copy of the Preliminary VEP shall be concurrently submitted to the State Value Management Engineer at **ValueManagementUnit@ncdot.gov**, the Resident Engineer and the Design-Build Unit.

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

The Design-Build Team shall concurrently submit a copy of the Final VEP to the State Value Management Engineer at **ValueManagementUnit@ncdot.gov**, the Resident Engineer and the Design-Build Unit.

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

The preparation of new design drawings by the Design-Build Team shall be coordinated with the appropriate Department personnel through the State Value Management Engineer. The Design-Build Team 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 concurrently submitted to the State Value Management Engineer, the Resident Engineer and the Design-Build Unit no later than ten (10) business days after acceptance of a VEP, unless otherwise permitted in writing.

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

Supplemental agreements shall add one line item deducting the full savings from the lump sum price bid for the entire project and one line item crediting the Design-Build Team with 50.0% 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 concurrently provided to the State Value Management Engineer, the Resident Engineer and the Design-Build Unit, the Design-Build Team shall remain obligated to perform the work in accordance with the terms of the existing contract with no additional contract time or compensation.

PLANT AND PEST QUARANTINES

(Imported Fire Ant, Gypsy Moth, Witchweed, And Other Noxious Weeds)

(8-31-13)

DB1 G130

Within Quarantined Area

This project may be within a county regulated for plant and/or pests. If the project or any part of the Design-Build Team'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 or other noxious weeds.

GIFTS FROM VENDORS AND CONTRACTORS

(12-15-09)

DB1 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:

- (1) have a contract with a governmental agency; or
- (2) have performed under such a contract within the past year; or
- (3) 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 *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

(3-19-14)

DB1 G160

Revise the 2012 *Standard Specifications for Roads and Structures* 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.

STATE HIGHWAY ADMINISTRATOR TITLE CHANGE

(07-31-12)

DB1 G185

Revise the 2012 *Standard Specifications for Roads and Structures* as follows:

Replace all references to “State Highway Administrator” with “Chief Engineer”.

SUBLETTING OF CONTRACT

(12-19-2014)

108-6

DB1 G186

Revise the 2012 *Standard Specifications for Roads and Structures* as follows:

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 Design Build Team. If the Design Build Team 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.

NAME CHANGE FOR NCDENR

(11-25-15)

DB Z11

Wherever in the 2012 *Standard Specifications for Roads and Structures*, elsewhere in this RFP, or material / information provided by the Department 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.

SELECT GRANULAR MATERIAL

(9-1-11)

DB2 R80

Revise the 2012 *Standard Specifications for Roads and Structures* as follows:

Page 2-28, Article 265-2 MATERIALS, add the following:

Use only Class III select material for select granular material.

ROCK AND BROKEN PAVEMENT FILLS

(12-29-15)

235

DB2 R85

Revise the 2012 *Standard Specifications for Roads and Structures* as follows:

Page 2-22, Article 235-2 MATERIALS, add the following after **Line 19**:

Item	Section
Geotextile for Rock and Broken Pavement Fills, Type 2	1056

Provide Type 2 geotextile for filtration geotextiles. Use rip rap and No. 57 stone from either a quarry or onsite material to fill voids in rock and broken pavement fills. Provide small and large size rip rap with stone sizes that meet Class A and B in accordance with Table 1042-1 and No. 57 stone with a gradation that meets Table 1005-1 or use similar size onsite material approved by the Engineer.

Page 2-23, Subarticle 235-3(B) Embankment Formation, Lines 18 - 19, delete the third sentence in the seventh paragraph.

Page 2-23, Subarticle 235-3(B) Embankment Formation, Lines 21 - 23, replace the eighth paragraph with the following:

Before placing embankment fill material or filtration geotextiles over rock and broken pavement, fill voids in the top of rock and broken pavement fill with rip rap and No. 57 stone. Place and compact larger rip rap first followed by smaller rip rap. Then, fill any remaining voids with No. 57 stone so geotextiles are not torn, ripped or otherwise damaged when installed and covered. Compact rip rap and No. 57 stone with tracked equipment or other approved methods. Install filtration geotextiles on top of rock, broken pavement, rip rap and No. 57 stone in accordance with Article 270-3 before placing remaining embankment fill material.

Remove any rocks, debris or pavement pieces from the roadbed larger than two inches within 12" of the subgrade or finished grade, whichever is lower.

BLASTING

(2-16-16)

220

DB2 R88A

Revise the 2012 *Standard Specifications for Roads and Structures* as follows:

Page 2-8, Article 220-1 DESCRIPTION, Line 22, replace “cushion” with “pre-split”.

Page 2-8, Article 220-1 DESCRIPTION, Line 23, add the following after the third sentence:

Unless required otherwise elsewhere in the RFP, design blasts for the vibration and air overpressure limits in this section. Pre-split rock cuts at locations shown on the plans developed by the Design-Build Team and as directed by the Engineer.

Page 2-9, Subarticle 220-3(A) Vibration and Air Overpressure Limits, Line 18, add the following to the end of Subarticle 220-3(A):

Unless required otherwise elsewhere in the RFP or as directed by the Engineer, design production, pre-split and trench blasts in accordance with the following:

(1) Production Blasting

- (a) For rock cut slopes steeper than 1.5:1 (H:V) without pre-splitting, do not use production blast holes more than four inches in diameter within ten feet of finished slope faces or neat lines

- (b) Do not drill production holes below bottom of adjacent pre-split blast holes
- (c) Use delay blasting to detonate production blast holes towards a free face

(2) Pre-splitting

- (a) Do not use pre-split blast holes more than three inches in diameter
- (b) Space pre-split holes no more than ten-hole diameters apart (wider pre-split blast hole spacing may be approved by the Engineer, in writing, if test blast results are satisfactory)
- (c) Limit subdrilling to the offset width between lifts
- (d) Do not subdrill more than two feet below finished grade
- (e) Pre-split rock at least 30 feet beyond production blasting lifts or to the end of rock cuts
- (f) Provide benches or lifts with a maximum height of 25 feet
- (g) Do not use ammonium nitrate fuel oil (ANFO) or other bulk loaded products
- (h) Use cartridge explosives or other explosive types designed for pre-splitting
- (i) Use charges with a maximum diameter of half the pre-split blast hole diameter except for charges in bottom two-foot of holes
- (j) If pre-split and production blast holes are fired in the same blast, fire pre-split holes at least 25 milliseconds before production holes

(3) Trench Blasting

- (a) Do not use trench blast holes more than three inches in diameter
- (b) Do not use ANFO or other bulk loaded products
- (c) Use cartridge explosives or other explosive types designed for trench blasting
- (d) Use charges with a diameter of 1/2" to 3/4" less than the trench blast hole diameter

Page 2-10, Subarticle 220-3(D) Blasting Requirements, Line 25, add the following after the third paragraph:

Pre-split rock cuts as required so irregularities between pre-split blast holes are less than one foot from finished slope faces. Alignment is crucial for pre-split holes. Maintain pre-split hole alignment within six inches of rock cut slopes and parallel to adjacent pre-split blast holes. Monitor and accurately measure pre-split hole alignment during drilling with a method acceptable to the Engineer. When rock cut heights require multiple benches or lifts, offset pre-split blast holes horizontally for each lift no more than the clearance necessary for drilling equipment.

BRIDGE APPROACH FILLS

(9-1-11)

DB4 R01

Description

Bridge approach fills include bridge approach fills for sub regional tier bridges and reinforced bridge approach fills. Construct bridge approach fills in accordance with the contract and Roadway Standard Drawing Nos. 422.10 or 422.11. Define "geosynthetics" as geotextiles or geomembranes.

Materials

Refer to Division 10 of the 2012 *Standard Specifications for Roads and Structures*.

Item	Section
Anchor Pins	1056-2
Geotextiles	1056
Portland Cement Concrete	1000
Select Material	1016
Subsurface Drainage Materials	1044
Wire Staples	1060-8(D)

For bridge approach fills for sub regional tier bridges, provide Type 1 geotextile for filtration geotextiles. For reinforced bridge approach fills, provide Type 5 geotextile for geotextile reinforcement and Type 1 geotextile and No. 78M stone for drains. Use Class B concrete for concrete pads.

Use Class III or V select material for reinforced bridge approach fills and only Class V select material (standard size No. 78M stone) for bridge approach fills for sub regional tier bridges. Provide PVC pipes, fittings and outlet pipes for subsurface drainage materials. For drains and PVC pipes behind end bents, use pipes with perforations that meet AASHTO M 278.

Use PVC, HDPE or linear low density polyethylene (LLDPE) geomembranes for reinforced bridge approach fills. For PVC geomembranes, provide grade PVC30 geomembranes that meet ASTM D7176. For HDPE and LLDPE geomembranes, use geomembranes with a nominal thickness of at least 30 mils that meet Geosynthetic Research Institute Standard Specifications GM13 or GM17, respectively. Handle and store geomembranes in accordance with Article 1056-2 of the 2012 *Standard Specifications for Roads and Structures*. Provide material certifications for geomembranes in accordance with Article 1056-3 of the 2012 *Standard Specifications for Roads and Structures*.

Construction Methods

Excavate as necessary for bridge approach fills in accordance with the contract. Notify the Engineer when foundation excavation is complete. Do not place geomembranes or filtration geotextiles until excavation dimensions and foundation material are approved. Attach geomembranes and filtration geotextiles to end bent cap back and wing walls with adhesives, tapes or other approved methods. Glue or weld geomembrane seams to prevent leakage.

For reinforced bridge approach fills, place geotextile reinforcement within 3" of locations shown in Roadway Standard Drawing No. 422.10 and in slight tension free of kinks, folds, wrinkles or creases. Install geotextile reinforcement with the orientation, dimensions and number of layers shown in Roadway Standard Drawing No. 422.10. Place first layer of geotextile reinforcement directly on geomembranes with no void or material in between. Install geotextile reinforcement with the machine direction (MD) parallel to the roadway centerline. The MD is the direction of the length or long dimension of the geotextile roll. Do not splice or overlap geotextile reinforcement in the MD so seams are perpendicular to the roadway centerline. Wrap geotextile reinforcement at end bent cap back and wing walls as shown in Roadway Standard Drawing No. 422.10 and directed by the Engineer. Extend geotextile reinforcement at least four feet back

behind end bent cap back and wing walls into select material.

Overlap adjacent geotextiles at least 18" with seams oriented parallel to the roadway centerline. Hold geotextiles in place with wire staples or anchor pins as needed. Contact the Engineer when existing or future obstructions such as foundations, pavements, pipes, inlets or utilities will interfere with geosynthetics.

For reinforced bridge approach fills, construct one foot square drains consisting of 4" diameter continuous perforated PVC pipes surrounded by No. 78M stone wrapped in Type 1 geotextiles. Install drains in accordance with Standard Drawing No. 422.10. For bridge approach fills for sub regional tier bridges, install 4" diameter continuous perforated PVC drain pipes in accordance with Roadway Standard Drawing No. 422.11.

Use solvent cement to connect PVC pipes so joints do not leak. Connect perforated pipes to outlet pipes just behind wing walls. Provide drain pipes and drains with positive drainage towards outlets. Place pipe sleeves in or under wing walls for outlet pipes so positive drainage is maintained. Use sleeves that can withstand wing wall loads.

Place select material in 8" to 10" thick lifts. Use only hand operated compaction equipment to compact select material for bridge approach fills. Compact Class III select material in accordance with Subarticle 235-3(C) of the 2012 *Standard Specifications for Roads and Structures*. Compact No. 78M stone with a vibratory compactor to the satisfaction of the Engineer. Do not displace or damage geosynthetics, drain pipes or drains when placing and compacting select material. End dumping directly on geosynthetics is not permitted. Do not operate heavy equipment on geosynthetics, drain pipes or drains until they are covered with at least 8" of select material. Replace any damaged geosynthetics, drain pipes or drains to the satisfaction of the Engineer.

Cover open ends of outlet pipes with rodent screens as shown in Roadway Standard Drawing No. 815.03. Connect ends of outlet pipes to concrete pads or existing drainage structures as directed by the Engineer. Construct concrete pads with an Ordinary surface finish that meets Subarticle 825-6(B) of the 2012 *Standard Specifications for Roads and Structures*.

PREPARATION OF SUBGRADE AND BASE

(9-1-11)

DB5 R05

On mainline portions and ramps of this project, prepare the subgrade and base beneath the pavement structure in accordance with the applicable sections of the 2012 *Standard Specifications for Roads and Structures* except use an automatically controlled fine grading machine utilizing string lines, laser controls, or other approved methods to produce final subgrade and base surfaces meeting the lines, grades, and cross sections required by the plans developed by the Design-Build Team or established by the Engineer.

CLASS IV AGGREGATE STABILIZATION

(10-02-14)

510

DB05 R12

Description

As directed by the Engineer, stabilize sandy subgrade material with Class IV aggregate to prevent rutting of the subgrade prior to paving directly on the subgrade. Remove material as needed in cut areas prior to placing the Class IV aggregate.

Materials

Refer to Division 10

Item	Section
Select Material, Class IV	1016

Use Class IV Select Material for Class IV Aggregate Stabilization.

Construction Methods

As directed by the Engineer, place aggregate by end dumping aggregate on approved subgrade soils to provide a working platform and reduce wheel rutting of subgrade material. Place the Class IV aggregate stabilization to a thickness of two to three inches.

Maintenance

Maintain aggregate stabilization in an acceptable condition and minimize the use of heavy equipment on aggregate in order to avoid damaging the subgrade. Provide and maintain drainage ditches and drains as required to prevent entrapping water in aggregate stabilization.

AGGREGATE BASE COURSE

(10-2-14)

520

DB05 R14

Revise the 2012 *Standard Specifications for Roads and Structures* as follows:

Page 5-10, Article 520-5, HAULING AND PLACING AGGREGATE BASE MATERIAL, add the following sentence to the end of the first paragraph starting on **Line 21**:

In addition, as approved by the Engineer, place by end dumping aggregate on approved sandy subgrade soils to provide a working platform and reduce wheel rutting of the subgrade. When allowed, end dumping will be limited to a uniformly spread thickness of two to three inches prior to placing the remaining aggregate thickness with a mechanical spreader.

CLASS IV SUBGRADE STABILIZATION IN LIEU OF CHEMICAL STABILIZATION

(10-23-15)

501, 542

DB05 R017

Description

In lieu of chemical stabilization, provide Class IV Subgrade Stabilization by replacing 8" of subgrade soils with geotextile and Class IV select material. This substitution shall be allowed in full typical section width, in a given direction, and shall not result in chemically stabilized sections or Class IV stabilized sections less than 1,000 feet in length, unless otherwise approved by the Engineer. Notify the Engineer at least 30 days in advance of starting Class IV Subgrade Stabilization in lieu of Chemical Stabilization.

Materials

Refer to the 2012 *Standard Specifications for Roads and Structures* as follows.

Item	Section
Geotextile for Soil Stabilization, Type 4	1056
Select Material, Class IV	1016

Use Class IV Select Material for Class IV Subgrade Stabilization.

Construction Methods

Install geotextile for soil stabilization in accordance with Article 270-3 in the 2012 *Standard Specifications for Roads and Structures* as follows: Place Class IV subgrade stabilization (standard size no. ABC) by end dumping ABC on geotextiles. Do not operate heavy equipment on geotextiles until geotextiles are covered with Class IV subgrade stabilization. Compact ABC to 97% of AASHTO T 180, as modified by the Department.

Maintain Class IV subgrade stabilization in an acceptable condition and minimize the use of heavy equipment on ABC in order to avoid damaging aggregate subgrades. Provide and maintain drainage ditches and drains as required to prevent entrapping water in aggregate subgrades.

ASPHALT PAVEMENTS - SUPERPAVE

(6-19-12) (Rev. 11-20-15)

605, 609, 610, 650

DB 6 R01

Revise the 2012 *Standard Specifications for Roads and Structures* 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 6-7, 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 Design-Build Team'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 – 290° F
PG 70-22	275- 305° F
PG 76-22	300- 325° F

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 275° F 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 50° F.

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 $\pm 25^{\circ}$ F of the JMF mix temperature. The temperature of the mixture, when discharged from the mixer, shall not exceed 350° F.

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° F to -25° F of the specified JMF temperature.” with “ $\pm 25^{\circ}$ F 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 Design-Build Team 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 and turn lanes that are less than 1000 feet and all loops.

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 ten 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 approve 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 feet to 100 feet in length at the continuous short interval of 25 feet. 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			
Grading Requirements	Total Percent Passing		
<i>Sieve Size (mm)</i>	<i>Type FC-1</i>	<i>Type FC-1 Modified</i>	<i>Type FC-2 Modified</i>
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

(6-07-12)

DB6 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 for Roads and Structures*.

ASPHALT PLANT MIXTURES

(07-01-95)

DB6 R20

Place asphalt concrete base course material in trench sections with asphalt pavement spreaders made for the purpose or with other equipment approved by the Engineer.

FINAL SURFACE TESTING

(4-26-16)

DB6 R45

On the mainline travel lanes, including but not limited to auxiliary lanes, and -Y- Line travel lanes with 1) two or more layers of asphalt, 2) one mile or greater in length, and 3) a posted speed limit of 45 mph or greater, perform smoothness acceptance testing of the longitudinal profile of the finished pavement surface using an Inertial Profiler in accordance with Article 610-13 of the 2012 *Standard Specifications for Roads and Structures* and the *Asphalt Pavements - Superpave* Standard Special Provision found elsewhere in this RFP. The North Carolina Hearne Straightedge will not be permitted.

For all mainline concrete pavement, except concrete shoulders, ramps, and loops, perform smoothness acceptance testing of the longitudinal profile of the finished pavement surface using an Inertial Profiler in accordance with Article 710-7 of the 2012 *Standard Specifications for Roads and Structures*.

PORTLAND CEMENT CONCRETE PAVEMENT

(2-5-15)

700, 710

SPI 7-17

Revise the 2012 *Standard Specifications for Roads and Structures* as follows:

Page 7-1, Article 700-1, DESCRIPTION, Lines 16 - 17, replace fifth paragraph with:

Submit for approval a Process Control Plan addressing all operations necessary in the production and placement of concrete pavement a minimum of 30 calendar days prior to placing concrete pavement.

Page 7-2, Subarticle 700-5(A)(1), Lines 29 - 31, replace first paragraph with:

A descending air temperature at the location of the concrete paving operation and away from artificial heat reaches 35° F. Paving may resume when the weather forecast is projected to reach a high of 40° F on that day's operation and the morning ambient temperature is above 32° F.

Page 7-2, Subarticle 700-5(A), General, Lines 38 and 40, replace "3500 psi" with "3000 psi."

Page 7-4, Subarticle 700-8(B), Cold Weather, Lines 38 - 42, replace the first paragraph with the following:

When the air temperature is projected to drop below 35° F for more than four hours, insulate the Portland cement concrete pavement to prohibit the concrete surface temperature from dropping below 35° F during the curing period.

Page 7-5, Subarticle 700-9(A), General, Line 9, first sentence of the first paragraph, replace "methods herein" with "curing methods herein".

Page 7-5, Subarticle 700-9(A), General, Lines 12 - 15, delete the third paragraph and replace with the following:

Curing shall be required until the concrete compressive strength has exceeded 3,000 psi using the maturity method in accordance with Article 700-13.

Page 7-6, Subarticle 700-11(A), General, Lines 20 - 29, delete the first and last sentence of the second paragraph. Add the following as the last sentence of the second paragraph on **lines 25-26**. Move third paragraph (**Lines 27 - 29**) to between the first and second paragraph before **line 20**.

To estimate the time of sawing, it is recommended to use the latest version of FHWA's High Performance Paving software entitled HIPERPAV.

Page 7-8, Subarticle 700-11(G), Verification of Dowel Bar Alignment, Line 7, in the second sentence of the second paragraph on the page replace "vertical tilt," with "vertical tilt, and total misalignment". **Line 25,** in the fourth sentence of the seventh paragraph on the page replace "greater misalignment" with "total misalignment". **Lines 26 - 27,** delete the last sentence of the seventh paragraph on the page. **Line 29,** in the first sentence of the sixth paragraph on the page replace "score of 10" with "score of 12".

Page 7-8, Subarticle 700-11(G), Table 700-1, TOLERANCE FOR DOWEL BAR ALIGNMENT^A, replace with the following:

TABLE 700-1 TOLERANCE FOR DOWEL BAR ALIGNMENT^A	
Misalignment Category, inches	Weight
$0 \leq d \leq 0.6$	0
$0.6 < d \leq 0.8$	2
$0.8 < d \leq 1.00$	4
$1.00 < d \leq 1.50$	5
$1.50 \leq d$	10

A. Where **d** is the individual dowel bar misalignment.

Page 7-9, Subarticle 700-12, (B), Age of Pavement, Line 6, delete “14 calendar days old.” and replace with “7 calendar days old and concrete is dry based on sealant manufacturer’s recommendations.”

Page 7-9, Article 700-13, USE OF NEW PAVEMENT OR SHOULDER, Line 31, in the first sentence of the first paragraph replace “3,500 psi, unless otherwise permitted.” with “3,000 psi.” **Line 36**, add the following as the third sentence of the second paragraph:

Install loggers in slabs after every two lots approximately four inches from the concrete surface.

Page 7-10, Article 700-13, USE OF NEW PAVEMENT OR SHOULDER, Lines 6 - 11, replace the second paragraph on the page with the following:

Validate the strength-maturity relationship and the correlation between cylinders and beams during the first day’s production by casting cylinders and beams and performing strength tests. Use the TTF developed during the mix design process to verify the production strength-maturity relationship. Validate the strength-maturity relationship and the correlation between cylinders and beams by casting cylinders and beams and performing strength tests least every 30 calendar days, or when the TTF varies by more than 10% from the latest approved maturity curve or there is a material change from the approved concrete mix design. If the verification sample’s compressive strength when tested at TTF is less than 3,000 psi, immediately suspend early opening of traffic on pavement that has not obtained TTF until a new strength-maturity relationship is developed.

Page 7-13, Article 710-6, FINISHING, Lines 5 - 10, replace the second paragraph on the page with the following:

Produce the final surface finish on all mainline pavement, auxiliary lanes, and ramps by mechanical equipment for longitudinally tined grooves while the concrete is plastic. The tining shall be done with a mechanical device such as a wire comb. The comb shall have a single row of tines. Each shall have a nominal width of 5/64 inch to 1/8 inch. The nominal spacing of the tines shall be 3/4 ± 1/8 inch center-to-center. The nominal depth of tined groove in the plastic concrete shall be 1/8 ± 1/32 inch.

Longitudinal tining shall be accomplished by equipment with automated horizontal and vertical controls to ensure straight, uniform depth tined grooves. The texture geometry shall be the same as imparted throughout the length of the tining comb. A two-inch to three-inch wide strip of pavement surface shall be protected from tining for the length of and centered about longitudinal joints.

The tining operation shall be done so that the desired surface texture will be achieved while minimizing displacement of the larger aggregate particles and before the surface permanently sets. Where abutting pavement is to be placed, the tining shall extend as close to the edge as possible without damaging the edge. If abutting pavement is not to be placed, the six-inch area nearest the edge or one foot from the face of the curb shall not be tined. Hand-operated tining equipment that produces an equivalent texture may be used only on small or irregularly shaped areas. Tines shall be thoroughly cleaned at the end of each day's use and damaged or worn tines replaced.

When surface corrections for pavement smoothness are made in the hardened concrete, no additional texturing will be required.

Page 7-13, Article 710-7, FINAL SURFACE TESTING, Lines 41 - 42, replace the third and fourth sentences of the fourth paragraph with the following:

The profile data shall be filtered with a cutoff wavelength of 250 feet. The interval at which relative profile elevations are reported shall be a maximum of one inch.

Page 7-14, Article 710-7, FINAL SURFACE TESTING, Line 38, in the first sentence of the ninth paragraph on the page, replace “(DVD-R or CD-R)” with “(USB flash drive, external hard drive or DVD)”.

Page 7-15, Subarticle 710-7(B), Localized Roughness, Line 33, in the third sentence of the first paragraph, replace “125 in/mile” with “150 in/mile”.

SUBSURFACE DRAINAGE

(9-1-11)

DB8 R05

Revise the 2012 *Standard Specifications for Roads and Structures* as follows:

Page 8-11, Article 815-1, Delete the first sentence and replace with the following:

The Design-Build Team shall construct subsurface drains, underdrains, blind drains and other types of drains where groundwater is within six feet of subgrade.

REMOVE AND STOCKPILE EXISTING GUARDRAIL

(7-1-95) (Rev. 7-18-06)

DB8 R55

Carefully dismantle and remove existing guardrail and all components, concrete anchors included, at locations indicated in the plans developed by the Design-Build Team and neatly

stockpile it on the right of way, with the small parts stored in sturdy containers, for removal by State Forces. Dispose of the concrete anchors.

GUARDRAIL ANCHOR UNITS, TYPE M-350

(9-1-11) (Rev. 7-21-15)

DB8 R60

Description

Furnish and install guardrail anchor units in accordance with the details in the plans developed by the Design-Build Team, the applicable requirements of Section 862 of the 2012 *Standard Specifications for Roads and Structures*, and at locations shown in the plans developed by the Design-Build Team.

Materials

The Design Build Team shall furnish guardrail anchor units listed on the NCDOT Approved Products List at <https://apps.dot.state.nc.us/vendor/approvedproducts/> or approved equal.

Prior to installation the Design Build Team shall submit to the Engineer:

1. FHWA acceptance letter for each guardrail anchor unit certifying it meets the requirements of NCHRP Report 350, Test Level 3, in accordance with Article 106-2 of the 2012 *Standard Specifications for Roads and Structures*.
2. Certified working drawings and assembling instructions from the manufacturer for each guardrail anchor unit in accordance with Article 105-2 of the 2012 *Standard Specifications for Roads and Structures*.

No modifications shall be made to the guardrail anchor unit without the express written permission from the manufacturer. Perform installation in accordance with the details in the plans developed by the Design-Build Team, and details and assembling instructions furnished by the manufacturer.

Construction Methods

Guardrail end delineation shall be required on all approach and trailing end sections for both temporary and permanent installations. Guardrail end delineation shall consist of yellow reflective sheeting applied to the entire end section of the guardrail in accordance with Article 1088-3 of the 2012 *Standard Specifications for Road*.

GUARDRAIL ANCHOR UNITS, TYPE 350 (TL-3)

(12-19-14) (Rev. 7-21-15)

DB8 R65

Description

Furnish and install guardrail anchor units in accordance with the details in the plans developed by the Design-Build Team, the applicable requirements of Section 862 of the 2012 *Standard*

Specifications for Roads and Structures, and at locations shown in the plans developed by the Design-Build Team.

Materials

The Design-Build Team shall furnish guardrail anchor units listed on the NCDOT Approved Products List at <https://apps.dot.state.nc.us/vendor/approvedproducts/> or approved equal.

Prior to installation the Design-Build Team shall submit to the Engineer:

1. FHWA acceptance letter for each guardrail anchor unit certifying it meets the requirements of NCHRP Report 350, Test Level 3, in accordance with Article 106-2 of the 2012 *Standard Specifications for Roads and Structures*.
2. Certified working drawings and assembling instructions from the manufacturer for each guardrail anchor unit in accordance with Article 105-2 of the 2012 *Standard Specifications for Roads and Structures*.

No modifications shall be made to the guardrail anchor unit without the express written permission from the manufacturer. Perform installation in accordance with the details in the plans developed by the Design-Build Team, and details and assembling instructions furnished by the manufacturer.

Construction Methods

Guardrail end delineation shall be required on all approach and trailing end sections for both temporary and permanent installations. Guardrail end delineation shall consist of yellow reflective sheeting applied to the entire end section of the guardrail in accordance with Article 1088-3 of the 2012 *Standard Specifications for Roads and Structures*.

IMPACT ATTENUATOR UNITS, TYPE 350

(9-1-11) (Rev. 7-21-15)

DB8 R75

Description

Furnish and install impact attenuator units and any components necessary to connect the impact attenuator units in accordance with the manufacturer's requirement, the details in the plans developed by the Design-Build Team and at locations shown in the plans developed by the Design-Build Team.

Materials

The Design-Build Team shall furnish impact attenuator units list on the NCDOT Approved Products List at <https://apps.dot.state.nc.us/vendor/approvedproducts/> or approved equal.

Prior to installation the Design-Build Team shall submit to the Engineer:

1. FHWA acceptance letter for each impact attenuator unit certifying it meets the requirements of NCHRP Report 350, Test Level 3, in accordance with Article 106-2 of the 2012 *Standard Specifications for Roads and Structures*.
2. Certified working drawings and assembling instructions from the manufacturer for each impact attenuator unit in accordance with Article 105-2 of the 2012 *Standard Specifications for Roads and Structures*.

No modifications shall be made to the impact attenuator unit without the express written permission from the manufacturer. Perform installation in accordance with the details in the plans developed by the Design-Build Team, and details and assembling instructions furnished by the manufacturer.

Construction Methods

If the median width is 40 feet or less, the Design-Build Team shall supply NON-GATING Impact Attenuator Units.

If the median width is greater than 40 feet, the Design-Build Team may use GATING or NON-GATING Impact Attenuator Units.

PREFORMED SCOUR HOLE WITH LEVEL SPREADER APRON

(8-24-09)

DB8 R105

Description

Construct and maintain preformed scour holes with spreader aprons at the locations shown on the plans developed by the Design-Build Team and in accordance with the details in the plans developed by the Design-Build Team. Work includes excavation, shaping and maintaining the hole and apron, furnishing and placing filter fabric, rip rap (class as specified in the plans developed by the Design-Build Team) and permanent soil reinforcement matting.

Materials

Item	Section
Plain rip rap	1042
Filter Fabric	1056

The permanent soil reinforcement matting shall be permanent erosion control reinforcement mat and shall be constructed of synthetic or a combination of coconut and synthetic fibers evenly distributed throughout the mat between a bottom UV stabilized netting and a heavy duty UV stabilized top net. The matting shall be stitched together with UV stabilized polypropylene thread to form a permanent three dimensional structure. The mat shall have the following minimum physical properties:

Property	Test Method	Value Unit
Light Penetration	ASTM D6567	9 %
Thickness	ASTM D6525	0.40 in
Mass Per Unit Area	ASTM D6566	0.55 lb/sy
Tensile Strength	ASTM D6818	385 lb/ft
Elongation (Maximum)	ASTM D6818	49 %
Resiliency	ASTM D1777	>70 %
UV Stability *	ASTM 4355	≥80 %
Porosity (Permanent Net)	ECTC Guidelines	≥85 %
Maximum Permissible Shear Stress (Vegetated)	Performance Bench Test	≥8.0 lb/ft ²
Maximum Allowable Velocity (Vegetated)	Performance Bench Test	≥16.0 ft/s

*ASTM D1682 Tensile Strength and % strength retention of material after 1000 hours of exposure.

A certification (Type 1, 2, or 3) from the manufacturer showing:

- (A) the chemical and physical properties of the mat used, and
- (B) conformance of the mat with this specification will be required.

Construction Methods

All areas to be protected with the mat shall be brought to final grade and seeded in accordance with Section 1660 of the 2012 *Standard Specifications for Roads and Structures*. The surface of the soil shall be smooth, firm, stable and free of rocks, clods, roots or other obstructions that would prevent the mat from lying in direct contact with the soil surface. Areas where the mat is to be placed will not need to be mulched.

DETECTABLE WARNINGS TO RETROFIT EXISTING CURB RAMPS

(9-1-11)

DB8 R125

Description

Construct detectable warnings consisting of raised truncated domes to retrofit existing curb ramps in accordance with the plan details developed by the Design-Build Team, Section 848 of the 2012 *Standard Specifications for Roads and Structures*, the requirements of the 28 *CFR Part 36 ADA Standards for Accessible Design* and these provisions.

Materials

Detectable warning for retrofitting existing curb ramps shall consist of raised truncated domes. The description, size and spacing shall conform to Section 848 of the 2012 *Standard Specifications for Roads and Structures*.

Use material for detectable warning systems as shown herein. Material and coating specifications must be stated in the Manufacturers Type 3 Certification and all Detectable Warning systems must be on the NCDOT Approved Product List for Curb Ramps.

Install detectable warnings created from one of the following materials: precast concrete blocks or bricks, clay paving brick, gray or ductile iron castings, mild steel, stainless steel, and engineered plastics, rubber or composite tile. Only one material type for detectable warning will be permitted per project, unless otherwise approved by the Engineer.

- (A) **Detectable Warnings shall** consist of a base with integrated raised truncated domes, and **when constructed of precast concrete** they shall conform to the material requirements of Article 848-2 of the 2012 *Standard Specifications for Roads and Structures*.
- (B) **Detectable Warnings shall** consist of a base with integrated raised truncated domes, and **may be comprised of other materials including but not limited to clay paving brick, gray iron or ductile iron castings, mild steel, stainless steel, and engineered plastics, rubber or composite tile**, which are applied directly to the curb ramps by incorporating into or attaching to the existing ramp floor. The material shall have an integral color throughout the thickness of the material. The detectable warning shall include fasteners, anchors, or adhesives for attachment in the existing ramp and shall be furnished as a system from the manufacturer.

Prior to installation, the Design Build Team shall submit to the Engineer assembling instructions from the manufacturer for each type of system used in accordance with Article 105-2 of the 2012 *Standard Specifications for Roads and Structures*. The system shall be furnished as a kit containing all consumable materials and consumable tools, required for the application. They shall be capable of being affixed to or anchored in the concrete curb ramp, including green concrete (concrete that has set but not appreciably hardened). The system shall be solvent free and contain no volatile organic compounds (VOC). The static coefficient of friction shall be 0.8 or greater when measured on top of the truncated domes and when measured between the domes in accordance with ASTM C 1028 (dry and wet). The system shall be resistant to deterioration due to exposure to sunlight, water, salt or adverse weather conditions and impervious to degradation by motor fuels, lubricants and antifreeze.

- (C) When steel or gray iron or ductile iron casting products are provided, only products that meet the requirements of Article 106-1(B) of the 2012 *Standard Specifications for Roads and Structures* may be used. Submit to the Engineer a Type 6 Certification, catalog cuts and installation procedures at least 30 days prior to installation for all.

Construction Methods

- (A) Prior to placing detectable warnings in existing concrete curb ramps, saw cut to the full depth of the concrete, for other material remove as necessary, and adjust the existing subgrade to the proper grade and in accordance with Article 848-3 of the 2012 *Standard Specifications for Roads and Structures*.

- (B) Install all detectable warning to retrofit existing curb ramps in accordance with the manufacturer's recommendations.

DETECTABLE WARNINGS FOR PROPOSED CURB RAMPS

(9-1-11)

DB8 R126

Description

Construct detectable warnings consisting of integrated raised truncated domes on proposed concrete curb ramps in accordance with the 2012 *Standard Specifications for Roads and Structures*, plan details developed by the Design-Build Team, the requirements of the 28 *CFR Part 36 ADA Standards for Accessible Design* and this provision.

Materials

Detectable warning for proposed curb ramps shall consist of integrated raised truncated domes. The description, size and spacing shall conform to Section 848 of the 2012 *Standard Specifications for Roads and Structures*.

Use material for detectable warning systems as shown herein. Material and coating specifications must be stated in the Manufacturers Type 3 Certification and all Detectable Warning systems must be on the NCDOT Approved Product List for Curb Ramps.

Install detectable warnings created from one of the following materials: precast concrete blocks or bricks, clay paving brick, gray or ductile iron castings, mild steel, stainless steel, and engineered plastics, rubber or composite tile. Only one material type for detectable warning will be permitted per project, unless otherwise approved by the Engineer.

- (A) **Detectable Warnings shall** consist of a base with integrated raised truncated domes, and **when constructed of precast concrete** they shall conform to the material requirements of Article 848-2 of the 2012 *Standard Specifications for Roads and Structures*.
- (B) **Detectable Warnings shall** consist of a base with integrated raised truncated domes, and **may be comprised of other materials including, but not limited, to clay paving brick, gray iron or ductile iron castings, mild steel, stainless steel, and engineered plastics, rubber or composite tile**, which are cast into the concrete of the curb ramps. The material shall have an integral color throughout the thickness of the material. The detectable warning shall include fasteners or anchors for attachment in the concrete and shall be furnished as a system from the manufacturer.

Prior to installation, the Design-Build Team shall submit to the Engineer assembling instructions from the manufacturer for each type of system used in accordance with Article 105-2 of the 2012 *Standard Specifications for Roads and Structures*. The system shall be furnished as a kit containing all consumable materials and consumable tools, required for the application. They shall be capable of being affixed to or anchored in the concrete curb ramp, including green concrete (concrete that has set but not appreciably hardened). The system shall be solvent free and contain no volatile organic compounds (VOC). The static coefficient of friction shall be 0.8 or greater when measured on top of

the truncated domes and when measured between the domes in accordance with ASTM C1028 (dry and wet). The system shall be resistant to deterioration due to exposure to sunlight, water, salt or adverse weather conditions and impervious to degradation by motor fuels, lubricants and antifreeze.

- (C) When steel or gray iron or ductile iron casting products are provided, only products that meet the requirements of Article 106-1(B) of the 2012 *Standard Specifications for Roads and Structures* may be used. Submit to the Engineer a Type 6 Certification, catalog cuts and installation procedures at least 30 days prior to installation for all.

Construction Methods

- (A) Prior to placing detectable warnings in proposed concrete curb ramps, adjust the existing subgrade to the proper grade and in accordance with Article 848-3 of the 2012 *Standard Specifications for Roads and Structures*.
- (B) Install all detectable warning in proposed concrete curb ramps in accordance with the manufacturer's recommendations.

STREET SIGNS AND MARKERS AND ROUTE MARKERS

(07-01-95)

DB9 R01

Move any existing street signs, markers, and route markers out of the construction limits of the project and install the street signs and markers and route markers so that they will be visible to the traveling public if there is sufficient right of way for these signs and markers outside of the construction limits.

Near the completion of the project and when so directed by the Engineer, move the signs and markers and install them in their proper location in regard to the finished pavement of the project.

Stockpile any signs or markers that cannot be relocated due to lack of right of way, or any signs and markers that will no longer be applicable after the construction of the project, at locations directed by the Engineer for removal by others.

The Design-Build Team shall be responsible to the owners for any damage to any street signs and markers or route markers during the above described operations.

MATERIALS

(2-21-12) (Rev. 1-29-16)

1000, 1002, 1005, 1016, 1018, 1024, 1050, 1074, 1078, 1080, 1081, 1086, 1084, 1087, 1092

DB10 R01

Revise the 2012 *Standard Specifications for Roads and Structures* 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 pound 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.
<i>Units</i>	<i>psi</i>					<i>inch</i>	<i>inch</i>	<i>lb/cy</i>	<i>lb/cy</i>	<i>lb/cy</i>	<i>lb/cy</i>
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 pound 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													
Percentage of Total by Weight Passing													
Std. Size #	2"	1-1/2"	1"	3/4"	1/2"	3/8"	#4	#8	#10	#16	#40	#200	Remarks
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, Str. Concrete, Shoulder Drain, 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	AST, Str. Concrete, Asphalt Plant Mix
78M	-	-	-	100	98-100	75-100	20-45	0-15	-	-	-	A	Asphalt Plant Mix, AST, Str. Conc. Weep Hole
14M	-	-	-	-	-	100	35-70	5-20	-	0-8	-	A	Asphalt Plant Mix, AST, Weep Hole
9	-	-	-	-	-	100	85-100	10-40	-	0-10	-	A	Drains, Str. Concrete
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 shall be used to evaluate the materials for visual acceptance by the Engineer:

- (A) At least 50% of the rock has a diameter from 1.5-foot to 3-foot,
- (B) 30% of the rock ranges in size from 2" to 1.5-foot 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 three feet 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 shall be 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 pound Class F fly ash per pound of cement replaced
Ground Granulated Blast Furnace Slag	35% - 50% by weight of required cement content with 1.0 pound slag per pound of cement replaced
Microsilica	4% - 8% by weight of required cement content with 1.0 pound microsilica per pound 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 lbs.) will be required only when noted on the design documents developed by the Design-Build Team.

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" x 6" x 1/4" 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 three 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, PPROPERTIES 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 Group 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 developed by the Design-Build Team. Steel sheet piles shall be coated as required by the plans developed by the Design-Build Team. 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 8 - 24, replace with the following:

The epoxy shall meet Article 1081-4.

The two types of epoxy adhesives 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.

SELECT MATERIAL, CLASS III, TYPE 3

12-02-11

DB10 R005

Revise the 2012 *Standard Specifications for Roads and Structures* as follows:

Page 10-39, Article 1016-3, CLASS III, add the following after **Line 14**:

Type 3 Select Material

Type 3 select material is a natural or manufactured fine aggregate material meeting the following gradation requirements and as described in Sections 1005 and 1006:

Percentage of Total by Weight Passing							
3/8"	#4	#8	#16	#30	#50	#100	#200
100	95-100	65-100	35-95	15-75	5-35	0-25	0-8

Page 10-39, Article 1016-3, CLASS III, Line 15, replace “either type” with “Type 1, Type 2 or Type 3”.

Page 10-62, Article 1044-1, Line 36, delete the sentence and replace with the following:

Subdrain fine aggregate shall meet Class III select material, Type 1 or Type 3.

Page 10-63, Article 1044-2, Line 2, delete the sentence and replace with the following:

Subdrain coarse aggregate shall meet Class V select material.

SHOULDER AND SLOPE BORROW

1/22/13

1019

DB10 R10

Use soil in accordance with Section 1019 of the 2012 *Standard Specifications for Roads and Structures*. Use soil consisting of loose, friable, sandy material with a PI greater than 6 and less than 25 and a pH ranging from 5.5 to 7.0.

Soil with a pH ranging from 4.0 to 5.5 will be accepted without further testing if additional limestone is provided in accordance with the application rates shown in Table 1019-1A. Soil type shall be identified during the soil analysis. Soils with a pH above 7.0 require acidic amendments to be added. Submit proposed acidic amendments to the Engineer for review and approval. Soils with a pH below 4.0 or that do not meet the PI requirements shall not be used.

TABLE 1019-1A ADDITIONAL LIMESTONE APPLICATION RATE TO RAISE pH			
pH TEST RESULT	Sandy Soils Additional Rate (lbs. / Acre)	Silt Loam Soils Additional Rate (lbs. / Acre)	Clay Loam Soils Additional Rate (lbs. / Acre)
4.0 - 4.4	1,000	4,000	6,000
4.5 - 4.9	500	3,000	5,000
5.0 - 5.4	NA	2,000	4,000

Note: Limestone application rates shown in this table are in addition to the standard rate of 4000 lbs. / acre required for seeding and mulching.

No direct payment will be made for providing additional lime or acidic amendments for pH adjustment.

GROUT PRODUCTION AND DELIVERY

(3-17-15)

1003

DB10 R20

Revise the 2012 *Standard Specifications for Roads and Structures* 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 Design-Build Team'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 three-day strength requirement and a fluid consistency that is typically used for filling subsurface voids.

Type 2 – A non-shrink 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 non-shrink 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 Design-Build Team'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 Design-Build Team 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 three and 28 days.

The Engineer will review the grout mix design for compliance with the contract and notify the Design-Build Team 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 Design-Build Team of their responsibility to furnish a product that meets the contract. Upon written request from the Design-Build Team, 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 RPC ^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 shall 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 not be 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 hour 15 minutes
80° F through 89° F	45 minutes	1 hour 30 minutes
79° F or below	60 minutes	1 hour 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.

GEOSYNTHETICS

(12-29-15)

1056

DB10 R25

Revise the 2012 *Standard Specifications for Roads and Structures* as follows:

Replace Section 1056 with the following:

SECTION 1056 **GEOSYNTHETICS**

1056-1 DESCRIPTION

Provide geosynthetics for subsurface drainage, separation, stabilization, reinforcement, erosion control, filtration and other applications in accordance with the contract. Use geotextiles, geocomposite drains and geocells that are on the NCDOT Approved Products List. Prefabricated geocomposite drains include sheet, strip and vertical drains (PVDs), i.e., "wick drains" consisting of a geotextile attached to and / or encapsulating a plastic drainage core. Geocells are comprised of ultrasonically welded polymer strips that when expanded form a 3D honeycomb grid that is typically filled with material to support vegetation.

If necessary or required, hold geotextiles and sheet drains in place with new wire staples, e.g., "sod staples" that meet Subarticle 1060-8(D) or new anchor pins. Use steel anchor pins with a diameter of at least 3/16" and a length of at least 18" and with a point at one end and a head at the other end that will retain a steel washer with an outside diameter of at least 1.5".

1056-2 HANDLING AND STORING

Load, transport, unload and store geosynthetics so geosynthetics are kept clean and free of damage. Label, ship and store geosynthetics in accordance with Section 7 of AASHTO M 288. Geosynthetics with defects, flaws, deterioration or damage shall be rejected. Do not unwrap geosynthetics until just before installation. Do not leave geosynthetics exposed for more than seven days before covering except for geosynthetics for temporary wall faces and erosion control.

1056-3 CERTIFICATIONS

Provide Type 1, Type 2 or Type 4 material certifications in accordance with Article 106-3 for geosynthetics. Define “minimum average roll value” (MARV) in accordance with ASTM D4439. Provide certifications with MARV for geosynthetic properties as required. Test geosynthetics using laboratories accredited by the Geosynthetic Accreditation Institute (GAI) to perform the required test methods. Sample geosynthetics in accordance with ASTM D4354.

1056-4 GEOTEXTILES

When required, sew geotextiles together in accordance with Article X1.1.4 of AASHTO M 288. Provide sewn seams with seam strengths meeting the required strengths for the geotextile type and class specified.

Provide geotextile types and classes in accordance with the contract. Geotextiles shall be identified by the product name printed directly on the geotextile. When geotextiles are not marked with a product name or marked with only a manufacturing plant identification code, geotextiles shall be identified by product labels attached to the geotextile wrapping. When identification is based on labels instead of markings, unwrap geotextiles just before use in the presence of the Engineer to confirm that the product labels on both ends of the outside of the geotextile outer wrapping match the labels affixed to both ends of the inside of the geotextile roll core. Partial geotextile rolls without the product name printed on the geotextile or product labels affixed to the geotextile roll core shall not be used.

Use woven or nonwoven geotextiles with properties that meet Table 1056-1. Define “machine direction” (MD) and “cross-machine direction” (CD) in accordance with ASTM D4439.

**TABLE 1056-1
GEOTEXTILE REQUIREMENTS**

Property	Requirement					Test Method
	Type 1	Type 2	Type 3 ^A	Type 4	Type 5 ^B	
<i>Typical Application</i>	<i>Shoulder Drains</i>	<i>Under Rip Rap</i>	<i>Silt Fence Fabric</i>	<i>Soil Stabilization</i>	<i>Temporary Walls</i>	
Elongation (MD & CD)	≥ 50%	≥ 50%	≤ 25%	< 50%	< 50%	ASTM D4632
Grab Strength (MD & CD)	Table 1 ^D , Class 3	Table 1 ^D , Class 1	100 lb ^C	Table 1 ^D , Class 3	—	ASTM D4632
Tear Strength (MD & CD)			—			ASTM D4533
Puncture Strength			—			ASTM D6241
Ultimate Tensile Strength (MD & CD)	—	—	—	—	2,400 lb/ft ^C (unless required otherwise in the contract)	ASTM D4595
Permittivity	Table 2 ^D , 15% to 50% <i>in Situ</i> Soil Passing 0.075 mm	Table 6 ^D , 15% to 50% <i>in Situ</i> Soil Passing 0.075mm	Table 7 ^D	Table 5 ^D	0.20 sec ^{-1,C}	ASTM D4491
Apparent Opening Size					0.60 mm ^E	ASTM D4751
UV Stability (Retained Strength)					70% ^C (after 500 hr of exposure)	ASTM D4355

A. Minimum roll width of 36inches required

B. Minimum roll width of 13 feet required

C. MARV per Article 1056-3

D. AASHTO M 288

E. Maximum average roll value

1056-5 GEOCOMPOSITE DRAINS

Provide geocomposite drain types in accordance with the contract and with properties that meet Table 1056-2.

**TABLE 1056-2
GEOCOMPOSITE DRAIN REQUIREMENTS**

Property	Requirement			Test Method
	Sheet Drain	Strip Drain	Wick Drain	
Width	≥ 12" (unless required otherwise in the contract)	12" ±1/4"	4" ±1/4"	N/A
In-Plane Flow Rate ^A (with gradient of 1.0 and 24-hour seating period)	6 gpm/ft @ applied normal compressive stress of 10 psi	15 gpm/ft @ applied normal compressive stress of 7.26 psi	1.5 gpm ^B @ applied normal compressive stress of 40 psi	ASTM D4716

A. MARV per Article 1056-3

B. Per 4" drain width

For sheet and strip drains, use accessories (e.g., pipe outlets, connectors, fittings, etc.) recommended by the Drain Manufacturer. Provide sheet and strip drains with Type 1 geotextiles heat bonded or glued to HDPE, polypropylene or high impact polystyrene drainage cores that meet Table 1056-3.

**TABLE 1056-3
DRAINAGE CORE REQUIREMENTS**

Property	Requirement (MARV)		Test Method
	Sheet Drain	Strip Drain	
Thickness	1/4"	1"	ASTM D1777 or D5199
Compressive Strength	40 psi	30 psi	ASTM D6364

For wick drains with a geotextile wrapped around a corrugated drainage core and seamed to itself, use drainage cores with an ultimate tensile strength of at least 225 pounds per four-inch width in accordance with ASTM D4595 and geotextiles with properties that meet Table 1056-4.

TABLE 1056-4 WICK DRAIN GEOTEXTILE REQUIREMENTS		
Property	Requirement	Test Method
Elongation	$\geq 50\%$	ASTM D4632
Grab Strength	Table 1 ^A , Class 3	ASTM D4632
Tear Strength		ASTM D4533
Puncture Strength		ASTM D6241
Permittivity	$0.7 \text{ sec}^{-1.B}$	ASTM D4491
Apparent Opening Size (AOS)	Table 2 ^A , > 50% <i>in Situ</i> Soil Passing 0.075 mm	ASTM D4751
UV Stability (Retained Strength)		ASTM D4355

A. AASHTO M 288

B. MARV per Article 1056-3

For wick drains with a geotextile fused to both faces of a corrugated drainage core along the peaks of the corrugations, use wick drains with an ultimate tensile strength of at least 1,650 lb/ft in accordance with ASTM D4595 and geotextiles with a permittivity, AOS and UV stability that meet Table 1056-4.

1056-6 GEOCELLS

Geocells shall be identified by product labels attached to the geocell wrapping. Unwrap geocells just before use in the presence of the Engineer. Previously opened geocell products shall be rejected.

Manufacture geocells from virgin polyethylene resin with no more than 10% rework, also called “regrind”, materials. Use geocells made from textured and perforated HDPE strips with an open area of 10% to 20% and properties that meet Table 1056-5.

**TABLE 1056-5
GEOCELL REQUIREMENTS**

Property	Minimum Requirement	Test Method
Cell Depth	4"	N/A
Sheet Thickness	50 mil -5%, +10%	ASTM D5199
Density	58.4 lb/cf	ASTM D1505
Carbon Black Content	1.5%	ASTM D1603 or D4218
ESCR ^A	5000 hr	ASTM D1693
Coefficient of Direct Sliding (with material that meets AASHTO M 145 for soil classification A-2)	0.85	ASTM D5321
Short-Term Seam (Peel) Strength (for 4" seam)	320 lb	USACE ^C Technical Report GL-86-19, Appendix A
Long-Term Seam (Hang) Strength ^B (for 4" seam)	160 lb	

A. Environmental Stress Crack Resistance

B. Minimum test period of 168 hours with a temperature change from 74° F to 130° F in one-hour cycles

C. US Army Corps of Engineers

Provide geocell accessories (e.g., stakes, pins, clips, staples, rings, tendons, anchors, deadmen, etc.) recommended by the Geocell Manufacturer.

TEMPORARY SHORING

(2-20-07) (Rev. 3-17-15)

DB11 R02

Description

Temporary shoring includes cantilever, braced and anchored shoring and temporary mechanically stabilized earth (MSE) walls. Temporary shoring does not include trench boxes. At the Design-Build Team's option, use any type of temporary shoring, unless noted otherwise in the plans developed by the Design-Build Team or as directed.

Design and construct temporary shoring based on actual elevations and shoring dimensions in accordance with the plans developed by the Design-Build Team and accepted submittals. Construct temporary shoring at locations shown in the plans developed by the Design-Build Team and as directed. Temporary shoring shall be required to maintain traffic when a 2:1 (H:V) slope from the top of an embankment or bottom of an excavation will intersect the existing ground line less than five feet from the edge of pavement of an open travelway. This Standard Special Provision does not apply to pipe, inlet or utility installation unless noted otherwise in the plans developed by the Design-Build Team.

Positive protection includes concrete barrier and temporary guardrail. Provide positive protection for temporary shoring at locations shown in the plans developed by the Design-Build Team and as directed. Positive protection shall be required if temporary shoring is located in the clear zone in accordance with the AASHTO *Roadside Design Guide*.

(A) Cantilever and Braced Shoring

Cantilever shoring consists of steel sheet piles or H-piles with timber lagging. Braced shoring consists of sheet piles or H-piles with timber lagging and bracing such as beams, plates, walers, struts, rakers, etc. Define “piles” as sheet piles or H-piles.

(B) Anchored Shoring

Anchored shoring consists of sheet piles with walers or H-piles with timber lagging anchored with ground or helical anchors. Driven anchors may be accepted at the discretion of the Engineer. A ground anchor consists of a grouted steel bar or multi-strand tendon with an anchorage. A helical anchor consists of a lead section with a central steel shaft and at least one helix steel plate followed by extensions with only central shafts (no helixes) and an anchorage. Anchorages consist of steel bearing plates with washers and hex nuts for bars or steel wedge plates and wedges for strands. Use a prequalified Anchored Wall Contractor to install ground anchors. Define “anchors” as ground, helical or driven anchors.

(C) Temporary MSE Walls

Temporary MSE walls include temporary geosynthetic and wire walls. Define “temporary wall” as a temporary MSE wall. Define “reinforcement” as geotextile, geogrid, welded wire grid or metallic strip reinforcement.

Temporary geosynthetic walls consist of geotextile or geogrid reinforcement wrapped behind welded wire facing. Define “temporary geotextile wall” as a temporary geosynthetic wall with geotextile reinforcement and “temporary geogrid wall” as a temporary geosynthetic wall with geogrid reinforcement.

Temporary wire walls consist of welded wire grid or metallic strip reinforcement connected to welded wire facing. Define “Wire Wall Vendor” as the vendor supplying the temporary wire wall.

(D) Embedment

Define “embedment” for cantilever, braced and anchored shoring as the pile depth below the grade in front of shoring. Define “embedment” for temporary walls as the wall height below the grade in front of walls.

(E) Positive Protection

Define “unanchored or anchored portable concrete barrier” as portable concrete barrier (PCB) that meets Roadway Standard Drawing No. 1170.01. Define “concrete barrier” as unanchored or anchored PCB or an approved equal. Define “temporary guardrail” as temporary steel beam guardrail that meets Roadway Standard Drawing No. 862.02.

Materials

Refer to the 2012 *Standard Specifications for Roads and Structures*.

Item	Section
Anchor Pins	1056-2
Concrete Barrier Materials	1170-2
Flowable Fill, Excavatable	1000-6
Geotextiles	1056
Grout	1003
Portland Cement Concrete	1000
Select Material	1016
Steel Beam Guardrail Materials	862-2
Steel Plates	1072-2
Steel Sheet Piles and H-Piles	1084
Untreated Timber	1082-2
Welded Wire Reinforcement	1070-3
Wire Staples	1060-8(D)

Provide Type 6 material certifications for shoring materials in accordance with Article 106-3 of the 2012 *Standard Specifications for Roads and Structures*. Use Class IV select material (standard size No. ABC) for temporary guardrail. Use neat cement grout for Type 2 grout for ground anchors. Use Class A concrete that meets Article 450-2 of the 2012 *Standard Specifications for Roads and Structures* or Type 1 grout for drilled-in piles. Provide untreated timber with a thickness of at least 3" and a bending stress of at least 1,000 psi for timber lagging. Provide steel bracing that meets ASTM A36.

(A) Shoring Backfill

Use Class II, Type 1, Class III, Class V or Class VI select material or material that meets AASHTO M 145 for soil classification A-2-4 with a maximum PI of 6 for shoring backfill except do not use A-2-4 soil for backfill around culverts.

(B) Anchors

Store anchor materials on blocking a minimum of 12" above the ground and protect it at all times from damage; and when placing in the work make sure it is free from dirt, dust, loose mill scale, loose rust, paint, oil or other foreign materials. Load, transport, unload and store anchor materials so materials are kept clean and free of damage. Bent, damaged or defective materials shall be rejected.

(1) Ground Anchors

Use high-strength deformed steel bars that meet AASHTO M 275 or seven-wire strands that meet ASTM A886 or Article 1070-5 of the 2012 *Standard Specifications for Roads and Structures*. Splice bars in accordance with Article 1070-9 of the 2012 *Standard Specifications for Roads and Structures*.

Do not splice strands. Use bondbreakers, spacers and centralizers that meet Article 6.3.5 of the AASHTO *LRFD Bridge Construction Specifications*.

(2) Helical Anchors

Use helical anchors with an ICC Evaluation Service, Inc. (ICC-ES) report. Helical anchors without an ICC-ES report may be approved at the discretion of the Engineer. Provide couplers, thread bar adapters and bolts recommended by the Anchor Manufacturer to connect helical anchors together and to piles.

(3) Anchorages

Provide steel plates for bearing plates and steel washers, hex nuts, wedge plates and wedges recommended by the Anchor Manufacturer.

(C) Temporary Walls

(1) Welded Wire Facing

Use welded wire reinforcement for welded wire facing, struts and wires. For temporary wire walls, provide welded wire facing supplied by the Wire Wall Vendor or a manufacturer approved or licensed by the vendor. For temporary wire walls with separate reinforcement and facing components, provide connectors (e.g., bars, clamps, plates, etc.) and fasteners (e.g., bolts, nuts, washers, etc.) required by the Wire Wall Vendor.

(2) Geotextiles

Provide Type 2 geotextile for separation and retention geotextiles. Provide Type 5 geotextile for geotextile reinforcement with ultimate tensile strengths in accordance with the accepted submittals.

(3) Geogrid Reinforcement

Handle and store geogrids in accordance with Article 1056-2 of the 2012 *Standard Specifications for Roads and Structures*. Define “machine direction” (MD) and “cross-machine direction” (CD) for geogrids in accordance with ASTM D4439.

Use geogrids with a roll width of at least four feet and an “approved” or “approved for provisional use” status code. The list of approved geogrids is available from:

connect.ncdot.gov/resources/Materials/Pages/SoilsLaboratory.aspx

Provide geogrids for geogrid reinforcement with design strengths in accordance with the accepted submittals. Geogrids are typically approved for ultimate tensile strengths in the MD and CD or short-term design strengths for a three-year design life in the MD based on material type. Define material type from the website above for shoring backfill as follows:

Material Type	Shoring Backfill
Borrow	A-2-4 Soil
Fine Aggregate	Class II, Type 1 or Class III Select Material
Coarse Aggregate	Class V or VI Select Material

(4) Welded Wire Grid and Metallic Strip Reinforcement

Provide welded wire grid and metallic strip reinforcement supplied by the Wire Wall Vendor or a manufacturer approved or licensed by the vendor. Use welded wire grid reinforcement (“mesh”, “mats” and “ladders”) that meet Article 1070-3 of the 2012 *Standard Specifications for Roads and Structures* and metallic strip reinforcement (“straps”) that meet ASTM A572 or A1011.

Preconstruction Requirements

(A) Concrete Barrier

Define “clear distance” behind concrete barrier as the horizontal distance between the barrier and edge of pavement. The minimum required clear distance for concrete barrier is shown in the plans developed by the Design-Build Team. At the Design-Build Team’s option or if the minimum required clear distance is not available, set concrete barrier next to and up against traffic side of temporary shoring except for barrier above temporary walls. Concrete barrier with the minimum required clear distance shall be required above temporary walls.

(B) Temporary Guardrail

Define “clear distance” behind temporary guardrail as the horizontal distance between guardrail posts and temporary shoring. At the Design-Build Team’s option or if clear distance for cantilever, braced and anchored shoring is less than 4 feet, attach guardrail to traffic side of shoring as shown in the plans developed by the Design-Build Team. Place ABC in clear distance and around guardrail posts instead of pavement. Do not use temporary guardrail above temporary walls.

(C) Temporary Shoring Designs

Before beginning temporary shoring design, survey existing ground elevations in the vicinity of shoring locations to determine actual design heights (H). Submit 8 copies of working drawings and three copies of design calculations and a PDF copy of each for temporary shoring designs in accordance with Article 105-2 of the 2012 *Standard Specifications for Roads and Structures*. Submit working drawings showing plan views,

shoring profiles, typical sections and details of temporary shoring design and construction sequence. Do not begin shoring construction until a design submittal is accepted.

Have cantilever and braced shoring designed, detailed and sealed by an engineer licensed in the state of North Carolina. Use a prequalified Anchored Wall Design Consultant to design anchored shoring. Provide anchored shoring designs sealed by a Design Engineer approved as a Geotechnical Engineer (key person) for an Anchored Wall Design Consultant. Include details in anchored shoring working drawings of anchor locations and lock-off loads, unit grout / ground bond strengths for ground anchors or minimum installation torque and torsional strength rating for helical anchors and if necessary, obstructions extending through shoring or interfering with anchors. Include details in the anchored shoring construction sequence of pile and anchor installation, excavation and anchor testing.

Use a prequalified MSE Wall Design Consultant to design temporary walls. Provide temporary wall designs sealed by a Design Engineer approved as a Geotechnical Engineer (key person) for the MSE Wall Design Consultant. Include details in temporary wall working drawings of geotextile and reinforcement types, locations and directions and obstructions extending through walls or interfering with reinforcement.

(1) Soil Parameters

Design temporary shoring for the assumed soil parameters and groundwater elevations shown in the plans. Assume the following soil parameters for shoring backfill:

(a) Unit weight (γ) = 120 lb/cf;

(b)	Friction Angle (Φ)	Shoring Backfill
	30°	A-2-4 Soil
	34°	Class II, Type 1 or Class III Select Material
	38°	Class V or VI Select Material

(c) Cohesion (c) = 0 lb/sf.

(2) Traffic Surcharge

Design temporary shoring for a traffic surcharge of 250 lb/sf if traffic will be above and within H of shoring. This traffic surcharge shall not apply to construction traffic. Design temporary shoring for any construction surcharge if construction traffic will be above and within H of shoring. For LRFD shoring designs, apply traffic (live load) surcharge in accordance with Figure C11.5.5-3 of the AASHTO *LRFD Bridge Design Specifications*.

(3) Cantilever, Braced and Anchored Shoring Designs

Use shoring backfill for fill sections and voids between cantilever, braced and anchored shoring and the critical failure surface. Use concrete or grout for embedded portions of drilled-in H-piles. Do not use drilled-in sheet piles.

Define "top of shoring" for cantilever, braced and anchored shoring as where the grade intersects the back of sheet piles or H-piles and timber lagging. Design cantilever, braced and anchored shoring for a traffic impact load of 2,000 lb/ft applied 18" above top of shoring if concrete barrier is above and next to shoring or temporary guardrail is above and attached to shoring. For anchored shoring designs, apply traffic impact load as horizontal load (P_{H1}) in accordance with Figure 3.11.6.3-2(a) of the AASHTO LRFD specifications.

Extend cantilever, braced and anchored shoring at least 32" above top of shoring if shoring is designed for traffic impact. Otherwise, extend shoring at least 6" above top of shoring.

Design cantilever, braced and anchored shoring for a maximum deflection of 3" if the horizontal distance to the closest edge of pavement or structure is less than H. Otherwise, design shoring for a maximum deflection of 6". Design cantilever and braced shoring in accordance with the plans developed by the Design-Build Team and AASHTO *Guide Design Specifications for Bridge Temporary Works*.

Design anchored shoring in accordance with the plans developed by the Design-Build Team and Article 11.9 of the AASHTO *LRFD Bridge Design Specifications*. Use a resistance factor of 0.80 for tensile resistance of anchors with bars, strands or shafts. Extend the unbonded length for ground anchors and the shallowest helix for helical anchors at least five feet behind the critical failure surface. Do not extend anchors beyond right of way or easement limits. If existing or future obstructions such as foundations, guardrail posts, pavements, pipes, inlets or utilities will interfere with anchors, maintain a clearance of at least 6" between obstructions and anchors.

(4) Temporary Wall Designs

Use shoring backfill in the reinforced zone of temporary walls. Separation geotextiles are required between shoring backfill and backfill, natural ground or culverts along the sides of the reinforced zone perpendicular to the wall face. For Class V or VI select material in the reinforced zone, separation geotextiles are also required between shoring backfill and backfill or natural ground on top of and at the back of the reinforced zone.

Design temporary walls in accordance with the plans developed by the Design-Build Team and Article 11.10 of the AASHTO *LRFD Bridge Design Specifications*. Embed temporary walls at least 18" except for walls on structures or rock as determined by the Engineer. Use a uniform reinforcement length

throughout the wall height of at least 0.7H or six feet, whichever is longer. Extend the reinforced zone at least 6" beyond end of reinforcement. Do not locate the reinforced zone outside right of way or easement limits.

Use the simplified method for determining maximum reinforcement loads in accordance with the AASHTO LRFD specifications. For geotextile reinforcement, use geotextile properties approved by the Department or default values in accordance with the AASHTO LRFD specifications. For geogrid reinforcement, use approved geogrid properties available from the website shown elsewhere in this provision. If the website does not list a short-term design strength for an approved geogrid, use a short-term design strength equal to the ultimate tensile strength divided by 3.5 for the geogrid reinforcement. Use geosynthetic properties for the direction reinforcement will be installed, a three-year design life and shoring backfill to be used in the reinforced zone.

Do not use more than four different reinforcement strengths for each temporary geosynthetic wall. Design temporary geotextile walls for a reinforcement coverage ratio (R_c) of 1.0 and temporary geogrid walls for an R_c of at least 0.8. For geogrid reinforcement with an R_c of less than 1.0, use a maximum horizontal clearance between geogrids of three feet and stagger reinforcement so geogrids are centered over gaps in the reinforcement layer below.

For temporary geosynthetic walls, use "L" shaped welded wire facing with 18" to 24" long legs. Locate geotextile or geogrid reinforcement so reinforcement layers are at the same level as the horizontal legs of welded wire facing. Use vertical reinforcement spacing equal to facing height. Wrap geotextile or geogrid reinforcement behind welded wire facing and extend reinforcement at least three feet back behind facing into shoring backfill.

For temporary wire walls with separate reinforcement and facing components, attach welded wire grid or metallic strip reinforcement to welded wire facing with a connection approved by the Department. For temporary geogrid and wire walls, retain shoring backfill at welded wire facing with retention geotextiles and extend geotextiles at least three feet back behind facing into backfill.

(D) Preconstruction Meeting

The Engineer may require a shoring preconstruction meeting to discuss the construction, inspection and testing of the temporary shoring. If required and if this meeting occurs before all shoring submittals have been accepted, additional preconstruction meetings may be required before beginning construction of temporary shoring without accepted submittals. The Resident, District or Bridge Maintenance Engineer, Bridge or Roadway Construction Engineer, Geotechnical Operations Engineer, Design-Build Team and Shoring Contractor Superintendent will attend preconstruction meetings.

Construction Methods

Control drainage during construction in the vicinity of shoring. Direct run off away from shoring and shoring backfill. Contain and maintain backfill and protect material from erosion.

Install positive protection in accordance with the contract and accepted submittals. Use PCB in accordance with Section 1170 of the 2012 *Standard Specifications for Roads and Structures* and Roadway Standard Drawing No. 1170.01. Use temporary guardrail in accordance with Section 862 of the 2012 *Standard Specifications for Roads and Structures* and Roadway Standard Drawing Nos. 862.01, 862.02 and 862.03.

(A) Tolerances

Construct shoring with the following tolerances:

- (1) Horizontal wires of welded wire facing are level in all directions,
- (2) Shoring location is within 6" of horizontal and vertical alignment shown in the accepted submittals, and
- (3) Shoring plumbness (batter) is not negative and within 2° of vertical.

(B) Cantilever, Braced and Anchored Shoring Installation

If overexcavation behind cantilever, braced or anchored shoring is shown in the accepted submittals, excavate before installing piles. Otherwise, install piles before excavating for shoring. Install cantilever, braced or anchored shoring in accordance with the construction sequence shown in the accepted submittals. Remove piles and if applicable, timber lagging when shoring is no longer needed.

(1) Pile Installation

Install piles with the minimum required embedment and extension in accordance with Subarticles 450-3(D) and 450-3(E) of the 2012 *Standard Specifications for Roads and Structures* except that a pile driving equipment data form is not required. Piles may be installed with a vibratory hammer as approved by the Engineer.

Do not splice sheet piles. Use pile excavation to install drilled-in H-piles. After filling holes with concrete or grout to the elevations shown in the accepted submittals, remove any fluids and fill remaining portions of holes with flowable fill. Cure concrete or grout at least seven days before excavating.

Notify the Engineer if refusal is reached before pile excavation or driven piles attain the minimum required embedment. When this occurs, a revised design submittal may be required.

(2) Excavation

Excavate in front of piles from the top down in accordance with the accepted submittals. For H-piles with timber lagging and braced and anchored shoring, excavate in staged horizontal lifts with a maximum height of five feet. Remove flowable fill and material in between H-piles as needed to install timber lagging. Position lagging with at least 3" of contact in the horizontal direction between the lagging and pile flanges. Do not excavate the next lift until timber lagging for the current lift is installed and if applicable, bracing and anchors for the current lift are accepted. Backfill behind cantilever, braced or anchored shoring with shoring backfill.

(3) Anchor Installation

If applicable, install foundations located behind anchored shoring before installing anchors. Fabricate and install ground anchors in accordance with the accepted submittals, Articles 6.4 and 6.5 of the *AASHTO LRFD Bridge Construction Specifications* and the following unless otherwise approved:

- (a) Materials in accordance with this provision shall be required instead of materials conforming to Articles 6.4 and 6.5.3 of the *AASHTO LRFD Specifications*,
- (b) Encapsulation-protected ground anchors in accordance with Article 6.4.1.2 of the *AASHTO LRFD specifications* are not required, and
- (c) Corrosion protection for unbonded lengths of ground anchors and anchorage covers are not required.
- (d) Measure grout temperature, density and flow during grouting with at least the same frequency grout cubes are made for compressive strength. Perform density and flow field tests in the presence of the Engineer in accordance with American National Standards Institute / American Petroleum Institute Recommended Practice 13B-1 (Section 4, Mud Balance) and ASTM C939 (Flow Cone), respectively.

Install helical anchors in accordance with the accepted submittals and Anchor Manufacturer's instructions. Measure torque during installation and do not exceed the torsional strength rating of the helical anchor. Attain the minimum required installation torque and penetration before terminating anchor installation. When replacing a helical anchor, embed last helix of the replacement anchor at least 3 helix plate diameters past the location of the first helix of the previous anchor.

(4) Anchor Testing

Proof test and lock-off anchors in accordance with the accepted submittals and Article 6.5.5 of the AASHTO *LRFD Bridge Construction Specifications* except for the acceptance criteria in Article 6.5.5.5. For the AASHTO LRFD specifications, “ground anchor” refers to a ground or helical anchor and “tendon” refers to a bar, strand or shaft.

(a) Anchor Acceptance

Anchor acceptance is based in part on the following criteria.

- (i) For ground and helical anchors, total movement is less than 0.04" between the 1 and 10 minute readings or less than 0.08" between the 6 and 60 minute readings.
- (ii) For ground anchors, total movement at maximum test load exceeds 80% of the theoretical elastic elongation of the unbonded length.

(b) Anchor Test Results

Submit two copies of anchor test records including movement versus load plots for each load increment within 24 hours of completing each row of anchors. The Engineer will review the test records to determine if the anchors are acceptable.

If the Engineer determines an anchor is unacceptable, revise the anchor design or installation methods. Submit a revised anchored shoring design for acceptance and provide an acceptable anchor with the revised design or installation methods. If required, replace the anchor or provide additional anchors with the revised design or installation methods.

(C) Temporary Wall Installation

Excavate as necessary for temporary walls in accordance with the plans developed by the Design-Build Team and accepted submittals. If applicable, install foundations located in the reinforced zone before placing shoring backfill or reinforcement unless otherwise approved. Notify the Engineer when foundation excavation is complete. Do not place shoring backfill or reinforcement until excavation dimensions and foundation material are approved.

Erect welded wire facing so the wall position is as shown in the plans developed by the Design-Build Team and accepted submittals. Set welded wire facing adjacent to each other in the horizontal and vertical direction to completely cover the wall face with facing. Stagger welded wire facing to create a running bond by centering facing over joints in the row below.

Wrap geotextile reinforcement and retention geotextiles behind welded wire facing as shown in the plans developed by the Design-Build Team and accepted submittals, and cover geotextiles with at least 3" of shoring backfill. Overlap adjacent geotextile reinforcement and retention and separation geotextiles at least 18" with seams oriented perpendicular to the wall face. Hold geotextiles in place with wire staples or anchor pins as needed.

Place reinforcement within 3" of locations shown in the plans developed by the Design-Build Team and accepted submittals, and in slight tension free of kinks, folds, wrinkles or creases. Install reinforcement with the direction shown in the plans developed by the Design-Build Team and accepted submittals. For temporary wire walls with separate reinforcement and facing components, attach welded wire grid or metallic strip reinforcement to welded wire facing as shown in the accepted submittals. Do not splice or overlap reinforcement so seams are parallel to the wall face. Contact the Engineer when unanticipated existing or future obstructions such as foundations, pavements, pipes, inlets or utilities will interfere with reinforcement.

Place shoring backfill in the reinforced zone in 8" to 10" thick lifts. Compact A-2-4 soil and Class II, Type 1 and Class III select material in accordance with Subarticle 235-3(C) of the 2012 *Standard Specifications for Roads and Structures*. Use only hand operated compaction equipment to compact backfill within 3 feet of welded wire facing. At a distance greater than 3 feet, compact shoring backfill with at least four passes of an eight-ton to ten-ton vibratory roller in a direction parallel to the wall face. Smooth wheeled or rubber tired rollers are also acceptable for compacting backfill. Do not use sheepsfoot, grid rollers or other types of compaction equipment with feet. Do not displace or damage reinforcement when placing and compacting shoring backfill. End dumping directly on geotextile or geogrid reinforcement shall not be permitted. Do not operate heavy equipment on reinforcement until it is covered with at least 8" of shoring backfill. Replace any damaged reinforcement to the satisfaction of the Engineer.

Backfill for temporary walls outside the reinforced zone in accordance with Article 410-8 of the 2012 *Standard Specifications for Roads and Structures*. Bench temporary walls into the sides of excavations where applicable. For temporary geosynthetic walls with top of wall within five feet of finished grade, remove top facing and incorporate top reinforcement layer into fill when placing fill in front of wall. Temporary walls remain in place permanently unless otherwise required.

TRUCK MOUNTED CHANGEABLE MESSAGE SIGNS

(6-27-12)

1101.02

DB11 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.

GROUT REFERENCES FOR POSITIVE PROTECTION

(4-10-15)

1170

DB11 R20

Revise the 2012 *Standard Specifications for Roads and Structures* as follows:

Page 11-14, Article 1170-2, MATERIALS, Line 30, in the materials table, replace "Freeze-Thaw Durable Grout, Nonshrink" with "Grout, Type 3".

Page 11-14, Article 1170-2, MATERIALS, Lines 31 - 32, delete the first paragraph after the materials table.

GROUT REFERENCES FOR UTILITY MANHOLES

(8-3-15)

1525

DB15 R40

Revise the 2012 *Standard Specifications for Roads and Structures* as follows:

Page 15-13, Article 1525-2, Materials, line 9, in the materials table, add the following:

Item	Section
Grout, Type 2	1003

Page 15-13, Article 1525-2, Materials, Lines 20 - 21, replace the third paragraph after the materials table with the following:

Use Type 2 grout with properties that meet Table 1003-2 in the *Grout Production and Delivery* Standard Special Provision found elsewhere in this RFP, except provide grout with a plastic consistency in accordance with ASTM C1107.

Page 15-14, Subarticle 1525-3(B), Installation of Precast Units, Line 22, in the second sentence of the first paragraph, replace “non-shrink grout.” with “grout.”

COORDINATION OF EXISTING LIGHTING WORK

(6-24-12)

DB14 R002

Unless noted otherwise elsewhere in this RFP, maintain operation of the existing lighting systems until such time that it becomes in conflict with the actual construction work, or it becomes a hazard to traffic as determined by the Engineer.

Use care in working around the lights and circuitry and phase operations so that the disruption of existing lighting systems will be minimized. Make repairs or replacements in conformance with the contract. Should the Design-Build Team fail to make such repairs within the time allowed, the Department will cause the necessary repairs to be made by others. The costs of such repairs will be deducted from any monies due the Design-Build Team on the next subsequent monthly or final payment.

LIGHTING

(12-15-15)

DB14 R002-2

1.00 DESCRIPTION

The work covered by this Section consists of furnishing, installing, connecting, and placing into satisfactory operating condition roadway lighting at locations shown on the plans. Perform all work in accordance with these Special Provisions, the Plans, the National Electrical Code, and 2012 *Standard Specifications for Roads and Structures*.

All material to be removed and all circuits to be de-energized shall be coordinated with the NCDOT Division Traffic Engineer, J.P. Couch, 336-747-7800, and Duke Energy Progress representative Patrick Sizemore, 336-917-2522, prior to removal and / or de-energizing

Perform all work in conformance with Division 14 of the 2012 *Standard Specifications for Roads and Structures*, except as modified or added to by these Special Provisions. Install all bore pits outside the clear zone, as defined in the AASHTO Roadside Design Guide or as directed by the Engineer.

In addition to the Division 14 requirements, other specific Sections of the 2012 *Standard Specifications for Roads and Structures* applicable to the work on this project are listed below.

Section 1401	High Mount Standard
Section 1407	Electric Service Pole and Lateral
Section 1408	Light Control System

Section 1409	Electrical Duct
Section 1410	Feeder Circuits
Section 1411	Electrical Junction Boxes
Section 1412	Underpass Lighting

The Contractor performing the work described in these Special Provisions shall have a license of the proper classification from the North Carolina State Board of Examiners of Electrical Contractors.

The licensed Electrical Contractor must be available on the job site when the work is being performed or when requested by the Engineer. The licensed Electrical Contractor shall have a set of plans and Special Provisions in possession on the job site, and must maintain accurate "As Built" Plans.

Electronically submit catalog cuts and / or drawings for all proposed materials for the Engineer's review and approval. Include the brand name, stock number, description, size, rating, manufacturing specification, and applicable contract item number(s) on each submittal. Allow ten (10) days for submittal review. The Engineer will advise the Design-Build Team of reasons for rejected submittals and will return approved submittals to the Design-Build Team. Do not deliver material to the project prior to submittal approval.

2.00 CONSTRUCTION METHODS

Modify the fourth paragraph of Subarticle 1400-4(F) of the 2012 *Standard Specifications for Roads and Structures* to read as follows:

Install manufactured set screw type connectors, suitable for connecting multiple wires, and which are UL Listed (UL486D) for all phase conductor splices. These precise fit connectors shall be insulated with high-strength dielectric material and have removable access plugs over the set screws. Direct buried and / or submersible versions of these connectors, equipped with factory made waterproof insulating boots, shall be required for splicing inside junction boxes. Non-direct buried and / or non-submersible connectors may be used for phase conductor splicing in normally dry areas such as inside poles and transformer bases. After tightening set screw, tape down the access plugs to keep them securely in place. Split-bolt connectors may be used for ground wire splicing. Wire nut and compression type connectors will not be allowed.

Add the following to the end of Article 1400-4 of the 2012 *Standard Specifications for Roads and Structures*:

(K) Foundations

Form foundations with prefabricated cardboard forms down to 12" minimum below top of ground.

Do not erect standards before test cylinders representing the foundation concrete have attained the minimum compressive strength detailed in Section 1000 of the 2012

Standard Specifications for Roads and Structures. Test cylinders shall be provided for each truckload of concrete used for light pole foundations. Tests shall be conducted as described in Section 1000 of the 2012 *Standard Specifications for Roads and Structures*.

To avoid vehicle undercarriage snagging of any substantial remains of a breakaway support (when it is broken away), the edge of the foundation or top of anchor bolt should not extend more than four inches (4") above a sixty inch (60") chord aligned radially to the centerline of the highway, and connecting any point within the length of the chord on the ground surface on one side of the foundation to a point on the ground surface on the other side. (Reference Roadway Standard Drawing No. 1405.01)

Modify the second paragraph of Article 1400-9 of the 2012 *Standard Specifications for Roads and Structures* to read as follows:

The Engineer and City of Winston-Salem representatives shall provide authorization to the Design-Build Team for electrical service to be obtained in the name of the City and / or the monthly power bills to be sent directly from the utility company to the City. The City will be responsible for direct payment of monthly power bills received from the utility company.

3.00 BURN IN TEST

Add the following to the end of Article 1400-4 of the 2012 *Standard Specifications for Roads and Structures*:

The Design-Build Team shall be responsible for all maintenance of the lighting system(s) installed or renovated as part of this contract until the Department accepts the entire project. The Department will assume maintenance responsibility for the completed lighting systems after the entire project is accepted and there is no chance of construction related damage.

The Design-Build Team shall re-lamp, repair and / or replace any newly installed non-functional luminaires within the project limits. All luminaires must be operational at project acceptance.

4.00 ELECTRICAL JUNCTION BOXES

4.10 DESCRIPTION

Same as Article 1411-1 of the 2012 *Standard Specifications for Roads and Structures*.

4.20 MATERIALS

Same as Article 1411-2 of the 2012 *Standard Specifications for Roads and Structures*, except modify referenced Article 1091-5 as follows:

- Page 10-202, revise paragraph starting on **Line 9** to read “Provide polymer concrete (PC) boxes which have bolted covers and open bottoms. Provide vertical extensions of 6" to 12" as required by project special provisions.”
- Page 10-202, revise sentence beginning on **Line 14** to read “Other thermoplastic materials may be used for components which are not normally exposed to sunlight.”

4.30 CONSTRUCTION METHODS

Same as Article 1411-3 of the 2012 *Standard Specifications for Roads and Structures*.

4.40 MEASUREMENT AND PAVEMENT

Delete Article 1411-4 in its entirety.

5.00 LIGHT STANDARDS

5.10 DESCRIPTION

Furnish and install light standards less than 55-foot high complete with bracket arm(s), when required, and an AASHTO approved impact attenuation device (slip base, frangible base adapter, breakaway base) as shown on the plans.

5.20 MATERIALS

Same as Article 1404-2 of the 2012 *Standard Specifications for Roads and Structures*, except as modified below:

- Remove the words ‘ellipsoidal shaped’ from paragraph two.
- Replace paragraph 12 to read “Luminaires may be either direct pole mounted or mounted to a bracket arm. Where bracket arms are required, use bracket arms for each standard which are the length shown in the plans and of the same material as the standard. For direct pole mounted luminaires, minimum setback distances shown in the 2012 *Roadway Standard Drawings* must be maintained.”
- Add the following: For light standards not located behind guardrail or installed on concrete median barrier, provide and install a polymer concrete (PC) electrical junction box measuring 18” (l) x 12” (w) x 18” (h) (PC18) and meeting the specifications found in this RFP.

5.30 CONSTRUCTION METHODS

Same as Article 1404-3 of the 2012 *Standard Specifications for Roads and Structures* except as modified below:

For light standards not located behind guardrail or installed on concrete median barrier, install PC18 junction box within two feet of the pole foundation. Junction box shall be used as a tee point for feeder circuitry and conductors, and as housing for the pole ground rod.

6.00 LIGHT STANDARD LIGHT EMITTING DIODE (LED) LUMINAIRES

6.10 DESCRIPTION

Furnish, install and place into satisfactory operation luminaire, either on a bracket arm or directly mounted to the standard, complete with all light sources, drivers, wiring inside standard from circuit conductors to luminaire, in-line breakaway fuseholders and fuses and ground wiring at the pole on light standards less than 55 feet in height.

The Design-Build Team shall supply light standard luminaires from the list below or approved equal.

- Kim Lighting Altitude LED, Catalog Number: 2SB/ALT2P70/120L4K480/BL
- Kim Lighting Warp9 PicoPrism LED, Catalog Number: 2SB/WP9L2P70/120L4K480/BL
- Philips RoadFocus, Catalog Number: RFL-145W64LED4K-T-R2M-HVU-DMG-BK
- Beacon Viper – Large LED, Catalog Number: VP-L/80NB-180/4K/T2/480V/SF2/BBT

Any alternate luminaire submitted for approval must meet the minimum requirements below and must meet the spacing shown in the plans. The Design-Build Team shall supply the Department with current catalog cuts and third party certified photometric data files in Illuminating Engineering Society (IES) format for any alternate high mount luminaire submitted for approval. The Department, in its sole discretion, will determine if proposed alternate high mount luminaire meets or exceeds design criteria prior to installation.

Third party certified photometric files in IES format shall be submitted with the catalog cuts for the proposed LED roadway luminaire. Photometric files must show that proposed luminaire will meet or exceed the design shown in the plans.

The manufacturer shall state the Light Loss Factor (LLF) used in the photometric calculations for the proposed luminaire. LLF shall be calculated as follows:

$$\text{LLF} = \text{Lamp Lumen Depreciation (LLD)} \times \text{Luminaire Dirt Depreciation (LDD)}$$

- Lamp Lumen Depreciation (LLD) shall be the value calculated and reported by the manufacturer based on the LM-80 and TM-21 reports for the proposed fixture for 70,000 hours at 25° C.
- Luminaire Dirt Depreciation (LDD) = 0.90

6.20 MATERIALS

6.21 LUMINAIRE REQUIREMENTS

A. General Requirements

- LM-79 photometric test reports shall be provided for all LED luminaires. LM-79 luminaire photometric reports shall be produced by an independent testing laboratory and include the following:
 - Name of testing laboratory. The testing laboratory must hold National Voluntary Laboratory Accreditation Program (NVLAP) accreditation for the IES LM-79 test procedure or must be qualified, verified, and recognized through the U.S. Department of Energy's CALiPER program.
 - Report number
 - Date
 - Complete luminaire catalog number. Catalog number tested must match the catalog number of the luminaire submitted, except for variations which do not affect performance.
 - Description of luminaire, LED light source(s) and LED driver(s)
 - Goniophotometry
 - Colorimetry
- LM-80 lumen maintenance test report shall be provided for each respective LED light source.
- Luminaire shall be constructed of a single piece die cast aluminum housing. Each luminaire shall be finished gray in color unless otherwise noted.
- The luminaire shall have a 7 pin ANSI C136.41 compliant photocontrol receptacle for future expansion capabilities. Provide shorting caps to cover photocontrol receptacle for all luminaires.
- Luminaires shall have a maximum lamp lumen depreciation (LLD) factor of 0.82 at 70,000 hours & 25° C. Provide a summary of reliability testing performed for LED driver.
- Luminaires shall have a minimum 15,300 maintained delivered lumens.
- Luminaires maximum total power consumption shall not exceed the values shown in the plans. Nominal luminaire input wattage shall account for nominal applied voltage and any reduction in driver efficiency due to sub-optimal driver loading.
- Luminaire shall have a maximum Backlight, Uplight & Glare (BUG) rating of 3-0-3 and an IESNA distribution of Type II or Type III as required to meet the spacing, the average maintained footcandle level, and the average to minimum uniformity ratio requirements shown on the plans. The same BUG rating and distribution type shall be used throughout the project.
- Luminaire electrical components (driver and surge protection) shall meet the dust and moisture requirements of ingress protection (IP) rating of IP65 and IP66 for the optical compartments as specified in ANSI C136.25, minimum.

- Luminaire shall have external and internal labels per ANSI C136.15 and ANSI C136.22, respectively. Internal label shall identify the manufacturer, year and month of manufacture, and the manufacturer's part number.
- Luminaire shall have an internal bubble level.
- Luminaires shall start and operate in -20° C to +40° C ambient.
- Luminaires shall be rated for continuous service at an ambient temperature of 40°C (104°F)
- Electrically test fully assembled luminaires before shipment from factory.
- Effective Projected Area (EPA) and weight of the luminaires shall not exceed 1.4 square feet and 46 pounds, respectively.
- Luminaires shall be designed for ease of electrical component replacement.
- Luminaires shall be rated for minimum 2G vibration, minimum, per ANSI C136.31.
- LED light sources and drivers shall be RoHS compliant.
- The luminaire manufacturer shall have no less than five (5) years of experience in manufacturing LED-based lighting products and the manufacturing facility must be ISO 9001 certified.
- Luminaire shall have a 1.25" to 2.0" adjustable tenon mount for connection to luminaire bracket arm assembly.
- Pole hardware, nuts, bolts, washers, etc. shall be made from 18-8 stainless steel, or steel conforming to ASTM A307 galvanized in accordance with ASTM A153.
- Grommets shall be installed in cable entry holes. Cable entry holes shall be free from sharp edges which might cut conductors or an ungloved hand.
- All conductors inside the luminaire shall be neatly secured with tie-wraps as needed to prevent pinch points and assist in trouble shooting.

B. Driver

- Shall be 0V-10V dimmable.
- Rated case temperature shall be suitable for operation in the luminaire operating in the ambient temperature range of -20° C to +40° C.
- Shall be rated for 480VAC at 50/60 Hz, and shall operate normally for input voltage fluctuations of $\pm 10\%$.
- Shall have a minimum Power Factor (PF) of 0.90 at full input power and across specified voltage range.
- Shall provide UL Class II output.

C. Surge Suppression

- Integral surge protection shall meet ANSI / IEEE C62.45 procedures based on ANSI / IEEE C62.41.2 definitions for standard and optional waveforms for location category C-High 10kV/10kA test, IEC 61000-4-2 (Electrostatic Discharge) 8kV Air/4kV Contact test and IEC 61000-4-4 (Fast Transients).

D. Electromagnetic interference

- Luminaires shall have a maximum Total Harmonic Distortion (THD) of 20% at full input power and across specified voltage range.
- Luminaires shall comply with FCC 47 CFR part 15 non-consumer RFI/EMI standards.

E. Electrical safety testing

- Luminaires shall be listed for wet locations.
- Luminaires shall be UL listed and labeled.

F. Finish

- Luminaires shall be painted with a corrosion resistant polyester powdered paint with a minimum 2.0 mil thickness.
- Luminaires shall exceed a rating of six per ASTM D1654 after 1000 hours of salt spray fog testing per ASTM B117.
- The coating shall exhibit no greater than 30% reduction of gloss per ASTM D523, after 500 hours of QUV testing at ASTM G154 Cycle 6.
- Exterior surfaces shall be smooth and free of burrs.

G. Thermal management

- Mechanical design of protruding external surfaces (heat sink fins) on roadway luminaires shall facilitate hose-down cleaning and discourage debris accumulation.
- Liquids or moving parts shall not be allowed for thermal management.

H. Color Quality

- Minimum Color Rendering Index (CRI) of 70 with a Correlated Color Temperature (CCT) of 3500K to 4500K

I. Optics

- Transmissive optical components shall be applied in accordance with OEM design guidelines to ensure suitability for the thermal / mechanical / chemical environment.

J. The following shall be in accordance with corresponding sections of ANSI C136.37

- All internal components shall be assembled and pre-wired using modular electrical connections.
- Terminal blocks shall be used for incoming AC lines. Terminal blocks shall be easily accessible to installers or repair personnel. Wire nuts shall be prohibited inside the luminaire housing.

K. Latching and hinging

- Refractor and housing door holders and hinges shall be designed to maintain positive control of door to the luminaire body so as not to allow the accidental disengagement of either door.
- Drivers shall be mounted to a housing door designed to be opened from the bottom of the luminaire. Housing door shall allow easy removal for troubleshooting / repair on the ground.

L. Manufacturer or local sales representative shall provide installation and troubleshooting support via telephone and / or e-mail.

6.30 WARRANTY

Provide a minimum ten-year warranty covering maintained integrity and functionality of the luminaire housing, wiring, and connections, LED light source(s) and LED driver. Negligible light output from more than 10 percent of the LED packages shall constitute luminaire failure.

Warranty period shall begin after project acceptance by the Department. Supplier shall furnish documentation of warranty procedures to the Design-Build Team stating that warranty is for NCDOT.

6.40 CONSTRUCTION METHODS

Level and secure each luminaire in all directions. Adjust any luminaires, as directed by the Engineer, to provide optimal illumination distribution.

All LED packages on all luminaires must be operating normally at project acceptance. Any luminaire displaying improper operating characteristics prior to the Department accepting the entire project shall be replaced by the Design-Build Team at no additional cost to the Department.

7.00 HIGH MAST LIGHT EMITTING DIODE (LED) LUMINAIRES**7.10 DESCRIPTION**

Furnish, install and place into satisfactory operation, LED luminaires on high mount standards as detailed in this RFP.

The Design-Build Team shall supply Holophane or Cooper LED high mount luminaires as specified below or approved equal.

Mounting Height	Nos. of Fixtures	Holophane Part Number	Cooper Part Number
120'	8	HMLED2-12-4K-AH-G-AW-P7	GAN-AE-10-LED-8-5WQ-AP-MA-4N7
100'	6	HMLED2-12-4K-AH-G-AW-P7	GAN-AE-10-LED-8-5WQ-AP-MA-4N7
80'	8	HMLED2-06-4K-AH-G-AWP7	GAN-AE-06-LED-8-5WQ-AP-MA-4N7
60'	4	HMLED2-06-4K-AH-G-AWP7	GAN-AE-06-LED-8-5WQ-AP-MA-4N7

Any alternate luminaire submitted for approval must meet the minimum requirements in the table and sections below.

Mounting Height	Max. LED Fixture Wattage	Number & HPS Replacement Equivalent	Color Temp	Min. % of initial output at 70k hours (LLD)	Min. Maintained Delivered Lumens (per fixture)
120'	550W	8 x 750W	4000K ±500K	87%	44,250
100'	550W	6 x 750W	4000K ±500K	87%	44,250
80'	320W	8 x 400W	4000K ±500K	87%	23,300
60'	320W	4 x 400W	4000K ±500K	87%	23,300

The Design-Build Team shall supply the Department with current catalog cuts and third party certified photometric data files in Illuminating Engineering Society (IES) format for any alternate high mount luminaire submitted for Department approval. The Department, in its sole discretion, will determine if proposed alternate high mount luminaire meets or exceeds design criteria prior to installation.

The manufacturer shall state the Light Loss Factor (LLF) used in the photometric calculations for the proposed luminaire. LLF shall be calculated as follows:

$$\text{LLF} = \text{Lamp Lumen Depreciation (LLD)} \times \text{Luminaire Dirt Depreciation (LDD)}$$

- Lamp Lumen Depreciation (LLD) shall be the value calculated and reported by the manufacturer based on the LM-80 and TM-21 reports for the proposed fixture for 70,000 hours at 25° C.
- Luminaire Dirt Depreciation (LDD) = 0.90

High mount luminaire retrofit LED kits shall not be an acceptable alternative.

7.20 MATERIALS

8.21 LUMINAIRE REQUIREMENTS

A. General Requirements

- LM-79 photometric test reports shall be provided for all LED luminaires. LM-79 luminaire photometric reports shall be produced by an independent testing laboratory and include the following:

- Name of testing laboratory. The testing laboratory must hold National Voluntary Laboratory Accreditation Program (NVLAP) accreditation for the IES LM-79 test procedure or must be qualified, verified, and recognized through the U.S. Department of Energy's CALiPER program.
 - Report number
 - Date
 - Complete luminaire catalog number. Catalog number tested must match the catalog number of the luminaire submitted, except for variations which do not affect performance.
 - Description of luminaire, LED light source(s), and LED driver(s)
 - Goniophotometry
 - Colorimetry
-
- LM-80 lumen maintenance test report shall be provided for each respective LED light source.
 - Luminaire shall be constructed of aluminum. Each luminaire shall be finished gray in color unless otherwise noted.
 - The luminaire shall have a 7 pin ANSI C136.41 compliant photocontrol receptacle for future expansion capabilities. Provide shorting caps to cover photocontrol receptacle for all luminaires.
 - Luminaires shall have a maximum lamp lumen depreciation (LLD) factor of 0.82 at 70,000 hours & 25° C. Provide a summary of reliability testing performed for LED driver.
 - Luminaires maximum total power consumption shall not exceed the values shown in the plans. Nominal luminaire input wattage shall account for nominal applied voltage and any reduction in driver efficiency due to sub-optimal driver loading.
 - Luminaire shall have a maximum Backlight, Uplight & Glare (BUG) rating of 5-0-5 and an IESNA distribution of Type V as required to meet the spacing, the average maintained footcandle level and the average to minimum uniformity ratio requirements shown on the plans. The same BUG rating and distribution type shall be used throughout the project.
 - Luminaire LED modules shall meet dust and moisture rating of IP-66, minimum.
 - Luminaire shall have an external label per ANSI C136.15.
 - Luminaires shall have an internal label per ANSI C136.22.
 - Luminaires shall start and operate in -20° C to +40° C ambient.
 - Electrically test fully assembled luminaires before shipment from factory.
 - Effective Projected Area (EPA) and weight of the luminaires shall not exceed 1.3 square feet and 65 pounds, respectively.
 - Luminaires shall be designed for ease of electrical component replacement.
 - Luminaires shall be rated for minimum 2G vibration, minimum, per ANSI C136.31-2010
 - LED light sources and drivers shall be RoHS compliant.
 - The luminaire manufacturer shall have no less than five (5) years of experience in manufacturing LED-based lighting products and the manufacturing facility must be ISO 9001 certified.

- Pole hardware, nuts, bolts, washers, etc. shall be made from 18-8 stainless steel, or steel conforming to ASTM A307 galvanized in accordance with ASTM A153.

B. Driver

- Shall be 0V-10V dimmable.
- Rated case temperature shall be suitable for operation in the luminaire operating in the ambient temperature range of -20° C to +40° C.
- Shall be rated for 480VAC at 50/60 Hz, and shall operate normally for input voltage fluctuations of $\pm 10\%$.
- Shall have a minimum Power Factor (PF) of 0.90 at full input power and across specified voltage range.

C. Surge Suppression

- Integral surge protection shall meet ANSI / IEEE C62.45 procedures based on ANSI / IEEE C62.41.2 definitions for standard and optional waveforms for location category C-High 10kV/10kA test, IEC 61000-4-2 (Electrostatic Discharge) 8kV Air/4kV Contact test and IEC 61000-4-4 (Fast Transients).

D. Electromagnetic interference

- Luminaires shall have a maximum Total Harmonic Distortion (THD) of 20% at full input power and across specified voltage range.
- Luminaires shall comply with FCC 47 CFR part 15 non-consumer RFI/EMI standards.

E. Electrical safety testing

- Luminaires shall be listed for wet locations.
- Luminaires shall be UL listed and labeled.

F. Finish

- Luminaires shall be painted with a corrosion resistant polyester powdered paint with a minimum 2.0 mil thickness.
- Luminaires shall exceed a rating of six per ASTM D1654 after 1000 hours of salt spray fog testing per ASTM B117.
- The coating shall exhibit no greater than 30% reduction of gloss per ASTM D523, after 500 hours of QUV testing at ASTM G154 Cycle 6.

G. Thermal management

- Mechanical design of protruding external surfaces (heat sink fins) shall facilitate hose-down cleaning and discourage debris accumulation.

H. Color Quality

- Minimum Color Rendering Index (CRI) of 70 with a Correlated Color Temperature (CCT) of 3500K to 4500K

I. Optics

- Transmissive optical components shall be applied in accordance with OEM design guidelines to ensure suitability for the thermal / mechanical / chemical environment.

J. The following shall be in accordance with corresponding sections of ANSI C136.37

- All internal components shall be assembled and pre-wired using modular electrical connections.
- Terminal blocks shall be used for incoming AC lines
- Latching and hinging

K. Manufacturer or local sales representative shall provide installation and troubleshooting support via telephone and / or email.

7.30 WARRANTY

Provide a minimum five-year warranty covering maintained integrity and functionality of the luminaire housing, wiring, and connections, LED light source(s) and LED driver. Negligible light output from more than 10 percent of the LED packages constitutes luminaire failure.

The warranty period shall begin after the Department accepts the entire project.

7.40 CONSTRUCTION METHODS

Level and secure each luminaire in all directions. Securely terminate the wiring for each high mount luminaire and include an equipment grounding conductor to bond the housing to the supply cord grounding conductor.

Adjust any luminaires, as directed by the Engineer, to provide optimal illumination distribution.

All LED packages on all luminaires must be operating normally at project acceptance. Any luminaire displaying improper operating characteristics prior to the Department accepting the entire project shall be replaced by the Design-Build Team at no additional cost to the Department.

8.00 LIGHT CONTROL SYSTEM

8.10 DESCRIPTION

Same as Article 1408-1 of the 2012 *Standard Specifications for Roads and Structures*.

8.20 MATERIALS

Same as article 1408-2 of the 2012 *Standard Specifications for Roads and Structures*, except as modified below:

- Modify the first sentence of paragraph 2 on page 14-20 to read “Use a delayed response photo-control...”

8.30 CONSTRUCTION METHODS

Same as Article 1408-3 of the 2012 NCDOT *Standard Specifications for Roads and Structures*.

9.00 REMOVE CONTROL SYSTEM

9.10 DESCRIPTION

The work covered by this section consists of providing all equipment, labor and materials necessary to remove an existing control system.

9.20 MATERIALS

No materials are required for this work, except such miscellaneous items as tape and terminal devices to dead-end circuits serving the light standards.

9.30 CONSTRUCTION METHODS

Maintain operation of the existing lighting system until such time that it becomes in conflict with the actual construction work, or it becomes a hazard to traffic, as determined by the Engineer.

Coordinate work with the NCDOT Division 9 Traffic Engineer and with Duke Energy Progress to assure that circuits can be de-energized where and when necessary.

Disconnect circuitry and remove control system enclosure from conduit and support structure. Abandon or remove underground circuitry, concrete pad and support structure. Backfill the holes with suitable material and compact backfill, as required.

Dispose of all removed materials in a manner acceptable to the Engineer.

10.00 REMOVE SINGLE ARM LIGHT STANDARDS

10.10 DESCRIPTION

The work covered by this section consists of the removal of existing single arm metal light standards on breakaway bases and concrete foundations at locations shown on the plans. The standards are less than 50-foot mounting height, and are attached to the foundations with anchor bolts.

Concrete foundations to be removed or abandoned may be located in areas where, due to knockdowns, there are no light standards that also require removal.

10.20 MATERIALS

No materials are required for this work, except such miscellaneous items as tape and terminal devices to dead-end circuits serving the light standards.

10.30 CONSTRUCTION METHODS

Maintain operation of the existing lighting system until such time that it becomes in conflict with the actual construction work, or it becomes a hazard to traffic, as determined by the Engineer.

Coordinate work with the NCDOT Division 9 Traffic Engineer and with Duke Energy Progress to assure that circuits can be de-energized where and when necessary.

Remove luminaires from pole-arms, light standard and arms, couplings, anchor nuts, washers, transformer bases with doors and connecting bolts and fuse holders. Removed items shall be disposed of as directed by the Engineer. Removed luminaires shall be disposed of in accordance with the North Carolina Department of Natural Resources (NCDENR) regulations for disposal of hazardous materials.

Remove or abandon existing concrete light standard foundations as defined in Article 1400-10 of the 2012 *Standard Specifications for Roads and Structures*. Dispose of the removed concrete, reinforcing steel and anchor bolts in a manner acceptable to the Engineer. Backfill the holes with suitable material and compact backfill as required.

In accordance with Article 1400-10 of the 2012 *Standard Specifications for Roads and Structures*, abandon or remove the conductors and the conduit for the removed light standards as shown on the plans.

11.00 ELECTRICAL CONDUIT SYSTEM ON Y-LINE BRIDGES

11.10 DESCRIPTION:

The work covered by this section consists of furnishing and installing conduit systems embedded in the sidewalk or barrier rail, for connection to future light poles that will be installed by others, on outriggers. Perform all work in accordance with this RFP, the plans, the National Electrical Code (NEC), and Division 14 of the 2012 *Standard Specifications for Roads and Structures*.

11.20 MATERIALS

Conduit shall be liquid-tight flexible metallic or non-metallic PVC and sized as noted on the plans.

Liquid-tight flexible metallic conduit (LFMC) and associated transition bushings shall be marked as suitable for direct burial.

Non-metallic conduit shall be rigid PVC (Polyvinyl chloride) heavy wall approved for underground use with concrete encasement per UL 651 "Rigid Non-Metallic Conduit". Use Terminations designed for PVC conduit, to seal and stub out each PVC conduit, and to provide watertight protection.

Provide Type BR junction boxes that meet the requirements of Section 1411 of the 2012 *Standard Specifications for Roads and Structures*, titled "Electrical Junction Boxes."

Provide pull lines specifically designed for pulling rope through conduit. Use pull lines made of 2-ply line, with a tensile strength of 240 pounds minimum. Use rot and mildew resistant pull lines that are resistant to tangling when being dispensed.

Use mastic that is a permanent, non-hardening, water sealing compound that adheres to metal, plastic, and concrete.

11.30 CONSTRUCTION METHODS

All conduit and boxes installed in the sidewalk or barrier rail shall be securely fastened with ties prior to placing any concrete. After the conduit is encased in concrete, the Design-Build Team shall clean each conduit by snaking with a steel band with an approved tube cleaner equipped with a mandrel of a diameter not less than 85% of the nominal inside diameter of the conduit. To ensure against corrosion in the areas where hot dipped galvanizing of the junction box has been damaged, cover all raw metal surfaces with a cold galvanized, zinc rich paint.

Prior to encasement, all junction boxes shall be bonded to rebar in accordance with NEC.

Install LFMC out of the bottom of the sidewalk junction boxes installed over the approach slab. Convert LFMC to PVC after LFMC has cleared the approach slab as shown in the plans. Stub the conduit out of the sidewalk junction boxes installed over the approach slab and at the outrigger locations as shown in the plans. Conduit stub shall be at an accessible location. Seal with termination kits, of the same material as the conduit, designed specifically for that purpose. Conduit may enter cast iron junction boxes through field drilled holes protected with zinc rich paint before the conduit is inserted. Use threaded adapters and bushings at all cast iron junction box to conduit connections. Install a pull line in each conduit for future use. Leave sufficient slack for attachment of a rope that will be used to install conductors. Coordinate electrical conduit system work with work by others, as directed by the Engineer.

Install junction boxes in accordance with Section 1411 of the 2012 *Standard Specifications for Roads and Structures*, titled "Electrical Junction Boxes".

All work shall be inspected and approved by the Engineer prior to concealment.

12.00 ELECTRICAL CONDUIT SYSTEM IN PEDESTRAIN CULVERT

12.10 DESCRIPTION

The work covered by this section consists of furnishing, installing, connecting, and placing into satisfactory operating condition a pedestrian culvert lighting system at the location shown on the plans. The work shall be in accordance with the RFP, the plans, the National Electrical Code (NEC), and Division 14 of the *Standard Specifications for Roads and Structures*, except as modified or added by these Special Provisions. The culvert may be either cast in place or pre-cast. Lighting work for each type of culvert is detailed in the sections below.

12.20 MATERIALS

The Design-Build Team shall provide and install flush mount LED fixtures inside the culvert. The fixtures shall be tamper resistant with a minimum 4,000 lumen output. The luminaire lens shall be UV-stabilized, impact resistant, frosted polycarbonate.

Provide and install a power riser for electrical service to the culvert lighting system. The power riser shall consist of a 100 Amp (A) meter base and a 20-position, 100A main panel mounted to a unistrut rack.

Install pull lines in all empty conduits. The pull line shall be 2-ply line with a tensile strength of 240 pounds minimum, shall be resistant to tangling when being dispensed and shall be rot and mildew resistant.

Cast in Place Culvert

Use polyvinyl chloride (PVC) conduit in accordance with UL 651 "Schedule 40 and 80 Rigid PVC Conduit and Fittings". Use ¾" conduit as shown in the plans.

Cast outlet boxes shall be zinc electroplated with a grounding lug. The boxes shall be deep enough to provide a minimum of 2" concrete over the conduit. Cast outlet boxes and junction boxes shall be installed with blank covers and gaskets to provide a weatherproof installation. The boxes shall be designed for flush-mounted installations in poured concrete. Field drilled holes may be provided in lieu of drilled and tapped conduit entrances. Lightweight, stamped metal boxes with knockouts are not acceptable.

In accordance with Article 1072-7 of the 2012 *Standard Specifications for Roads and Structures*, incidental bolts, nuts, and washers shall be high strength and galvanized.

Precast Culvert

Use rigid galvanized conduit (RGC) in accordance with UL 6 "Electrical Rigid Metal Conduit - Steel", with rigid full weight galvanized threaded fittings. Use ¾" conduit as shown in the plans. Use hot dipped or mechanically galvanized malleable iron pipe straps, clamp backs and conduit spacers to secure RGC conduit on the culvert wall.

Die cast outlet boxes and junction boxes shall be zinc electroplated with a grounding lug installed as recommended by the light fixtures manufacturer. Cast outlet boxes and junction boxes shall be installed with blank covers and gaskets to provide a weatherproof installation prior to pulling in circuit conductors and mounting light fixtures. Field drilled holes may be provided in lieu of drilled and tapped conduit entrances. Lightweight, stamped metal boxes with knockouts will not be acceptable.

Attach all outlet boxes, junction boxes and conduit clamps using concrete expansion anchors and bolts. Concrete bolt anchors are one-piece, pre-assembled, stainless steel that are ¼" diameter and 1 ½" long.

Provide expansion fittings at each culvert expansion joint and/or one expansion joint for every 80' or longer run.

12.30 CONSTRUCTION METHODS

Install power riser as shown on the Lighting Plans provided by the Department.

Conduit shall be installed continuous, watertight, free of kinks, and all runs shall be made with as few couplings as standard lengths will permit. The total angle of all bends between outlets shall not exceed 270° (3-90 bends).

Protection shall be provided at all times against the entrance of moisture or other foreign matter into the conduit. Conduit shall be plugged or capped when work is temporarily suspended, including nightly stoppage of work.

For a pre-cast culvert, expansion fittings shall be provided where conduit crosses culvert expansion joints and one expansion joint for every 80-foot or longer run. Mount and wire LED light fixtures over outlet boxes.

For a cast in place culvert, all conduit and boxes shall be securely fastened with ties prior to placing any concrete. After the conduit is encased in concrete, the Design-Build Team shall use a non-destructive cleaning technique to thoroughly clean the inside of each conduit and ensure the conduit is free from accidental plugs. Conduit shall enter and exit LED light fixture through the fixture housing. Complete all wire terminations inside the fixture housing.

The conduit system shall be installed in accordance with NEC requirements as an approved raceway for electrical circuits.

All exposed raw metal surfaces or areas with damaged galvanizing shall be covered with a cold galvanized, zinc rich paint prior to installation to ensure against corrosion.

Conduits stubbed for future use shall be capped with a waterproof cap. All conduit-to-box connections shall be made with locknuts and insulating bushings. Install pull rope prior to capping conduit system.

All work shall be inspected and approved by the Engineer before concealment.

ON-THE-JOB TRAINING

(2-24-15) (Rev. 3-2-15)

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**AVAILABILITY OF FUNDS – TERMINATION OF CONTRACTS**

(9-1-11)

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 Article 108-13(E), of the *North Carolina Department of Transportation Standard Specifications for Roads and Structures*, dated January 2012 and as amended by the Standard Special Provision, Division One found elsewhere in this RFP.

***** STANDARD SPECIAL PROVISIONS *******NCDOT GENERAL SEED SPECIFICATIONS FOR SEED QUALITY**

(5-7-11)

Z-3

Seed shall be sampled and tested by the North Carolina Department of Agriculture and Consumer Services, Seed Testing Laboratory. When said samples are collected, the vendor shall supply an independent laboratory report for each lot to be tested. Results from seed so sampled shall be final. Seed not meeting the specifications shall be rejected by the Department of Transportation and shall not be delivered to North Carolina Department of Transportation warehouses. If seed has been delivered it shall be available for pickup and replacement at the supplier's expense.

Any re-labeling required by the North Carolina Department of Agriculture and Consumer Services, Seed Testing Laboratory, that would cause the label to reflect as otherwise specified herein shall be rejected by the North Carolina Department of Transportation.

Seed shall be free from seeds of the noxious weeds Johnsongrass, Balloonvine, Jimsonweed, Witchweed, Itchgrass, Serrated Tussock, Showy Crotalaria, Smooth Crotalaria, Sicklepod, Sandbur, Wild Onion, and Wild Garlic. Seed shall not be labeled with the above weed species on the seed analysis label. Tolerances as applied by the Association of Official Seed Analysts will NOT be allowed for the above noxious weeds except for Wild Onion and Wild Garlic.

Tolerances established by the Association of Official Seed Analysts will generally be recognized. However, for the purpose of figuring pure live seed, the found pure seed and found germination percentages as reported by the North Carolina Department of Agriculture and Consumer Services, Seed Testing Laboratory will be used. Allowances, as established by the NCDOT, will be recognized for minimum pure live seed as listed on the following pages.

The specifications for restricted noxious weed seed refers to the number per pound as follows:

Restricted Noxious Weed	Limitations per Lb. of Seed	Restricted Noxious Weed	Limitations per Lb. of Seed
Blessed Thistle	4 seeds	Cornflower (Ragged Robin)	27 seeds
Cocklebur	4 seeds	Texas Panicum	27 seeds
Spurred Anoda	4 seeds	Bracted Plantain	54 seeds
Velvetleaf	4 seeds	Buckhorn Plantain	54 seeds
Morning-glory	8 seeds	Broadleaf Dock	54 seeds
Corn Cockle	10 seeds	Curly Dock	54 seeds
Wild Radish	12 seeds	Dodder	54 seeds
Purple Nutsedge	27 seeds	Giant Foxtail	54 seeds
Yellow Nutsedge	27 seeds	Horsenettle	54 seeds
Canada Thistle	27 seeds	Quackgrass	54 seeds
Field Bindweed	27 seeds	Wild Mustard	54 seeds
Hedge Bindweed	27 seeds		

Seed of Pensacola Bahiagrass shall not contain more than 7% inert matter, Kentucky Bluegrass, Centipede and Fine or Hard Fescue shall not contain more than 5% inert matter whereas a maximum of 2% inert matter will be allowed on all other kinds of seed. In addition, all seed shall not contain more than 2% other crop seed nor more than 1% total weed seed. The germination rate as tested by the North Carolina Department of Agriculture shall not fall below 70%, which includes both dormant and hard seed. Seed shall be labeled with not more than 7%, 5% or 2% inert matter (according to above specifications), 2% other crop seed and 1% total weed seed.

Exceptions may be made for minimum pure live seed allowances when cases of seed variety shortages are verified. Pure live seed percentages will be applied in a verified shortage situation. Those purchase orders of deficient seed lots will be credited with the percentage that the seed is deficient.

FURTHER SPECIFICATIONS FOR EACH SEED GROUP ARE GIVEN BELOW:

Minimum 85% pure live seed; maximum 1% total weed seed; maximum 2% total other crop seed; maximum 144 restricted noxious weed seed per pound. Seed less than 83% pure live seed will not be approved.

Sericea Lespedeza
Oats (seeds)

Minimum 80% pure live seed; maximum 1% total weed seed; maximum 2% total other crop; maximum 144 restricted noxious weed seed per pound. Seed less than 78% pure live seed will not be approved.

Tall Fescue (all approved varieties)	Bermudagrass
Kobe Lespedeza	Browntop Millet
Korean Lespedeza	German Millet - Strain R
Weeping Lovegrass	Clover – Red / White / Crimson
Carpetgrass	

Minimum 78% pure live seed; maximum 1% total weed seed; maximum 2% total other crop seed; maximum 144 restricted noxious weed seed per pound. Seed less than 76% pure live seed will not be approved.

Common or Sweet Sundangrass

Minimum 76% pure live seed; maximum 1% total weed seed; maximum 2% total other crop seed; maximum 144 restricted noxious weed seed per pound. Seed less than 74% pure live seed will not be approved.

Rye (grain; all varieties)
Kentucky Bluegrass (all approved varieties)
Hard Fescue (all approved varieties)
Shrub (bicolor) Lespedeza

Minimum 70% pure live seed; maximum 1% total weed seed; maximum 2% total other crop seed; maximum 144 noxious weed seed per pound. Seed less than 70% pure live seed will not be approved.

Centipedegrass	Japanese Millet
Crownvetch	Reed Canary Grass
Pensacola Bahiagrass	Zoysia
Creeping Red Fescue	

Minimum 70% pure live seed; maximum 1% total weed seed; maximum 2% total other crop seed; maximum 5% inert matter; maximum 144 restricted noxious weed seed per pound.

Barnyard Grass
Big Bluestem
Little Bluestem
Bristly Locust
Birdsfoot Trefoil
Indiangrass
Orchardgrass
Switchgrass
Yellow Blossom Sweet Clover

STANDARD SPECIAL PROVISION**ERRATA**

(02-24-15) (Rev.03/02/15)

Z-4

Revise the 2012 *Standard Specifications for Roads and Structures* 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 “competition” 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: $W = LD\sqrt{P} \div 148,000$

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 PROVISIONS *******AWARD OF CONTRACT**

(6-28-77)(Rev. 1-8-16)

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 PROVISIONS *******MINORITY AND FEMALE EMPLOYMENT REQUIREMENTS**

(12-18-07)

Z-7

NOTICE OF REQUIREMENTS FOR AFFIRMATIVE ACTION TO ENSURE EQUAL EMPLOYMENT OPPORTUNITY (*EXECUTIVE NUMBER 11246*)

1. The goals and timetables for minority and female participation, expressed in percentage terms for the Contractor's aggregate workforce in each trade on all construction work in the covered area, see as shown on the attached sheet entitled "Employment Goals for Minority and Female Participation".

These goals are applicable to all the Contractor's construction work (whether or not it is Federal or federally assisted) performed in the covered area. If the Contractor performs construction work in a geographical area located outside of the covered area, it shall apply the goals established for such geographical area where the work is actually performed. With regard to this second area, the Contractor also is subject to the goals for both its federally involved and nonfederally involved construction.

The Contractor's compliance with the Executive Order and the regulations in *41 CFR Part 60-4* shall be based on its implementation of the Equal Opportunity Clause, specific affirmative action obligations required by the specifications set forth in *41 CFR 60-4.3(a)*, and its effort to meet the goals. The hours of minority and female employment and training must be substantially uniform throughout the length of the contract, and in each trade and the Contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from Contractor to Contractor or from project to project or the sole purpose of meeting the Contractor's goals shall be a violation of the contract, the executive Order and the regulations in *41 CFR Part 60-4*. Compliance with the goals will be measured against the total work hours performed.

2. As used in this Notice and in the contract resulting from this solicitation, the "covered area" is the county or counties shown on the cover sheet of the proposal form and contract.

**EMPLOYMENT GOALS FOR MINORITY
AND FEMALE PARTICIPATION**

<p><u>Area 023 29.7%</u> Bertie County Camden County Chowan County Gates County Hertford County Pasquotank County Perquimans County</p>	<p><u>Economic Areas</u> <u>Area 026 33.5%</u> Bladen County Hoke County Richmond County Robeson County Sampson County Scotland County</p>	<p><u>Area 029 15.7%</u> Alexander County Anson County Burke County Cabarrus County Caldwell County Catawba County Cleveland County Iredell County Lincoln County Polk County Rowan County Rutherford County Stanly County</p>
<p><u>Area 024 31.7%</u> Beaufort County Carteret County Craven County Dare County Edgecombe County Green County Halifax County Hyde County Jones County Lenoir County Martin County Nash County Northampton County Pamlico County Pitt County Tyrrell County Washington County Wayne County Wilson County</p>	<p><u>Area 027 24.7%</u> Chatham County Franklin County Granville County Harnett County Johnston County Lee County Person County Vance County Warren County</p>	<p><u>Area 0480 8.5%</u> Buncombe County Madison County</p>
<p><u>Area 025 23.5%</u> Columbus County Duplin County Onslow County Pender County</p>	<p><u>Area 028 15.5%</u> Alleghany County Ashe County Caswell County Davie County Montgomery County Moore County Rockingham County Surry County Watauga County Wilkes County</p>	<p><u>Area 030 6.3%</u> Avery County Cherokee County Clay County Graham County Haywood County Henderson County Jackson County McDowell County Macon County Mitchell County Swain County Transylvania County Yancey County</p>

SMSA Areas**Area 5720 26.6%**

Currituck County

Area 9200 20.7%

Brunswick County

New Hanover County

Area 2560 24.2%

Cumberland County

Area 6640 22.8%

Durham County

Orange County

Wake County

Area 1300 16.2%

Alamance County

Area 3120 16.4%

Davidson County

Forsyth County

Guilford County

Randolph County

Stokes County

Yadkin County

Area 1520 18.3%

Gaston County

Mecklenburg County

Union County

Goals for Female**Participation in Each Trade**

(Statewide) 6.9%

STANDARD SPECIAL PROVISION

REQUIRED CONTRACT PROVISIONS FEDERAL - AID CONSTRUCTION CONTRACTS

FHWA - 1273 Electronic Version - May 1, 2012

Z-8

- I. General
- II. Nondiscrimination
- III. Nonsegregated Facilities
- IV. Davis-Bacon and Related Act Provisions
- V. Contract Work Hours and Safety Standards Act Provisions
- VI. Subletting or Assigning the Contract
- VII. Safety: Accident Prevention
- VIII. False Statements Concerning Highway Projects
- IX. Implementation of Clean Air Act and Federal Water Pollution Control Act
- X. Compliance with Governmentwide Suspension and Debarment Requirements
- XI. Certification Regarding Use of Contract Funds for Lobbying

ATTACHMENTS

- A. Employment and Materials Preference for Appalachian Development Highway System or Appalachian Local Access Road Contracts (included in Appalachian contracts only)

I. GENERAL

1. Form FHWA-1273 must be physically incorporated in each construction contract funded under Title 23 (excluding emergency contracts solely intended for debris removal). The contractor (or subcontractor) must insert this form in each subcontract and further require its inclusion in all lower tier subcontracts (excluding purchase orders, rental agreements and other agreements for supplies or services).
The applicable requirements of Form FHWA-1273 are incorporated by reference for work done under any purchase order, rental agreement or agreement for other services. The prime contractor shall be responsible for compliance by any subcontractor, lower-tier subcontractor or service provider.
Form FHWA-1273 must be included in all Federal-aid design-build contracts, in all subcontracts and in lower tier subcontracts (excluding subcontracts for design services, purchase orders, rental agreements and other agreements for supplies or services). The design-builder shall be responsible for compliance by any subcontractor, lower-tier subcontractor or service provider.
Contracting agencies may reference Form FHWA-1273 in bid proposal or request for proposal documents, however, the Form FHWA-1273 must be physically incorporated (not referenced) in all contracts, subcontracts and lower-tier subcontracts (excluding purchase orders, rental agreements and other agreements for supplies or services related to a construction contract).
2. Subject to the applicability criteria noted in the following sections, these contract provisions shall apply to all work performed on the contract by the contractor's own organization and with the assistance of workers under the contractor's immediate superintendence and to all work performed on the contract by piecework, station work, or by subcontract.
3. A breach of any of the stipulations contained in these Required Contract Provisions may be sufficient grounds for withholding of progress payments, withholding of final payment, termination of the contract, suspension / debarment or any other action determined to be appropriate by the contracting agency and FHWA.
4. Selection of Labor: During the performance of this contract, the contractor shall not use convict labor for any purpose within the limits of a construction project on a Federal-aid highway unless it is labor performed by convicts who are on parole, supervised release, or probation. The term Federal-aid highway does not include roadways functionally classified as local roads or rural minor collectors.

II. NONDISCRIMINATION

The provisions of this section related to 23 CFR Part 230 are applicable to all Federal-aid construction contracts and to all related construction subcontracts of \$10,000 or more. The provisions of 23 CFR Part 230 are not applicable to material supply, engineering, or architectural service contracts.

In addition, the contractor and all subcontractors must comply with the following policies: Executive Order 11246, 41 CFR 60, 29 CFR 1625-1627, Title 23 USC Section 140, the Rehabilitation Act of 1973, as amended (29 USC 794), Title VI of the Civil Rights Act of 1964, as amended, and related regulations including 49 CFR Parts 21, 26 and 27; and 23 CFR Parts 200, 230, and 633.

The contractor and all subcontractors must comply with: the requirements of the Equal Opportunity Clause in 41 CFR 60-1.4(b) and, for all construction contracts exceeding \$10,000, the Standard Federal Equal Employment Opportunity Construction Contract Specifications in 41 CFR 60-4.3.

Note: The U.S. Department of Labor has exclusive authority to determine compliance with Executive Order 11246 and the policies of the Secretary of Labor including 41 CFR 60, and 29 CFR 1625-1627. The contracting agency and the FHWA have the authority and the responsibility to ensure compliance with Title 23 USC Section 140, the Rehabilitation Act of 1973, as amended (29 USC 794), and Title VI of the Civil Rights Act of 1964, as amended, and related regulations including 49 CFR Parts 21, 26 and 27; and 23 CFR Parts 200, 230, and 633.

The following provision is adopted from 23 CFR 230, Appendix A, with appropriate revisions to conform to the U.S. Department of Labor (US DOL) and FHWA requirements.

1. **Equal Employment Opportunity:** Equal employment opportunity (EEO) requirements not to discriminate and to take affirmative action to assure equal opportunity as set forth under laws, executive orders, rules, regulations (28 CFR 35, 29 CFR 1630, 29 CFR 1625-1627, 41 CFR 60 and 49 CFR 27) and orders of the Secretary of Labor as modified by the provisions prescribed herein, and imposed pursuant to 23 U.S.C. 140 shall constitute the EEO and specific affirmative action standards for the contractor's project activities under this contract. The provisions of the Americans with Disabilities Act of 1990 (42 U.S.C. 12101 et seq.) set forth under 28 CFR 35 and 29 CFR 1630 are

incorporated by reference in this contract. In the execution of this contract, the contractor agrees to comply with the following minimum specific requirement activities of EEO:

- a. The contractor will work with the contracting agency and the Federal Government to ensure that it has made every good faith effort to provide equal opportunity with respect to all of its terms and conditions of employment and in their review of activities under the contract.
- b. The contractor will accept as its operating policy the following statement:
"It is the policy of this Company to assure that applicants are employed, and that employees are treated during employment, without regard to their race, religion, sex, color, national origin, age or disability. Such action shall include: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship, pre-apprenticeship, and/or on-the-job training."
2. **EEO Officer:** The contractor will designate and make known to the contracting officers an EEO Officer who will have the responsibility for and must be capable of effectively administering and promoting an active EEO program and who must be assigned adequate authority and responsibility to do so.
3. **Dissemination of Policy:** All members of the contractor's staff who are authorized to hire, supervise, promote, and discharge employees, or who recommend such action, or who are substantially involved in such action, will be made fully cognizant of, and will implement, the contractor's EEO policy and contractual responsibilities to provide EEO in each grade and classification of employment. To ensure that the above agreement will be met, the following actions will be taken as a minimum:
 - a. Periodic meetings of supervisory and personnel office employees will be conducted before the start of work and then not less often than once every six months, at which time the contractor's EEO policy and its implementation will be reviewed and explained. The meetings will be conducted by the EEO Officer.
 - b. All new supervisory or personnel office employees will be given a thorough indoctrination by the EEO Officer, covering all major aspects of the contractor's EEO obligations within thirty days following their reporting for duty with the contractor.
 - c. All personnel who are engaged in direct recruitment for the project will be instructed by the EEO Officer in the contractor's procedures for locating and hiring minorities and women.
 - d. Notices and posters setting forth the contractor's EEO policy will be placed in areas readily accessible to employees, applicants for employment and potential employees.
 - e. The contractor's EEO policy and the procedures to implement such policy will be brought to the attention of employees by means of meetings, employee handbooks, or other appropriate means.
4. **Recruitment:** When advertising for employees, the contractor will include in all advertisements for employees the notation: "An Equal Opportunity Employer." All such advertisements will be placed in publications having a large circulation among minorities and women in the area from which the project work force would normally be derived.
 - a. The contractor will, unless precluded by a valid bargaining agreement, conduct systematic and direct recruitment through public and private employee referral sources likely to yield qualified minorities and women. To meet this requirement, the contractor will identify sources of potential minority group employees, and establish with such identified sources procedures whereby minority and women applicants may be referred to the contractor for employment consideration.
 - b. In the event the contractor has a valid bargaining agreement providing for exclusive hiring hall referrals, the contractor is expected to observe the provisions of that agreement to the extent that the system meets the contractor's compliance with EEO contract provisions. Where implementation of such an agreement has the effect of discriminating against minorities or women, or obligates the contractor to do the same, such implementation violates Federal nondiscrimination provisions.
 - c. The contractor will encourage its present employees to refer minorities and women as applicants for employment. Information and procedures with regard to referring such applicants will be discussed with employees.
5. **Personnel Actions:** Wages, working conditions, and employee benefits shall be established and administered, and personnel actions of every type, including hiring, upgrading, promotion, transfer, demotion, layoff, and termination, shall be taken without regard to race, color, religion, sex, national origin, age or disability. The following procedures shall be followed:
 - a. The contractor will conduct periodic inspections of project sites to insure that working conditions and employee facilities do not indicate discriminatory treatment of project site personnel.
 - b. The contractor will periodically evaluate the spread of wages paid within each classification to determine any evidence of discriminatory wage practices.
 - c. The contractor will periodically review selected personnel actions in depth to determine whether there is evidence of discrimination. Where evidence is found, the contractor will promptly take corrective action. If the review indicates that the discrimination may extend beyond the actions reviewed, such corrective action shall include all affected persons.
 - d. The contractor will promptly investigate all complaints of alleged discrimination made to the contractor in connection with its obligations under this contract, will attempt to resolve such complaints, and will take appropriate corrective action within a reasonable time. If the investigation indicates that the discrimination may affect persons other than the complainant, such corrective action shall include such other persons. Upon completion of each investigation, the contractor will inform every complainant of all of their avenues of appeal.
6. **Training and Promotion:**
 - a. The contractor will assist in locating, qualifying, and increasing the skills of minorities and women who are applicants for employment or current employees. Such efforts should be aimed at developing full journey level status employees in the type of trade or job classification involved.
 - b. Consistent with the contractor's work force requirements and as permissible under Federal and State regulations, the contractor shall make full use of training programs, i.e., apprenticeship, and on-the-job training programs for the geographical area of contract performance. In the event a special provision for training is provided under this contract, this subparagraph will be superseded as indicated in the special provision. The contracting agency may reserve training positions for persons who receive welfare assistance in accordance with 23 U.S.C. 140(a).
 - c. The contractor will advise employees and applicants for employment of available training programs and entrance requirements for each.
 - d. The contractor will periodically review the training and promotion potential of employees who are minorities and women and will encourage eligible employees to apply for such training and promotion.
7. **Unions:** If the contractor relies in whole or in part upon unions as a source of employees, the contractor will use good faith efforts to obtain the cooperation of such unions to increase opportunities for minorities and women. Actions by the contractor, either directly or through a contractor's association acting as agent, will include the procedures set forth below:

- a. The contractor will use good faith efforts to develop, in cooperation with the unions, joint training programs aimed toward qualifying more minorities and women for membership in the unions and increasing the skills of minorities and women so that they may qualify for higher paying employment.
 - b. The contractor will use good faith efforts to incorporate an EEO clause into each union agreement to the end that such union will be contractually bound to refer applicants without regard to their race, color, religion, sex, national origin, age or disability.
 - c. The contractor is to obtain information as to the referral practices and policies of the labor union except that to the extent such information is within the exclusive possession of the labor union and such labor union refuses to furnish such information to the contractor, the contractor shall so certify to the contracting agency and shall set forth what efforts have been made to obtain such information.
 - d. In the event the union is unable to provide the contractor with a reasonable flow of referrals within the time limit set forth in the collective bargaining agreement, the contractor will, through independent recruitment efforts, fill the employment vacancies without regard to race, color, religion, sex, national origin, age or disability; making full efforts to obtain qualified and/or qualifiable minorities and women. The failure of a union to provide sufficient referrals (even though it is obligated to provide exclusive referrals under the terms of a collective bargaining agreement) does not relieve the contractor from the requirements of this paragraph. In the event the union referral practice prevents the contractor from meeting the obligations pursuant to Executive Order 11246, as amended, and these special provisions, such contractor shall immediately notify the contracting agency.
8. **Reasonable Accommodation for Applicants / Employees with Disabilities:** The contractor must be familiar with the requirements for and comply with the Americans with Disabilities Act and all rules and regulations established there under. Employers must provide reasonable accommodation in all employment activities unless to do so would cause an undue hardship.
9. **Selection of Subcontractors, Procurement of Materials and Leasing of Equipment:** The contractor shall not discriminate on the grounds of race, color, religion, sex, national origin, age or disability in the selection and retention of subcontractors, including procurement of materials and leases of equipment. The contractor shall take all necessary and reasonable steps to ensure nondiscrimination in the administration of this contract.
- a. The contractor shall notify all potential subcontractors and suppliers and lessors of their EEO obligations under this contract.
 - b. The contractor will use good faith efforts to ensure subcontractor compliance with their EEO obligations.
10. **Assurance Required by 49 CFR 26.13(b):**
- a. The requirements of 49 CFR Part 26 and the State DOT's U.S. DOT-approved DBE program are incorporated by reference.
 - b. The contractor or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The contractor shall carry out applicable requirements of 49 CFR Part 26 in the award and administration of DOT-assisted contracts. Failure by the contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy as the contracting agency deems appropriate.
11. **Records and Reports:** The contractor shall keep such records as necessary to document compliance with the EEO requirements. Such records shall be retained for a period of three years following the date of the final payment to the contractor for all contract work and shall be available at reasonable times and places for inspection by authorized representatives of the contracting agency and the FHWA.
- a. The records kept by the contractor shall document the following:
 - (1) The number and work hours of minority and non-minority group members and women employed in each work classification on the project;
 - (2) The progress and efforts being made in cooperation with unions, when applicable, to increase employment opportunities for minorities and women; and
 - (3) The progress and efforts being made in locating, hiring, training, qualifying, and upgrading minorities and women;
 - b. The contractors and subcontractors will submit an annual report to the contracting agency each July for the duration of the project, indicating the number of minority, women, and non-minority group employees currently engaged in each work classification required by the contract work. This information is to be reported on Form FHWA-1391. The staffing data should represent the project work force on board in all or any part of the last payroll period preceding the end of July. If on-the-job training is being required by special provision, the contractor will be required to collect and report training data. The employment data should reflect the work force on board during all or any part of the last payroll period preceding the end of July.

III. NONSEGREGATED FACILITIES

This provision is applicable to all Federal-aid construction contracts and to all related construction subcontracts of \$10,000 or more.

The contractor must ensure that facilities provided for employees are provided in such a manner that segregation on the basis of race, color, religion, sex, or national origin cannot result. The contractor may neither require such segregated use by written or oral policies nor tolerate such use by employee custom. The contractor's obligation extends further to ensure that its employees are not assigned to perform their services at any location, under the contractor's control, where the facilities are segregated. The term "facilities" includes waiting rooms, work areas, restaurants and other eating areas, time clocks, restrooms, washrooms, locker rooms, and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing provided for employees. The contractor shall provide separate or single-user restrooms and necessary dressing or sleeping areas to assure privacy between sexes.

IV. DAVIS-BACON AND RELATED ACT PROVISIONS

This section is applicable to all Federal-aid construction projects exceeding \$2,000 and to all related subcontracts and lower-tier subcontracts (regardless of subcontract size). The requirements apply to all projects located within the right-of-way of a roadway that is functionally classified as Federal-aid highway. This excludes roadways functionally classified as local roads or rural minor collectors, which are exempt. Contracting agencies may elect to apply these requirements to other projects.

The following provisions are from the U.S. Department of Labor regulations in 29 CFR 5.5 "Contract provisions and related matters" with minor revisions to conform to the FHWA-1273 format and FHWA program requirements.

1. Minimum wages

- a. All laborers and mechanics employed or working upon the site of the work, will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is

attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics.

Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph 1.d. of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in 29 CFR 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, That the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under paragraph 1.b. of this section) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

- b. (1) The contracting officer shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The contracting officer shall approve an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:
 - (i) The work to be performed by the classification requested is not performed by a classification in the wage determination; and
 - (ii) The classification is utilized in the area by the construction industry; and
 - (iii) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.
- (2) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the contracting officer to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, DC 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.
- (3) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Wage and Hour Administrator for determination. The Wage and Hour Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.
- (4) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs 1.b.(2) or 1.b.(3) of this section, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.
- c. Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.
- d. If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, Provided, That the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.
2. **Withholding.** The contracting agency shall upon its own action or upon written request of an authorized representative of the Department of Labor, withhold or cause to be withheld from the contractor under this contract, or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work, all or part of the wages required by the contract, the contracting agency may, after written notice to the contractor, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.
3. **Payrolls and basic records**
 - a. Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.
 - b. (1) The contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to the contracting agency. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on weekly transmittals. Instead the payrolls shall only need to include an individually identifying number for each employee (e.g. the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH-347 is available

for this purpose from the Wage and Hour Division Web site at <http://www.dol.gov/esa/whd/forms/wh347instr.htm> or its successor site. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to the contracting agency for transmission to the State DOT, the FHWA or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to the contracting agency.

- (2) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:
 - (i) That the payroll for the payroll period contains the information required to be provided under §5.5 (a)(3)(ii) of Regulations, 29 CFR part 5, the appropriate information is being maintained under §5.5 (a)(3)(i) of Regulations, 29 CFR part 5, and that such information is correct and complete;
 - (ii) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 CFR part 3;
 - (iii) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.
 - (3) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph 3.b.(2) of this section.
 - (4) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under section 1001 of title 18 and section 231 of title 31 of the United States Code.
 - c. The contractor or subcontractor shall make the records required under paragraph 3.a. of this section available for inspection, copying, or transcription by authorized representatives of the contracting agency, the State DOT, the FHWA, or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, the FHWA may, after written notice to the contractor, the contracting agency or the State DOT, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.
4. **Apprentices and trainees**
- a. Apprentices (programs of the USDOL). Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice.

The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractor's registered program shall be observed.

Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination.

In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

- b. Trainees (programs of the USDOL). Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration.

The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration.

Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed.

In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

- c. Equal employment opportunity. The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR part 30.
- d. Apprentices and Trainees (programs of the U.S. DOT). Apprentices and trainees working under apprenticeship and skill training programs which have been certified by the Secretary of Transportation as promoting EEO in connection with Federal-aid highway construction programs are not subject to the requirements of paragraph 4 of this Section IV. The straight time hourly wage rates for apprentices and trainees under such programs will be established by the particular programs. The ratio of apprentices and trainees to journeymen shall not be greater than permitted by the terms of the particular program.
- 5. **Compliance with Copeland Act requirements.** The contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this contract.
- 6. **Subcontracts.** The contractor or subcontractor shall insert Form FHWA-1273 in any subcontracts and also require the subcontractors to include Form FHWA-1273 in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR 5.5.
- 7. **Contract termination:** debarment. A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.
- 8. **Compliance with Davis-Bacon and Related Act requirements.** All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this contract.
- 9. **Disputes concerning labor standards.** Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.
- 10. **Certification of eligibility.**
 - a. By entering into this contract, the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).
 - b. No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).
 - c. The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

V. CONTRACT WORK HOURS AND SAFETY STANDARDS ACT

The following clauses apply to any Federal-aid construction contract in an amount in excess of \$100,000 and subject to the overtime provisions of the Contract Work Hours and Safety Standards Act. These clauses shall be inserted in addition to the clauses required by 29 CFR 5.5(a) or 29 CFR 4.6. As used in this paragraph, the terms laborers and mechanics include watchmen and guards.

- 1. **Overtime requirements.** No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.
- 2. **Violation; liability for unpaid wages; liquidated damages.** In the event of any violation of the clause set forth in paragraph (1.) of this section, the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (1.) of this section, in the sum of \$10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (1.) of this section.
- 3. **Withholding for unpaid wages and liquidated damages.** The FHWA or the contracting agency shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (2.) of this section.
- 4. **Subcontracts.** The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraph (1.) through (4.) of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (1.) through (4.) of this section.

VI. SUBLETTING OR ASSIGNING THE CONTRACT

This provision is applicable to all Federal-aid construction contracts on the National Highway System.

- 1. The contractor shall perform with its own organization contract work amounting to not less than 30 percent (or a greater percentage if specified elsewhere in the contract) of the total original contract price, excluding any specialty items designated by the contracting agency. Specialty items may be performed by subcontract and the amount of any such specialty items performed may be deducted from the total original contract price before computing the amount of work required to be performed by the contractor's own organization (23 CFR 635.116).
 - a. The term "perform work with its own organization" refers to workers employed or leased by the prime contractor, and equipment owned or rented by the prime contractor, with or without operators. Such term does not include employees or equipment of a subcontractor or lower tier subcontractor, agents of the prime contractor, or any other assignees. The term may include payments for the costs of hiring leased employees from an employee leasing firm meeting all relevant Federal and State regulatory requirements. Leased employees may only be included in this term if the prime contractor meets all of the following conditions:
 - (1) the prime contractor maintains control over the supervision of the day-to-day activities of the leased employees;
 - (2) the prime contractor remains responsible for the quality of the work of the leased employees;
 - (3) the prime contractor retains all power to accept or exclude individual employees from work on the project; and

- (4) the prime contractor remains ultimately responsible for the payment of predetermined minimum wages, the submission of payrolls, statements of compliance and all other Federal regulatory requirements.
- b. "Specialty Items" shall be construed to be limited to work that requires highly specialized knowledge, abilities, or equipment not ordinarily available in the type of contracting organizations qualified and expected to bid or propose on the contract as a whole and in general are to be limited to minor components of the overall contract.
2. The contract amount upon which the requirements set forth in paragraph (1) of Section VI is computed includes the cost of material and manufactured products which are to be purchased or produced by the contractor under the contract provisions.
 3. The contractor shall furnish (a) a competent superintendent or supervisor who is employed by the firm, has full authority to direct performance of the work in accordance with the contract requirements, and is in charge of all construction operations (regardless of who performs the work) and (b) such other of its own organizational resources (supervision, management, and engineering services) as the contracting officer determines is necessary to assure the performance of the contract.
 4. No portion of the contract shall be sublet, assigned or otherwise disposed of except with the written consent of the contracting officer, or authorized representative, and such consent when given shall not be construed to relieve the contractor of any responsibility for the fulfillment of the contract. Written consent will be given only after the contracting agency has assured that each subcontract is evidenced in writing and that it contains all pertinent provisions and requirements of the prime contract.
 5. The 30% self-performance requirement of paragraph (1) is not applicable to design-build contracts; however, contracting agencies may establish their own self-performance requirements.

VII. SAFETY: ACCIDENT PREVENTION

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

1. In the performance of this contract the contractor shall comply with all applicable Federal, State, and local laws governing safety, health, and sanitation (23 CFR 635). The contractor shall provide all safeguards, safety devices and protective equipment and take any other needed actions as it determines, or as the contracting officer may determine, to be reasonably necessary to protect the life and health of employees on the job and the safety of the public and to protect property in connection with the performance of the work covered by the contract.
2. It is a condition of this contract, and shall be made a condition of each subcontract, which the contractor enters into pursuant to this contract, that the contractor and any subcontractor shall not permit any employee, in performance of the contract, to work in surroundings or under conditions which are unsanitary, hazardous or dangerous to his/her health or safety, as determined under construction safety and health standards (29 CFR 1926) promulgated by the Secretary of Labor, in accordance with Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 3704).
3. Pursuant to 29 CFR 1926.3, it is a condition of this contract that the Secretary of Labor or authorized representative thereof, shall have right of entry to any site of contract performance to inspect or investigate the matter of compliance with the construction safety and health standards and to carry out the duties of the Secretary under Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C.3704).

VIII. FALSE STATEMENTS CONCERNING HIGHWAY PROJECTS

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

In order to assure high quality and durable construction in conformity with approved plans and specifications and a high degree of reliability on statements and representations made by engineers, contractors, suppliers, and workers on Federal-aid highway projects, it is essential that all persons concerned with the project perform their functions as carefully, thoroughly, and honestly as possible. Willful falsification, distortion, or misrepresentation with respect to any facts related to the project is a violation of Federal law. To prevent any misunderstanding regarding the seriousness of these and similar acts, Form FHWA-1022 shall be posted on each Federal-aid highway project (23 CFR 635) in one or more places where it is readily available to all persons concerned with the project:

18 U.S.C. 1020 reads as follows:

"Whoever, being an officer, agent, or employee of the United States, or of any State or Territory, or whoever, whether a person, association, firm, or corporation, knowingly makes any false statement, false representation, or false report as to the character, quality, quantity, or cost of the material used or to be used, or the quantity or quality of the work performed or to be performed, or the cost thereof in connection with the submission of plans, maps, specifications, contracts, or costs of construction on any highway or related project submitted for approval to the Secretary of Transportation; or

Whoever knowingly makes any false statement, false representation, false report or false claim with respect to the character, quality, quantity, or cost of any work performed or to be performed, or materials furnished or to be furnished, in connection with the construction of any highway or related project approved by the Secretary of Transportation; or

Whoever knowingly makes any false statement or false representation as to material fact in any statement, certificate, or report submitted pursuant to provisions of the Federal-aid Roads Act approved July 1, 1916, (39 Stat. 355), as amended and supplemented;

Shall be fined under this title or imprisoned not more than 5 years or both."

IX. IMPLEMENTATION OF CLEAN AIR ACT AND FEDERAL WATER POLLUTION CONTROL ACT

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

By submission of this bid/proposal or the execution of this contract, or subcontract, as appropriate, the bidder, proposer, Federal-aid construction contractor, or subcontractor, as appropriate, will be deemed to have stipulated as follows:

1. That any person who is or will be utilized in the performance of this contract is not prohibited from receiving an award due to a violation of Section 508 of the Clean Water Act or Section 306 of the Clean Air Act.
2. That the contractor agrees to include or cause to be included the requirements of paragraph (1) of this Section X in every subcontract, and further agrees to take such action as the contracting agency may direct as a means of enforcing such requirements.

X. CERTIFICATION REGARDING DEBARMENT, SUSPENSION, INELIGIBILITY AND VOLUNTARY EXCLUSION

This provision is applicable to all Federal-aid construction contracts, design-build contracts, subcontracts, lower-tier subcontracts, purchase orders, lease agreements, consultant contracts or any other covered transaction requiring FHWA approval or that is estimated to cost \$25,000 or more – as defined in 2 CFR Parts 180 and 1200.

1. Instructions for Certification – First Tier Participants:

- a. By signing and submitting this proposal, the prospective first tier participant is providing the certification set out below.
- b. The inability of a person to provide the certification set out below will not necessarily result in denial of participation in this covered transaction. The prospective first tier participant shall submit an explanation of why it cannot provide the certification set out below. The certification or explanation will be considered in connection with the department or agency's determination whether to enter into this transaction. However, failure of the prospective first tier participant to furnish a certification or an explanation shall disqualify such a person from participation in this transaction.
- c. The certification in this clause is a material representation of fact upon which reliance was placed when the contracting agency determined to enter into this transaction. If it is later determined that the prospective participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the contracting agency may terminate this transaction for cause of default.
- d. The prospective first tier participant shall provide immediate written notice to the contracting agency to whom this proposal is submitted if any time the prospective first tier participant learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.
- e. The terms "covered transaction," "debarred," "suspended," "ineligible," "participant," "person," "principal," and "voluntarily excluded," as used in this clause, are defined in 2 CFR Parts 180 and 1200. "First Tier Covered Transactions" refers to any covered transaction between a grantee or subgrantee of Federal funds and a participant (such as the prime or general contractor). "Lower Tier Covered Transactions" refers to any covered transaction under a First Tier Covered Transaction (such as subcontracts). "First Tier Participant" refers to the participant who has entered into a covered transaction with a grantee or subgrantee of Federal funds (such as the prime or general contractor). "Lower Tier Participant" refers any participant who has entered into a covered transaction with a First Tier Participant or other Lower Tier Participants (such as subcontractors and suppliers).
- f. The prospective first tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency entering into this transaction.
- g. The prospective first tier participant further agrees by submitting this proposal that it will include the clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transactions," provided by the department or contracting agency, entering into this covered transaction, without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions exceeding the \$25,000 threshold.
- h. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant is responsible for ensuring that its principals are not suspended, debarred, or otherwise ineligible to participate in covered transactions. To verify the eligibility of its principals, as well as the eligibility of any lower tier prospective participants, each participant may, but is not required to, check the Excluded Parties List System website (<https://www.epls.gov/>), which is compiled by the General Services Administration.
- i. Nothing contained in the foregoing shall be construed to require the establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of the prospective participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.
- j. Except for transactions authorized under paragraph (f) of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency may terminate this transaction for cause or default.

* * * * *

2. Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion – First Tier Participants:

- a. The prospective first tier participant certifies to the best of its knowledge and belief, that it and its principals:
 - (1) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency;
 - (2) Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;
 - (3) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (a)(2) of this certification; and
 - (4) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State or local) terminated for cause or default.
- b. Where the prospective participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

2. Instructions for Certification - Lower Tier Participants:

(Applicable to all subcontracts, purchase orders and other lower tier transactions requiring prior FHWA approval or estimated to cost \$25,000 or more - 2 CFR Parts 180 and 1200)

- a. By signing and submitting this proposal, the prospective lower tier is providing the certification set out below.
- b. The certification in this clause is a material representation of fact upon which reliance was placed when this transaction was entered into. If it is later determined that the prospective lower tier participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the department, or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.
- c. The prospective lower tier participant shall provide immediate written notice to the person to which this proposal is submitted if at any time the prospective lower tier participant learns that its certification was erroneous by reason of changed circumstances.
- d. The terms "covered transaction," "debarred," "suspended," "ineligible," "participant," "person," "principal," and "voluntarily excluded," as used in this clause, are defined in 2 CFR Parts 180 and 1200. You may contact the person to which this proposal is submitted for assistance in obtaining a copy of those regulations. "First Tier Covered Transactions" refers to any covered transaction between a grantee or subgrantee of

Federal funds and a participant (such as the prime or general contract). "Lower Tier Covered Transactions" refers to any covered transaction under a First Tier Covered Transaction (such as subcontracts). "First Tier Participant" refers to the participant who has entered into a covered transaction with a grantee or subgrantee of Federal funds (such as the prime or general contractor). "Lower Tier Participant" refers to any participant who has entered into a covered transaction with a First Tier Participant or other Lower Tier Participants (such as subcontractors and suppliers).

- e. The prospective lower tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency with which this transaction originated.
- f. The prospective lower tier participant further agrees by submitting this proposal that it will include this clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transaction," without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions exceeding the \$25,000 threshold.
- g. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant is responsible for ensuring that its principals are not suspended, debarred, or otherwise ineligible to participate in covered transactions. To verify the eligibility of its principals, as well as the eligibility of any lower tier prospective participants, each participant may, but is not required to, check the Excluded Parties List System website (<https://www.epls.gov/>), which is compiled by the General Services Administration.
- h. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.
- i. Except for transactions authorized under paragraph e of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

* * * * *

Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion--Lower Tier Participants:

1. The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency.
2. Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

* * * * *

XI. CERTIFICATION REGARDING USE OF CONTRACT FUNDS FOR LOBBYING

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts which exceed \$100,000 (49 CFR 20).

1. The prospective participant certifies, by signing and submitting this bid or proposal, to the best of his or her knowledge and belief, that:
 - a. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.
 - b. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.
2. This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by 31 U.S.C. 1352. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.
3. The prospective participant also agrees by submitting its bid or proposal that the participant shall require that the language of this certification be included in all lower tier subcontracts, which exceed \$100,000 and that all such recipients shall certify and disclose accordingly.

STANDARD SPECIAL PROVISION
MINIMUM WAGES
GENERAL DECISION NC160101 01/08/2016 NC101

Z-101

Date: January 8, 2016

General Decision Number: NC160101 01/08/2016 NC101

Superseded General Decision Numbers: NC20150101

State: North Carolina

Construction Type: HIGHWAY

COUNTIES

Alamance	Forsyth	Randolph
Anson	Gaston	Rockingham
Cabarrus	Guilford	Stokes
Chatham	Mecklenburg	Union
Davie	Orange	Yadkin
Durham	Person	

HIGHWAY CONSTRUCTION PROJECTS (excluding tunnels, building structures in rest area projects & railroad construction; bascule, suspension & spandrel arch bridges designed for commercial navigation, bridges involving marine construction; and other major bridges).

Note: Executive Order (EO) 13658 establishes an hourly minimum wage of \$10.15 for calendar year 2016 that applies to all contracts subject to the Davis-Bacon Act for which the solicitation is issued on or after January 1, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least \$10.15 (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract for calendar year 2016. The EO minimum wage rate will be adjusted annually. Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Modification Number

0

Publication Date

01/08/2016

SUNC2014-003 11/14/2014

	Rates	Fringes
BLASTER	18.64	
CARPENTER	13.68	.05
CEMENT MASON / CONCRETE FINISHER	13.93	
ELECTRICIAN		
Electrician	18.79	2.72
Telecommunications Technician	15.19	1.25
IRONWORKER	13.30	
LABORER		
Asphalt Raker and Spreader	12.78	
Asphalt Screed / Jackman	14.50	
Carpenter Tender	12.51	.27
Cement Mason / Concrete Finisher Tender	11.04	
Common or General	10.40	.01
Guardrail / Fence Installer	13.22	
Pipelayer	12.43	
Traffic Signal / Lighting Installer	15.65	.24
PAINTER		
Bridge	23.77	
POWER EQUIPMENT OPERATORS		
Asphalt Broom Tractor	10.15	
Bulldozer Fine	16.13	
Bulldozer Rough	14.36	
Concrete Grinder / Groover	17.92	
Crane Boom Trucks	18.19	
Crane Other	19.83	
Crane Rough / All-Terrain	19.10	
Drill Operator Rock	14.28	
Drill Operator Structure	20.89	
Excavator Fine	16.95	
Excavator Rough	13.63	
Grader / Blade Fine	19.84	
Grader / Blade Rough	15.47	
Loader 2 Cubic Yards or Less	13.31	
Loader Greater Than 2 Cubic Yards	16.19	
Material Transfer Vehicle (Shuttle Buggy)	15.44	
Mechanic	17.51	
Milling Machine	15.22	
Off-Road Hauler/Water Tanker	11.83	
Oiler / Greaser	14.16	
Pavement Marking Equipment	12.05	
Paver Asphalt	15.97	
Paver Concrete	18.20	
Roller Asphalt Breakdown	12.79	
Roller Asphalt Finish	13.76	
Roller Other	12.08	
Scraper Finish	12.65	
Scraper Rough	11.50	
Slip Form Machine	19.60	
Tack Truck / Distributor Operator	14.82	

	Rates	Fringes
TRUCK DRIVER		
GVWR of 26,000 Lbs or Less	11.45	
GVWR of 26,000 Lbs or Greater	13.57	.03

Welders – Receive rate prescribed for craft performing operation to which welding is incidental.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29 CFR 5.5(a)(1)(ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of "identifiers" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than "SU" or "UAVG" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the "SU" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union

data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

- * an existing published wage determination
- * a survey underlying a wage determination
- * a Wage and Hour Division letter setting forth a position on a wage determination matter
- * a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U. S. Department of Labor
200 Constitution Avenue, N.W.
Washington, D.C. 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, D.C. 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, D.C. 20210

- 4.) All decisions by the Administrative Review Board are final.

END OF GENERAL DECISION

***** STANDARD SPECIAL PROVISIONS *****

(7-9-12)

DIVISION ONE OF STANDARD SPECIFICATIONS

Division One of the 2012 NCDOT Standard Specifications for Roads and Structures (Standard Specifications) shall apply except as follows:

Definitions: Throughout Division One of the 2012 *Standard Specifications*, the term “Contractor” is replaced with “Design-Build Team”, the term “Bidder” is replaced with “Proposer,” the term “Bid” is replaced by “Price Proposal,” and the phrase “lowest Responsible Bidder” is replaced with “responsible Proposer with the lowest adjusted price.” The replacement of “Contractor” with “Design-Build Team” does not apply to Article 102-2. The replacement of the above terms also does not apply when the terms are part of a phrase (e.g. bid bond, prime contractor, total amount bid, etc.)

Deletions: Articles 102-4, 102-8(B), 102-9(C)(2), 103-2(B), and 103-4(B) of the 2012 *Standard Specifications for Roads and Structures* are deleted from Design-Build Contracts.

Modifications: The remainder of this Standard Special Provision includes modifications to Division One of the 2012 *Standard Specifications for Roads and Structures*.

**SECTION 101
DEFINITION OF TERMS**

Page 1-3, Article 101-3, replace and add certain definitions as follows:

ADDITIONAL WORK

Additional work is that which results from a change or alteration to the contract and for which there are contract unit prices in the original contract or an executed supplemental agreement.

ADVERTISEMENT

The public advertisement inviting Statements of Qualifications for the design and construction of specific projects.

AWARD

The decision of the Department of Transportation to accept the proposal of the selected Design-Build Team for work which is subject to the furnishing of payment and performance bonds, and such other conditions as may be otherwise provided by law, the Request for Proposals, and the 2012 *Standard Specifications for Roads and Structures*.

CONTRACT

The executed agreement between the Department and the successful proposer, covering the performance of, and compensation for, the work. The term contract is all inclusive with reference to all written agreements affecting a contractual relationship and all documents referred to therein. The contract shall include, but not be limited to, the Request for Proposals, the

Technical Proposal, the Price Proposal, the printed contract form and attachments, contract bonds, plans and associated special provisions prepared by the Design-Build Team, standard specifications and supplemental specifications standard special provisions and project special provisions contained in the Request for Proposals or as developed by the Design-Build Team and accepted by the Department, and all executed supplemental agreements. The contract shall constitute one instrument.

DATE OF AVAILABILITY

That date set forth in the Request for Proposals, by which it is anticipated that the Contract will be executed and sufficient design efforts or work sites within the project limits will be available for the Design-Build Team to begin his controlling operations or design.

DESIGN-BUILD

A form of contracting in which the successful proposer undertakes responsibility for both the design and construction of a project.

DESIGN-BUILD TEAM

An individual, partnership, joint venture, corporation or other legal entity that furnishes the necessary design and construction services, whether by itself or through subcontracts.

DESIGN-BUILD PROPOSAL

A proposal to contract consisting of a separately sealed Technical Proposal and a separately sealed Price Proposal submitted in response to a Request for Proposals on a Design-Build project.

PLANS

The project plans, Standard Drawings, working drawings and supplemental drawings, or reproductions thereof, accepted by the Engineer, which show the location, character, dimensions and details of the work to be performed. Unless otherwise noted within the Request for Proposals, the term “plans” refers to plans as developed by the Design-Build Team and accepted by the Department.

(A) Standard Drawings:

Drawings approved for repetitive use, showing details to be used where appropriate. All Standard Drawings approved by the Department plus subsequent revisions and additions. Standard Drawings are available for purchase from:

Randy A. Garris, PE
State Contract Officer
1591 Mail Service Center
Raleigh, NC 27699-1591

(B) Preliminary Plans:

Department-furnished drawings distributed in concert with a Request for Proposals, or as developed by the Design-Build Team.

(C) Project Plans:

Construction drawings prepared, sealed and completed by the Design-Build Team, or as provided by the Department, that contain specific details and dimensions peculiar to the work.

(D) Working Drawings and Supplemental Drawings:

Supplemental design sheets, shop drawings, or similar data which the Design-Build Team is required to submit to the Engineer.

(E) As-Constructed Drawings:

Red-lined mark-up of the latest Released for Construction (RFC) Plans containing the information listed under As-Constructed Plans in the Records and Reports Section of the NCDOT Construction Manual.

(F) As-Built Plans:

Coordinately correct plans documenting the details, dimensions and locations of the completed work.

PRICE PROPOSAL

The offer of a Proposer, submitted on the prescribed forms, to perform the work and furnish the labor and materials at the price quoted.

PROPOSAL (OR REQUEST FOR PROPOSALS)

The paper document provided by the Department that the proposer uses to develop his paper offer to perform the work at designated bid prices.

PROPOSER

An individual, partnership, firm, corporation, LLC, or joint venture formally submitting a Technical Proposal and Price Proposal in response to a Request for Proposals.

RIGHT OF WAY

The land area shown on the plans as right of way within which the project is to be constructed.

SCHEDULE OF VALUES

A schedule of work items necessary to complete work, along with the progress of each work item, primarily for the purpose of partial payments.

TABLE OF QUANTITIES

A listing of work items (corresponding to the items in the Trns*port pay item list) that contributes to a project completion. The table shall include estimated quantities for each work item.

TECHNICAL PROPOSAL

A submittal from a proposer, in accordance with requirements of the Request for Proposals, for the purpose of final selection. The Technical Proposal is defined to also include any supplemental information requested by the Department from a proposer prior to opening bids.

**SECTION 102
PROPOSAL REQUIREMENTS AND CONDITIONS**

Page 1-9, delete Article 102-1 and replace with the following:

102-1 INVITATION TO BID

After the advertisement has been made, an Invitation to Bid will be made available to known prequalified contractors and any other contracting firms, material suppliers and other interested parties who have requested they be placed on the Invitation to Bid mailing list, informing them that Statements of Qualifications and Proposals will be received for the construction of specific projects. Such invitation will indicate the contract identification number, length, locations and descriptions; a general summary of the scope of work to be performed; and information on how to receive a Request for Qualifications.

All projects will be advertised in daily newspapers throughout the state before the bid opening.

Page 1-12, delete Article 102-3 and replace with the following:

102-3 CONTENTS OF REQUEST FOR PROPOSALS

A Request for Proposals will be furnished by the Department to the selected proposers from among the respondents to the Request for Qualifications. Each Request for Proposals will be marked on the front cover by the Department with an identifier of the Proposer to whom it is being furnished. This Request for Proposals will state the location of the project and will show a schedule of contract items for which Technical and Price Proposals are invited. It will set forth the date and time Technical and Price Proposals are to be submitted and when the Price Proposals will be opened. The Request for Proposals will also include special provisions or requirements that vary from or are not contained in any preliminary design information or standard specifications.

The Request for Proposals will also include the printed contract forms and signature sheets for execution by both parties to the contract. In the event the Proposer is awarded the contract, execution of the Request for Proposals by the Proposer is considered the same as execution of the contract.

Standard specifications, sealed plans specifically identified as the Department's responsibility and other documents designated in the Request for Proposals shall be considered a part of the Request for Proposals whether or not they are attached thereto. All papers bound with the proposal are necessary parts thereof and shall not be detached, taken apart, or altered.

The names and identity of each prospective Proposer that receives a copy of the Request for Qualifications for the purposes of submitting a Statement of Qualifications shall be made public,

except that a potential Proposer who obtains a Request for Qualifications may, at the time of ordering, request that his name remain confidential.

One copy of the Final Request for Proposals will be furnished to each prospective Proposer. Additional copies may be purchased for the sum of \$25 each. The copy of the Final Request for Proposals marked with the Proposer's name and prequalification number shall be returned to the Department as the Proposer's Price Proposal.

Page 1-14, Article 102-7, 4th paragraph, delete the first two sentences and replace with the following:

The Proposer is cautioned that details shown in the subsurface investigation report are preliminary only. The subsurface investigation and subsurface report, if provided, is done so for information purposes only.

Pages 1-14, delete Article 102-8 and replace with the following:

102-8 PREPARATION AND SUBMISSION OF BIDS

All Price Proposals shall be prepared and submitted in accordance with the following requirements:

1. The Request for Proposals provided by the Department shall be used and shall not be taken apart or altered. The Price Proposal shall be submitted on the same form, which has been furnished to the Proposer by the Department as identified by the Proposer's name marked on the front cover by the Department.
2. All entries including signatures shall be written in ink.
3. The Proposer shall submit a lump sum or unit price for every item in the Price Proposal. The lump sum or unit prices bid for the various contract items shall be written in figures.
4. An amount bid shall be entered in the Request for Proposals for every item and the price shall be written in figures in the "Amount Bid" column in the Request for Proposals.
5. An amount bid shall be entered in the proposal for every item on which a unit price has been submitted. The amount bid for each item other than lump sum items shall be determined by multiplying each unit bid price by the quantity for that item and shall be written in figures in the Amount Bid column in the proposal.
6. The total amount bid shall be written in figures in the proper place in the Request for Proposals. The total amount bid shall be determined by adding the amounts bid for each lump sum item.
7. Changes in any entry shall be made by marking through the entry in ink and making the correct entry adjacent thereto in ink. A representative of the Proposer shall initial the change in ink.
8. The Price Proposal shall be properly executed. To constitute proper execution, the Price Proposal shall be executed in strict compliance with the following:
 - a. If a Price Proposal is by an individual, it shall show the name of the individual and shall be signed by the individual with the word "Individually" appearing under the

- signature. If the individual operates under a firm name, the bid shall be signed in the name of the individual doing business under the firm name.
- b. If the Price Proposal is by a corporation, it shall be executed in the name of the corporation by the President, Vice President, or Assistant Vice President. It shall be attested by the Secretary or Assistant Secretary. The seal of the corporation shall be affixed. If the Price Proposal is executed on behalf of a corporation in any other manner than as above, a certified copy of the minutes of the Board of Directors of said corporation authorizing the manner and style of execution and the authority of the person executing shall be attached to the Price Proposal or shall be on file with the Department.
 - c. If the Price Proposal is made by a partnership, it shall be executed in the name of the partnership by one of the general partners.
 - d. If the Price Proposal is made by a limited liability company, it shall be signed by the manager, member, or authorized agent and notarized.
 - e. If the Price Proposal is made by a joint venture, it shall be executed by each of the joint venturers in the appropriate manner set out above. In addition, the execution by the joint venturers shall appear below their names.
 - f. The Price Proposal execution shall be notarized by a notary public whose commission is in effect on the date of execution. Such notarization shall be applicable both to the Price Proposal and to the Non-Collusion Affidavit, Debarment Certification and Gift Ban Certification that is part of the signature sheets.
9. The Price Proposal shall not contain any unauthorized additions, deletions, or conditional bids.
 10. The Proposer shall not add any provision reserving the right to accept or reject an award or to enter into a contract pursuant to an award.
 11. The Price Proposal shall be accompanied by a bid bond on the form furnished by the Department or by a bid deposit. The bid bond shall be completely and properly executed in accordance with the requirements of Article 102-10 and as modified herein. The bid deposit shall be a certified check or cashier check in accordance with Article 102-10 and as modified herein.
 12. The Price Proposal shall be placed in a sealed envelope and shall have been delivered to and received by the Department prior to the time specified in the Request for Proposals.

Page 1-18, Article 102-10, 3rd paragraph, delete the fifth sentence and replace with the following:

The condition of the bid bond or bid deposit is: the Principal shall not withdraw its bid within 75 days after the submittal of the same, and if the Department shall award a contract to the Principal, the Principal shall within 14 calendar days after the notice of award is received by him, give payment and performance bonds with good and sufficient surety as required for the faithful performance of the contract and for the protection of all persons supplying labor and materials in the prosecution of the work.

Page 1-18, Article 102-10, delete the end of the Article beginning with, and inclusive of, the 6th paragraph.

Pages 1-19, delete Article 102-12 and replace with the following:

102-12 WITHDRAWAL OR REVISION OF BIDS

A Design-Build Team will not be permitted to withdraw its Technical and Price Proposals after they have been submitted to the Department, unless allowed under Article 103-3 or unless otherwise approved by the Chief Engineer.

Page 1-19, delete Article 102-13 and replace with the following:

102-13 RECEIPT AND OPENING OF BIDS

Price Proposals from shortlisted Proposers will be opened and read publicly on the date and time indicated in the Request for Proposals. The scores of the previously conducted evaluation of the Technical Proposals will also be read publicly in accordance with the procedures outlined in the Request for Proposals. Proposers, their authorized agents, and other interested parties are invited to be present.

Page 1-19, Article 102-14, replace the 1st paragraph with the following:

102-14 REJECTION OF BIDS

Any Price Proposal submitted which fails to comply with any of the requirements of Articles 102-8, 102-9 or 102-10, or with the requirements of the project scope and specifications shall be considered irregular and may be rejected. A Price Proposal that does not contain costs for all proposal items shall be considered irregular and may be rejected.

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.

SECTION 103 AWARD AND EXECUTION OF CONTRACT

Page 1-21, delete Article 103-1 and replace with the following:

103-1 CONSIDERATION OF PRICE PROPOSALS

After the Price Proposals are opened and read, they will be tabulated. The Price Proposal and score of the Technical Proposal will be made available in accordance with procedures outlined in the Request for Proposals. In the event of errors, omissions, or discrepancies in the bid prices, corrections to the Price Proposal will be made in accordance with the provisions of Article 103-2. Such corrected bid prices will be used to determine the lowest adjusted price.

After the reading of the Price Proposals and technical scores, the Department will calculate the lowest adjusted price as described in the Request for Proposals.

The right is reserved to reject any or all Price Proposals, to waive technicalities, to request the Proposer with the lowest adjusted price to submit an up-to-date financial and operating statement, to advertise for new proposals, or to proceed to do the work otherwise, if in the judgment of the Department, the best interests of the State will be promoted thereby.

Page 1-21, Subarticle 103-2(A), add items (6) and (7) as follows:

(6) Discrepancy in the “Total Amount Bid” and the addition of the “Amount Bid” for each line Item

In the case of the Total Amount Bid does not equal the summation of each Amount Bid for the line items, the summation of each Amount Bid for the line items shall be deemed to be the correct Total Amount Bid for the entire project.

(7) Omitted Total Amount Bid –Amount Bid Completed

If the Total Amount Bid is not completed and the Amount Bid for all line items is completed the Total Amount Bid shall be the summation of the Amount Bid for all line items.

Page 1-24, Subarticle 103-4(A), first paragraph, replace the 4th and 5th sentences with the following:

Where award is to be made, the notice of award will be issued within 75 days after the submittal of Price Proposals, except with the consent of the responsible Proposer with the lowest adjusted price the decision to award the contract to such bidder may be delayed for as long a time as may be agreed upon by the Department and such Proposer. In the absence of such agreement, the Proposer may withdraw his Price Proposal at the expiration of the 75 days without penalty if no notice of award has been issued.

Page 1-25, Article 103-6, delete the 1st and 2nd paragraphs and replace with the following:

Checks that have been furnished as a bid deposit will be retained until after the contract bonds have been furnished by the successful proposer, at which time the checks that were furnished as a bid deposit will be returned.

SECTION 104 SCOPE OF WORK

Page 1-26, delete Article 104-1 and replace with the following:

104-1 INTENT OF CONTRACT

The intent of the contract is to prescribe the work or improvements that the Design-Build Team undertakes to perform, in full compliance with the contract documents. In case the method of construction or character of any part of the work is not covered by the contract, this section shall apply. The Design-Build Team shall perform all work in accordance with the contract or as may be modified by written orders, and shall do such special, additional, extra, and incidental work as may be considered necessary to complete the work to the full intent of the contract. Unless otherwise provided elsewhere in the contract, the Design-Build Team shall furnish all

implements, machinery, equipment, tools, materials, supplies, transportation, and labor necessary for the design, prosecution and completion of the work.

Page 1-26, Article 104-3, replace “plans or details of construction” with “contract” in all instances within this Article.

Page 1-35, Article 104-10, replace the first paragraph with the following:

104-10 MAINTENANCE OF THE PROJECT

The Design-Build Team shall maintain the project from the date of beginning construction on the project until the project is finally accepted. For sections of facilities impacted by utility construction / relocation performed by the Design-Build Team prior to beginning construction on the roadway project, maintenance of the impacted sections of facilities shall be performed by the Design-Build Team beginning concurrently with the impact. All existing and constructed guardrail / guiderail within the project limits shall be included in this maintenance. This maintenance shall be continuous and effective and shall be prosecuted with adequate equipment and forces to the end that all work covered by the contract is kept in satisfactory and acceptable conditions at all times. The Design-Build Team shall perform weekly inspections of guardrail and guiderail and shall report damages to the Engineer on the same day of the weekly inspection. Where damaged guardrail or guiderail is repaired or replaced as a result of maintaining the project in accordance with this Article, such repair or replacement shall be performed within 7 consecutive calendar days of such inspection report.

Page 1-35, Article 104-10, add the following after the last paragraph:

The Design-Build Team will not be compensated for performance of weekly inspections and damage reports for the guardrail / guiderail. Other maintenance activities for existing guardrail / guiderail will be handled in accordance with Articles 104-7 and 104-8.

SECTION 105 CONTROL OF WORK

Pages 1-40, delete Article 105-2 and replace with the following:

105-2 PLANS AND WORKING DRAWINGS

All plans shall be supplemented by such approved working drawings as are necessary to adequately control the work. Working drawings furnished by the Design-Build Team and approved by the Engineer shall consist of such detailed drawings as may be required to adequately control the work. They may include stress sheets, shop drawings, erection drawings, falsework drawings, cofferdam drawings, bending diagrams for reinforcing steel, catalog cuts, or any other supplementary drawings or similar data required of the Design-Build Team. When working drawings are approved by the Engineer, such approval shall not operate to relieve the Design-Build Team of any of his responsibility under the contract for the successful completion of the work.

Changes on shop drawings after approval and/or distribution shall be subject to the approval of the Engineer and he shall be furnished a record of such changes.

Page 1-41, Article 105-3, add the following after the 3rd paragraph:

The Design-Build Team shall bear all the costs of providing the burden of proof that the nonconforming work is reasonable and adequately addresses the design purpose. The Design-Build Team shall bear all risk for continuing with nonconforming work in question until it is accepted.

The Engineer may impose conditions for acceptance of the nonconforming work. The Design-Build Team shall bear all costs for fulfilling the conditions.

The decisions whether the product satisfies the design purpose, whether the nonconforming work is reasonably acceptable and the conditions for acceptance are at the sole discretion of the Engineer.

Pages 1-41, delete Article 105-4 and replace with the following:

105-4 COORDINATION OF PLANS, SPECIFICATIONS, SUPPLEMENTAL SPECIFICATIONS, AND SPECIAL PROVISIONS

The Request for Proposals, all construction Plans, the Standard Specifications, Supplemental Specifications and Special Provisions and all supplementary documents are essential parts of the contract and a requirement occurring in one is as binding as though occurring in all. They are complementary and describe and provide the complete contract.

In case of discrepancy or conflict, the order in which they govern shall be as follows:

- (A) Request for Proposals, in which Project Special Provisions govern Standard Special Provisions
- (B) Technical Proposal from the Design-Build Team
- (C) Accepted Plans and Details from the Design-Build Team, or sealed plans provided by the Department, as applicable
- (D) Standard Drawings
- (E) Standard Specifications

Where dimensions on the plans are given or can be computed from other given dimensions they shall govern over scaled dimensions.

The Design-Build Team shall take no advantage of any error or omission in the plans, estimated quantities, or specifications. In the event the Design-Build Team discovers an error or omission, he shall immediately notify the Engineer.

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.

Page 1-44, delete Article 105-9 and replace with the following:

105-9 CONSTRUCTION STAKES, LINES, AND GRADES

The Design-Build Team shall be responsible for all surveying, construction staking and layout required in the performance of the work. He will be responsible for the accuracy of lines, slopes, grades and other engineering work which he provides under this contract.

**SECTION 106
CONTROL OF MATERIAL**

Page 1-49, Article 106-2, add the following after the second paragraph:

Prior to beginning construction, the Design-Build Team shall provide a Table of Quantities as described in Article 101-3 of these specifications.

The Table of Quantities Work Items shall correspond to Pay Items as defined in the Standard Specifications. These Work Items have associated Materials and Conversion Factors. For non-standard Work Items, a Generic Work Item with the correct Unit of Measure and in an appropriate category will be used. For example, "GENERIC TRAFFIC CONTROL ITEM – EA" or "GENERIC RETAINING WALL ITEM – LF". For these Generic Work Items, Materials must be defined and appropriate conversion factors submitted.

An initial Table of Quantities shall be submitted no later than 30 calendar days after the date of award. The Table of Quantities shall be updated and resubmitted within 14 days of when a set of Plans is sealed as Release for Construction (RFC) Plans, and whenever there are substantial changes to the Quantities on previously incorporated RFC Plans.

Page 1-51, Article 106-6, add the following after the last paragraph:

For items normally pretested by the Department, the Design-Build Team shall provide a minimum of 30 days notice prior to the beginning of production of the items for this project along with final approved shop drawings.

**SECTION 107
LEGAL RELATIONS AND RESPONSIBILITY
TO PUBLIC**

Page 1-61, delete Article 107-18 and replace with the following:

107-18 FURNISHING RIGHT OF WAY

The responsibility for coordinating the securing of all necessary rights of way is as outlined in the Request for Proposals.

SECTION 108 PROSECUTION AND PROGRESS

Page 1-64. Article 108-2, replace the 2nd paragraph with the following:

The Design-Build Team shall submit a Progress Schedule for review within thirty (30) calendar days of receiving Notice of Award. The Department will review the Progress Schedule within twenty-one (21) calendar days of receipt. The Design-Build Team shall make any necessary corrections and adjustments to the Progress Schedule as necessitated by the Department's review within seven (7) calendar days. The Department will review the revised Progress Schedule within seven (7) calendar days of receipt.

Page 1-64, Subarticle 108-2(A)(1), add the following:

- (k) Utility relocation and construction

Page 1-65, Subarticle 108-2(A)(2), add the following:

- (h) Critical design submittal dates
- (i) Critical permitting dates
- (j) Completion of right of way acquisition
- (k) Completion of utility relocation and construction

Page 1-65, Article 108-2, add the following:

- (D)** The Design-Build Team shall provide a written narrative each month detailing the work and percentage of work completed, anticipated sequence of upcoming work (2 month forecast), controlling operation(s), intermediate completion dates, and milestones. If any milestones are exceeded or will not be achieved, the Design-Build Team shall provide in the written narrative details of the delay; controlling operation affected, impacts to other operations, revisions to future intermediate completion dates and milestones, and remedial action necessary to get the project back to the original completion date.

Page 1-65, delete Article 108-3 and replace with the following:

108-3 PRECONSTRUCTION AND PRE-DESIGN CONFERENCES

The selected Design-Build Team shall meet with the Engineer for a pre-design conference concerning the design phase of the work. This conference shall be held prior to the commencement of work, as it is determined according to Article 108-1, and will be scheduled by the Engineer. At the predesign conference, the Design-Build Team shall furnish authorized signature forms and a list of any proposed subcontractors associated with the design of the project.

A preconstruction conference shall be held at least 10 working days before construction activity begins. This second conference, concerning the construction phase, shall also be scheduled by the Engineer. The Design-Build Team shall give the Engineer a minimum of 45 days notice

before he plans to begin construction activities. This will allow the Engineer time for any environmental agency representatives involved in the permitting process, as well as any other pertinent entities, to be scheduled to attend the preconstruction conference. If the Design-Build Team is responsible for utilities in accordance with Article 105-8 and the Request for Proposals, he shall be responsible for coordinating with the Engineer in scheduling their attendance and for notifying them. The Design-Build Team shall also be responsible for coordinating with the Engineer in scheduling the attendance of subcontractors and others deemed appropriate, and for notifying them.

At the preconstruction conference, a list of any proposed subcontractors and major material suppliers associated with the construction of the project will be submitted.

If the contract has a DBE requirement, the Design-Build Team shall submit copies of completed and signed DBE subcontracts, purchase orders, or invoices to the Department.

The Design-Build Team shall submit a traffic control plan in accordance with Article 1101-5 and the Request for Proposals. The Design-Build Team shall designate an employee who is competent and experienced in traffic control to implement and monitor the traffic control plan. The qualifications of the designated employee must be satisfactory to the Engineer.

The Design-Build Team shall submit a safety plan and designate an employee as Safety Supervisor.

Both plans shall be submitted at the preconstruction conference and must be satisfactory to the Engineer. Should the design plan include activities that would place personnel on the work site, traffic control and safety plans for those activities shall be submitted at the predesign conference.

During the preconstruction conference, the Engineer will designate a Department employee or employees who will be responsible to see that the traffic control plans and any alterations thereto are implemented and monitored to the end that traffic is carried through the work in an effective manner. If approved by the Engineer, the Design-Build Team may designate one employee to be responsible for both the traffic control and safety plans. The Design-Build Team shall not designate its superintendent as the responsible person for either the traffic control plan or the safety plan, unless approved by the Engineer.

If the project requires that Design-Build Team or State personnel work from falsework, within shoring, or in any other hazardous area the Design-Build Team shall submit, as part of the Design-Build Team's safety plan, specific measures it will use to ensure worker safety.

The Design-Build Team shall also submit a program for erosion control and pollution prevention on all projects involving clearing and grubbing, earthwork, structural work, or other construction, when such work is likely to create erosion or pollution problems.

If the Design-Build Team fails to provide the required submissions, the Engineer may order the preconstruction conference suspended until such time as they are furnished. Work shall not begin until the preconstruction conference has been concluded and the safety plan has been approved, unless authorized by the Engineer. The Design-Build Team shall not be entitled to additional compensation or an extension of contract time resulting from any delays due to such a suspension.

The Design-Build Team shall designate a qualified employee as Quality Control Manager. The Quality Control Manager shall be responsible for implementing and monitoring the quality control requirements of the project.

Page 1-65, Article 108-4, add the following sentence to the end of this article:

The Design-Build Team shall record the proceedings of these conferences and distribute the final minutes of the conferences to all attendees.

Page 1-65, Article 108-5, delete the first sentence of the second paragraph and delete the first word of the second sentence of the second paragraph.

Page 1-66, Article 108-6, replace “40%” with “30%” in the 1st paragraph.

Page 1-66, Article 108-6, replace “35%” with “25%” in the 2nd paragraph.

Pages 1-68, delete Article 108-8 and replace with the following:

108-8 FAILURE TO MAINTAIN SATISFACTORY PROGRESS

The Engineer will check the Design-Build Team’s progress at the time each partial pay request is received. The Design-Build Team’s progress may be considered as unsatisfactory if, according to the Progress schedule, the projected finish date for all work exceeds the scheduled finish date by more than 10%.

When the Design-Build Team's progress is found to be unsatisfactory as described above, the Engineer may make written demand of the Design-Build Team to state in writing the reason for the unsatisfactory progress and produce such supporting data as the Engineer may require or the Design-Build Team may desire to submit. The Engineer will consider the justifications submitted by the Design-Build Team and extensions of the completion date that have or may be allowed in accordance with Article 108-10(B) and as modified herein.

When the Design-Build Team cannot satisfactorily justify the unsatisfactory progress the Engineer may invoke one or more of the following sanctions:

1. Withhold anticipated liquidated damages from amounts currently due or which become due.
2. Remove the Design-Build Team and individual managing firms of the Design-Build Team and / or prequalified design firms from the Department’s Prequalified Bidders List.

When any of the above sanctions have been invoked, they shall remain in effect until rescinded by the Engineer.

Page 1-71, Article 108-10(B), add the following as the first paragraph:

Only delays to activities which affect the completion date or intermediate contract date will be considered for an extension of contract time. No extensions will be granted until a delay occurs which impacts the project’s critical path and extends the work beyond the contract completion date or intermediate completion date. Any extension to the completion date or intermediate

contract date will be based on the number of calendar days the completion date or intermediate completion date is impacted as determined by the Engineer's analysis.

Pages 1-71, delete Subarticle 108-10(B)(1) in its entirety.

Page 1-75, Article 108-13, delete bullet (E)(2) in its entirety.

SECTION 109 MEASUREMENT AND PAYMENT

Page 1-76, Article 109-2, delete the last sentence of the 1st paragraph and replace with the following:

Payment to the Design-Build Team will be made only for the work completed, certified and accepted in accordance with the terms of the contract.

Pages 1-81, delete Article 109-4(A) and replace with the following:

109-4 PARTIAL PAYMENTS

(A) General:

Partial payments will be based upon progress estimates prepared by the Engineer at least once each month on the date established by the Engineer. Partial payments may be made twice each month if in the judgment of the Engineer the amount of work performed is sufficient to warrant such payment. No partial payment will be made when the total value of work performed since the last partial payment amounts to less than \$10,000.00. Partial payments will be approximate only and will be subject to correction in the final estimate and payment.

When the contract includes one lump sum price for the entire work required by the contract, partial payments for the lump sum design-build price shall be based on a certified Schedule of Values submitted by the successful Design-Build Team and approved by the Engineer. The certification shall indicate the Design-Build Team has reviewed the information submitted and the information accurately represents the work performed for which payment is requested. The certified Schedule of Values shall be submitted no later than 30 calendar days after the date of award. Each item on the certified Schedule of Values shall be assigned a cost and quantity and shall be identified as an activity on the progress schedule. A revised certified Schedule of Values shall be submitted with each update of the Progress schedule as described in Article 108-2, and as modified herein, or when requested by the Engineer. A certified copy of the Table of Quantities shall also be submitted with each payment request. The certification of the Table of Quantities shall indicate the Design-Build Team has reviewed the information submitted and the information accurately represents the materials for the work performed for which payment is requested.

When the contract includes lump sum items for portions of the work required by the contract, and the applicable section of the Specifications or Request for Proposals specify the means by which the total amount bid be included in the partial pay estimates, the

Engineer will determine amounts due on the partial pay estimate in accordance with the applicable portion of the Specifications or Request for Proposals.

The Engineer will withhold an amount sufficient to cover anticipated liquidated damages as determined by the Engineer.

Page 1-82, Subarticle 109-5(D), delete the 4th and 5th paragraphs and replace with the following:

Partial payments will not be made on seed or any living or perishable plant materials.

Partial payment requests shall not be submitted by the Design-Build Team until those items requested have corresponding signed and sealed RFC plans accepted by the Department.

Pages 1-84, Article 109-10, add the following as bullets (E) and (F) under the 1st paragraph.

- (E) As-Constructed Drawings, As-Built Plans and other documents required elsewhere in this RFP.
- (F) Documents or guarantees to support any warranty provided by the Design Build Team.

County : Forsyth

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
ROADWAY ITEMS						

0001	0000900000-N	SP	GENERIC MISCELLANEOUS ITEM DESIGN & CONSTRUCTION	Lump Sum	L.S.	
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1253/Apr04/Q1.0/D900000/E1	Total Amount Of Bid For Entire Project :					
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FUEL USAGE FACTOR CHART AND ESTIMATE OF QUANTITIES

Description of Work	Units	Fuel Usage Factor Diesel #2	Estimate of Quantities
Unclassified Excavation	Gal / CY	0.29	_____ CY
Borrow Excavation	Gal / CY	0.29	_____ CY
Class IV Subgrade Stabilization	Gal / Ton	0.55	_____ Tons
Aggregate Base Course			
Sub-Ballast			
Aggregate for Cement Treated Base Course			
Portland Cement for Cement Treated Base Course	Gal / Ton	0.55	_____ Tons
Asphalt Concrete Base Course	Gal / Ton	2.90	_____ Tons
Asphalt Concrete Intermediate Course			
Asphalt Concrete Surface Course			
Open-Graded Asphalt Friction Course			
Permeable Asphalt Drainage Course			
Sand Asphalt Surface Course, Type SA-1			
Portland Cement Concrete Pavement:	Gal / SY		
Thru Lanes and Shoulders (> 11")			
Thru Lanes and Shoulders (9" to 11")			
Thru Lanes and Shoulders (< 9")			
* Structural Concrete (Cast-in-Place Only)	Gal / CY	0.98	_____ CY

* Structural Concrete shall be defined as cast-in-place Class A or Class AA concrete used in the construction of major structures for various work items identified in Division 4 of the 2012 Standard Specifications for Roads and Structures.

☐ The above quantities represent a reasonable estimate of the total quantities anticipated, for each item, as pertaining to fuel price adjustments, and is representative of the design proposed in the Technical Proposal submitted under separate cover.

Or

☐ The Design-Build Team elects not to pursue reimbursement for Fuel Price Adjustments on this project.

The information submitted on this sheet is claimed as a "Trade Secret" in accordance with the requirements of G.S. 66-152(3) until such time as the Price Proposal is opened.

Signature, Title

Dated

Print Name, Title

(Submit a copy of this sheet in a separate sealed package with the outer wrapping clearly marked "Fuel Price Adjustment" and deliver with the Technical and Price Proposal.)

LISTING OF DBE SUBCONTRACTORS					Sheet _____ of _____
Firm Name and Address	Item No.	Item Description	* Agreed upon Unit Price	** Dollar Volume of Item	
Name Address					
Name Address					
Name Address					
Name Address					
Name Address					
Name Address					
Name Address					

**This form must be completed in order for the Bid to be considered responsive and be publicly read.
Bidders with no DBE participation must so indicate this on the form by entering the word or number *zero*.**

LISTING OF DBE SUBCONTRACTORS					
Firm Name and Address		Item No.	Item Description	* Agreed upon Unit Price	** Dollar Volume of Item
Name Address					
Name Address					
Name Address					
Name Address					
Name Address					
Name Address					
Name Address					

**This form must be completed in order for the Bid to be considered responsive and be publicly read.
Bidders with no DBE participation must so indicate this on the form by entering the word or number *zero*.**

LISTING OF DBE SUBCONTRACTORS					Sheet _____ of _____
Firm Name and Address	Item No.	Item Description	* Agreed upon Unit Price	** Dollar Volume of Item	
Name Address					
Name Address					
Name Address					
Name Address					
Name Address					
Name Address					
Name Address					

This form must be completed in order for the Bid to be considered responsive and be publicly read.

Bidders with no DBE participation must so indicate this on the form by entering the word or number *zero*.

LISTING OF DBE SUBCONTRACTORS					
Firm Name and Address		Item No.	Item Description	* Agreed upon Unit Price	** Dollar Volume of Item
Name Address					
Name Address					
Name Address					
Name Address					

COST OF CONSTRUCTION WORK ONLY

\$ _____

*The Dollar Volume shown in this column shall be the Actual Price Agreed Upon by the Prime Contractor and the DBE subcontractor, and these prices will be used to determine the percentage of the DBE participation in the contract.

** Dollar Volume of DBE Subcontractor \$ _____

Percentage of Total Construction Cost _____ %

(Including Right of Way Acquisition Services)

** - Must have entry even if figure to be entered is zero.

** - *If firm is a Material Supplier Only, show Dollar Volume as 60% of Agreed Upon Amount from Letter of Intent.*
If firm is a Manufacturer, show Dollar Volume as 100% of Agreed Upon Amount from Letter of Intent.

This form must be completed in order for the Bid to be considered responsive and be publicly read.
Bidders with no DBE participation must so indicate this on the form by entering the word or number *zero*.

EXECUTION OF BID
NON-COLLUSION AFFIDAVIT, DEBARMENT CERTIFICATION AND GIFT BAN CERTIFICATION

CORPORATION

The person executing the bid, on behalf of the Bidder, being duly sworn, solemnly swears (or affirms) that neither he, nor any official, agent or employee of the bidder has entered into any agreement, participated in any collusion, or otherwise taken any action which is in restraint of free competitive bidding in connection with any bid or contract, that the bidder has not been convicted of violating *N.C.G.S. § 133-24* within the last three years, and that the Bidder intends to do the work with its own bonafide employees or subcontractors and is not bidding for the benefit of another contractor.

In addition, execution of this bid in the proper manner also constitutes the Bidder's certification of status under penalty of perjury under the laws of the United States in accordance with the Debarment Certification attached, provided that the Debarment Certification also includes any required statements concerning exceptions that are applicable.

N.C.G.S. § 133-32 and Executive Order 24 prohibit the offer to, or acceptance by, any State Employee of any gift from anyone with a contract with the State, or from any person seeking to do business with the State. By execution of any response in this procurement, you attest, for your entire organization and its employees or agents, that you are not aware that any such gift has been offered, accepted, or promised by any employees of your organization.

SIGNATURE OF CONTRACTOR

Full name of Corporation

Address as prequalified

Attest _____

Secretary / Assistant Secretary
Select appropriate title

By _____

President / Vice President / Assistant Vice President
Select appropriate title

Print or type Signer's name

Print or type Signer's name

CORPORATE SEAL

AFFIDAVIT MUST BE NOTARIZED

Subscribed and sworn to before me this the
_____ day of _____, 20____

Signature of Notary Public

Of _____ County

State of _____

My Commission Expires _____

NOTARY SEAL

EXECUTION OF BID
NON-COLLUSION AFFIDAVIT, DEBARMENT CERTIFICATION AND GIFT BAN CERTIFICATION
PARTNERSHIP

The person executing the bid, on behalf of the Bidder, being duly sworn, solemnly swears (or affirms) that neither he, nor any official, agent or employee of the bidder has entered into any agreement, participated in any collusion, or otherwise taken any action which is in restraint of free competitive bidding in connection with any bid or contract, that the bidder has not been convicted of violating *N.C.G.S. § 133-24* within the last three years, and that the Bidder intends to do the work with its own bonafide employees or subcontractors and is not bidding for the benefit of another contractor.

In addition, execution of this bid in the proper manner also constitutes the Bidder's certification of status under penalty of perjury under the laws of the United States in accordance with the Debarment Certification attached, provided that the Debarment Certification also includes any required statements concerning exceptions that are applicable.

N.C.G.S. § 133-32 and Executive Order 24 prohibit the offer to, or acceptance by, any State Employee of any gift from anyone with a contract with the State, or from any person seeking to do business with the State. By execution of any response in this procurement, you attest, for your entire organization and its employees or agents, that you are not aware that any such gift has been offered, accepted, or promised by any employees of your organization.

SIGNATURE OF CONTRACTOR

Full Name of Partnership

Address as Prequalified

By

Signature of Witness

Signature of Partner

Print or type Signer's name

Print or type Signer's name

AFFIDAVIT MUST BE NOTARIZED

Subscribed and sworn to before me this the
day of _____ 20____.

Signature of Notary Public

of _____ County

State of _____

My Commission Expires: _____

NOTARY SEAL

EXECUTION OF BID
NON-COLLUSION AFFIDAVIT, DEBARMENT CERTIFICATION AND GIFT BAN CERTIFICATION
LIMITED LIABILITY COMPANY

The person executing the bid, on behalf of the Bidder, being duly sworn, solemnly swears (or affirms) that neither he, nor any official, agent or employee of the bidder has entered into any agreement, participated in any collusion, or otherwise taken any action which is in restraint of free competitive bidding in connection with any bid or contract, that the bidder has not been convicted of violating *N.C.G.S. § 133-24* within the last three years, and that the Bidder intends to do the work with its own bonafide employees or subcontractors and is not bidding for the benefit of another contractor.

In addition, execution of this bid in the proper manner also constitutes the Bidder's certification of status under penalty of perjury under the laws of the United States in accordance with the Debarment Certification attached, provided that the Debarment Certification also includes any required statements concerning exceptions that are applicable.

N.C.G.S. § 133-32 and Executive Order 24 prohibit the offer to, or acceptance by, any State Employee of any gift from anyone with a contract with the State, or from any person seeking to do business with the State. By execution of any response in this procurement, you attest, for your entire organization and its employees or agents, that you are not aware that any such gift has been offered, accepted, or promised by any employees of your organization.

SIGNATURE OF CONTRACTOR

Full Name of Firm

Address as Prequalified

Signature of Witness

Signature of Member / Manager / Authorized Agent
Select appropriate title

Print or type Signer's name

Print or type Signer's Name

AFFIDAVIT MUST BE NOTARIZED

Subscribed and sworn to before me this the

NOTARY SEAL

_____ day of _____ 20__.

Signature of Notary Public

of _____ County

State of _____

My Commission Expires: _____

EXECUTION OF BID
NON-COLLUSION AFFIDAVIT, DEBARMENT CERTIFICATION AND GIFT BAN CERTIFICATION
JOINT VENTURE (2) or (3)

The person executing the bid, on behalf of the Bidder, being duly sworn, solemnly swears (or affirms) that neither he, nor any official, agent or employee of the bidder has entered into any agreement, participated in any collusion, or otherwise taken any action which is in restraint of free competitive bidding in connection with any bid or contract, that the bidder has not been convicted of violating N.C.G.S. § 133-24 within the last three years, and that the Bidder intends to do the work with its own bonafide employees or subcontractors and is not bidding for the benefit of another contractor.

In addition, execution of this bid in the proper manner also constitutes the Bidder's certification of status under penalty of perjury under the laws of the United States in accordance with the Debarment Certification attached, provided that the Debarment Certification also includes any required statements concerning exceptions that are applicable.

N.C.G.S. § 133-32 and Executive Order 24 prohibit the offer to, or acceptance by, any State Employee of any gift from anyone with a contract with the State, or from any person seeking to do business with the State. By execution of any response in this procurement, you attest, for your entire organization and its employees or agents, that you are not aware that any such gift has been offered, accepted, or promised by any employees of your organization.

SIGNATURE OF CONTRACTORS

Instructions: **2 Joint Venturers** Fill in lines (1), (2) and (3) and execute. **3 Joint Venturers** Fill in lines (1), (2), (3) and (4) and execute. On Line (1), fill in the name of the Joint Venture Company. On Line (2), fill in the name of one of the joint venturers and execute below in the appropriate manner. On Line (3), print or type the name of the other joint venturer and execute below in the appropriate manner. On Line (4), fill in the name of the third joint venturer, if applicable and execute below in the appropriate manner.

(1) _____
Name of Joint Venture

(2) _____
Name of Contractor

Address as prequalified

Signature of Witness or Attest By Signature of Contractor

Print or type Signer's name Print or type Signer's name

If Corporation, affix Corporate Seal and

(3) _____
Name of Contractor

Address as prequalified

Signature of Witness or Attest By Signature of Contractor

Print or type Signer's name Print or type Signer's name

If Corporation, affix Corporate Seal and

(4) _____
Name of Contractor (for 3 Joint Venture only)

Address as prequalified

Signature of Witness or Attest By Signature of Contractor

Print or type Signer's name Print or type Signer's name

If Corporation, affix Corporate Seal

NOTARY SEAL

Affidavit must be notarized for Line (2)

Subscribed and sworn to before me this

_____ day of _____ 20____

Signature of Notary Public

of _____ County

State of _____

My Commission Expires: _____

NOTARY SEAL

Affidavit must be notarized for Line (3)

Subscribed and sworn to before me this

_____ day of _____ 20____

Signature of Notary Public

of _____ County

State of _____

My Commission Expires: _____

NOTARY SEAL

Affidavit must be notarized for Line (4)

Subscribed and sworn to before me this

_____ day of _____ 20____

Signature of Notary Public

of _____ County

State of _____

My Commission Expires: _____

EXECUTION OF BID
NON-COLLUSION AFFIDAVIT, DEBARMENT CERTIFICATION AND GIFT BAN CERTIFICATION

INDIVIDUAL DOING BUSINESS UNDER A FIRM NAME

The person executing the bid, on behalf of the Bidder, being duly sworn, solemnly swears (or affirms) that neither he, nor any official, agent or employee of the bidder has entered into any agreement, participated in any collusion, or otherwise taken any action which is in restraint of free competitive bidding in connection with any bid or contract, that the bidder has not been convicted of violating *N.C.G.S. § 133-24* within the last three years, and that the Bidder intends to do the work with its own bonafide employees or subcontractors and is not bidding for the benefit of another contractor.

In addition, execution of this bid in the proper manner also constitutes the Bidder's certification of status under penalty of perjury under the laws of the United States in accordance with the Debarment Certification attached, provided that the Debarment Certification also includes any required statements concerning exceptions that are applicable.

N.C.G.S. § 133-32 and Executive Order 24 prohibit the offer to, or acceptance by, any State Employee of any gift from anyone with a contract with the State, or from any person seeking to do business with the State. By execution of any response in this procurement, you attest, for your entire organization and its employees or agents, that you are not aware that any such gift has been offered, accepted, or promised by any employees of your organization.

SIGNATURE OF CONTRACTOR

Name of Contractor

Individual name

Trading and doing business as

Full name of Firm

Address as Prequalified

Signature of Witness

Signature of Contractor, Individually

Print or type Signer's name

Print or type Signer's name

AFFIDAVIT MUST BE NOTARIZED

Subscribed and sworn to before me this the
 ____ day of _____ 20__.

Signature of Notary Public
 of _____ County
 State of _____
 My Commission Expires: _____

NOTARY SEAL

EXECUTION OF BID
NON-COLLUSION AFFIDAVIT, DEBARMENT CERTIFICATION AND GIFT BAN CERTIFICATION

INDIVIDUAL DOING BUSINESS IN HIS OWN NAME

The person executing the bid, on behalf of the Bidder, being duly sworn, solemnly swears (or affirms) that neither he, nor any official, agent or employee of the bidder has entered into any agreement, participated in any collusion, or otherwise taken any action which is in restraint of free competitive bidding in connection with any bid or contract, that the bidder has not been convicted of violating *N.C.G.S. § 133-24* within the last three years, and that the Bidder intends to do the work with its own bonafide employees or subcontractors and is not bidding for the benefit of another contractor.

In addition, execution of this bid in the proper manner also constitutes the Bidder's certification of status under penalty of perjury under the laws of the United States in accordance with the Debarment Certification attached, provided that the Debarment Certification also includes any required statements concerning exceptions that are applicable.

N.C.G.S. § 133-32 and Executive Order 24 prohibit the offer to, or acceptance by, any State Employee of any gift from anyone with a contract with the State, or from any person seeking to do business with the State. By execution of any response in this procurement, you attest, for your entire organization and its employees or agents, that you are not aware that any such gift has been offered, accepted, or promised by any employees of your organization.

SIGNATURE OF CONTRACTOR

Name of Contractor _____

Print or type Individual name

 Address as Prequalified

 Signature of Contractor, Individually

 Print or type Signer's Name

 Signature of Witness

 Print or type Signer's name

AFFIDAVIT MUST BE NOTARIZED

Subscribed and sworn to before me this the
 ____ day of _____ 20__.

 Signature of Notary Public
 of _____ County
 State of _____
 My Commission Expires: _____

NOTARY SEAL

DEBARMENT CERTIFICATION

Conditions for certification:

1. The prequalified bidder shall provide immediate written notice to the Department if at any time the bidder learns that his certification was erroneous when he submitted his debarment certification or explanation that is file with the Department, or has become erroneous because of changed circumstances.
2. The terms *covered transaction*, *debarred*, *suspended*, *ineligible*, *lower tier covered transaction*, *participant*, *person*, *primary covered transaction*, *principal*, *proposal*, and *voluntarily excluded*, as used in this provision, have the meanings set out in the Definitions and Coverage sections of the rules implementing Executive Order 12549. A copy of the Federal Rules requiring this certification and detailing the definitions and coverages may be obtained from the Contract Officer of the Department.
3. The prequalified bidder agrees by submitting this form, that he will not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in NCDOT contracts, unless authorized by the Department.
4. For Federal Aid projects, the prequalified bidder further agrees that by submitting this form he will include the Federal-Aid Provision titled *Required Contract Provisions Federal-Aid Construction Contract (Form FHWA PR 1273)* provided by the Department, without subsequent modification, in all lower tier covered transactions.
5. The prequalified bidder may rely upon a certification of a participant in a lower tier covered transaction that he is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless he knows that the certification is erroneous. The bidder may decide the method and frequency by which he will determine the eligibility of his subcontractors.
6. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this provision. The knowledge and information of a participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.
7. Except as authorized in paragraph 6 herein, the Department may terminate any contract if the bidder knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available by the Federal Government.

DEBARMENT CERTIFICATION

The prequalified bidder certifies to the best of his knowledge and belief, that he and his principals:

- a. Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency;
- b. Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records; making false statements; or receiving stolen property;
- c. Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph b. of this certification; and
- d. Have not within a three-year period preceding this proposal had one or more public transactions (Federal, State or local) terminated for cause or default.
- e. Will submit a revised Debarment Certification immediately if his status changes and will show in his bid proposal an explanation for the change in status.

If the prequalified bidder cannot certify that he is not debarred, he shall provide an explanation with this submittal. An explanation will not necessarily result in denial of participation in a contract.

Failure to submit a non-collusion affidavit and debarment certification will result in the prequalified bidder's bid being considered non-responsive.

☐

Check here if an explanation is attached to this certification.

Contract No.: **C203862**

County: **Forsyth County**

ACCEPTED BY THE
DEPARTMENT OF TRANSPORTATION

Contract Officer

Date

Execution of Contract and Bonds
Approved as to Form:

Attorney General